Initial Environmental Examination

Document stage: Draft
Project number: 49329-006
January 2019

BAN: Second City Region Development Project – Dhaka Region Roads (Savar Upazila) PART A

Package No: CRDP-II/LGED/DHAKA/SAVAR/NCB/2018/W-02

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

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CURRENCY EQUIVALENTS

(as of 1 December 2018)

Currency Unit	=	taka (Tk)
Tk1.00	=	$0.0117
$1.00	=	Tk85.15

ABBREVIATION

ADB	-	Asian Development Bank
BOQ	-	Bill of Quantities
CRDP	-	City Region Development Project
DOE	-	Department of Environment
EARF	-	Environmental Assessment and Review Framework
ECC	-	Environmental Clearance Certificate
ECR	-	Environmental Conservation Rules
EIA	-	environmental impact assessment
EMP	-	environmental management plan
GRC	-	Grievance Redress Committee
GRM	-	grievance redress mechanism
IEE	-	initial environmental examination
LGED	-	Local Government Engineering Department
PDSC	-	preparation, design and supervision consultant
NGO	-	nongovernment organization
NOC	-	no objection certificate
O&M	-	operations and maintenance
PIU	-	Project Implementation Unit
PMCU	-	Project Management and Coordination Unit
REA	-	rapid environmental assessment
ROW	-	right -of -way
SPS	-	safeguard policy statement
WBM	-	water bound mecadam

NOTE

In this report, "$" refers to United States dollar.

This initial environmental examination report is a document of the borrower. I. INTRODUCTION 1

Development Bank does not intend to make any judgments as to the legal or other status of any territory or area.

APPENDIXES

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Executive Summary

The Second City Region Development Project (the project) will support development in the city regions of Dhaka and Khulna by building upon infrastructure and capacity building initiatives implemented during the first City Region Development Project (CRDP) funded by the Asian Development Bank (ADB). The project will finance additional crucial infrastructure in urban and peri-urban areas needed to stimulate growth and improve livability Dhaka and Khulna, two densely populated rapidly growing city regions of Bangladesh. The project will also continue strengthening capacity for project development, sustainable service delivery, and community awareness. The project will be implemented over a five-year period.

Subproject Scope. This initial environmental examination (IEE) report has been prepared for one of the subprojects of the project that is covered by Package Number CRDP-II/LGED/Dhaka/Savar Upazila/NCB/2018/W-02 This package includes combination of construction and rehabilitation of roadway and/or drain for the following road alignments or components in the Savar Upazila in Dhaka region: (i) Road 1- ID 2004: Improvement of Nayarhat GC to Savar GC Road (8.20 km); (ii) Road 2- ID 3024: Improvement of Dhaka - Aricha RHD at Dairy Farm Gate - Pathalia UP Office Kashipur and Monohor Road, (4.567 km); (iii) Road 3- ID 3017: Improvement of Prantik bazar BLRI (RHD) – Ashulia UP Road, (5.51 km); (iv) Road 4- ID 3010: Improvement of Ashulia UP-Katgora Bazar via Boro Rangamatia Road, (4.761 km) and (v) Road 5- 4198: Improvement of Katgora Bazar - Chitrashail Road via Kandail Road, (2.787 km). These roads are bounded by the Dhaka- Aricha Highway and River Bangshi on the west and by the Dhaka-Baipail via Ashulia Highway and River Turag on the eastside.

Categorization. ADB requires the consideration of environmental issues in all aspects of ADB's operations, and the requirements for environmental assessment are described in ADB Safeguard Policy Statement (SPS), 2009. Using ADB Rapid Environmental Assessment Checklist (**Appendix 1**), the subproject is classified as Environmental Category B per ADB SPS, 2009 as no diverse, irreversible or unprecedented significant impacts are envisaged. ADB's Environment and Safeguards Division confirmed this categorization on 27 August 2018. Accordingly, this IEE has been undertaken, which assesses in more detail the likely environmental impacts of the subproject and provides an environmental management plan (EMP) specifying the required mitigation and monitoring measures to ensure that these impacts are managed to acceptable levels. This IEE also emphasizes the need to incorporate pollution prevention and control technologies during the design, construction, and operation of the subproject and adhere to internationally recognized standards such as the World Bank Group's Environment, Health and Safety Guidelines.

Environmental Management. The potential impacts and mitigation measures have been identified through review of the subproject designs, discussion with the designers, and stakeholder consultation. An EMP is included as part of this IEE, which discusses the following:

(i) Mitigation measures for environmental impacts during implementation; and
(ii) An environmental monitoring program, and the responsible entities for mitigating, monitoring, and reporting .

The total length of the 5 (five) subproject roads is 25.825 km and of drains is 2.525 km. The subproject road alignments pass more or less through built-up areas of small and medium enterprises, markets or bazars, open fields, sporadically scattered human settlements and various ponds, ditches and low-lying areas on both sides; and traverse along and/or cross some canals. These subproject roads are expected to establish more efficient connectivity within the Dhaka city

region.

The subproject road alignments are not within or located near any ecologically critical areas, and further development interventions to these roads will not have any significant impact on the physical, biological and social environment. This IEE has been conducted to evaluate any potential environmental impacts of the subproject and propose measures to mitigate these impacts, including monitoring.

The subproject does not involve any special considerations regarding location since the roads occupy existing rights-of-way (ROWs). There will be no road widening beyond these ROWs, and therefore no land acquisition is required. No private property will be affected and the methods to be used for site preparation, construction and commissioning, as well as associated arrangements to ensure sound environmental management and safety at all times, are to be defined by the Contractor in a Site-specific Environmental Management Plan (SEMP) based on the EMP of this IEE. Contractor will submit its SEMP for approval to the project implementation unit (PIU). This will cover the following areas of impact which are potentially significant but can be mitigated by the adoption of good practice: (i) impedance of traffic, (ii) noise pollution and vibration, (iii) waste generation (iv) release of silt from excavations, (v) water pollution, (vi) air and dust pollution, (vii) community health and safety risks, and (viii) occupational health and safety.

Grievance Redress Mechanism. The project will adopt the grievance redress mechanism (GRM) outline of the first CRDP. The GRM shall be set up to register grievances of the people regarding technical, social and environmental aspects. The process will be designed to be transparent, gender responsive, culturally appropriate and commensurate to the risks and adverse impacts of the project, as well as readily accessible to all segments of the affected people. The project GRM will not supersede any legal government grievance procedures. Affected people are to be informed about the mechanism through media and public outlets. This participatory process shall ensure that all views of the people are adequately reviewed and suitably incorporated in the design and implementation process.

Implementation Arrangement. The executing and implementing agency is the Local Government and Engineering Department (LGED) of the Government of Bangladesh. The LGED will establish a Project Management and Coordination Unit (PMCU) comprising officials including an Environmental Safeguard Officer who is a permanent employee of LGED. The PMCU will be strengthened with external experts or consultants in environmental and social safeguards, including experts on finance, procurement, technical areas, and contract management. PIUs will be established at the Upazila or local level where the project subprojects are located. In this subproject, Savar Upazila will serve as the PIU. The PMCU and Savar PIU will have responsibility for overseeing subproject management, including overseeing EMP implementation.

For civil works, the Contractor will be required to (i) obtain all statutory clearances prior to commencement of civil works; (ii) establish an operational system for managing environmental impacts (iii) prepare a SEMP based on the EMP of this IEE, and submit to PIU for approval; (iv) carry out all of the monitoring and mitigation measures set forth in the approved SEMP; and (v) implement any corrective or preventative actions set out in safeguards monitoring reports that the PMCU will prepare from time to time to monitor implementation of this IEE, EMP, and SEMP. The Contractor shall allocate a budget for compliance with these EMP measures, requirements and actions.

Monitoring and Reporting. The EMP compliance monitoring will be undertaken by the PMCU and PIU, with support of external experts or consultants. Contractors will submit monthly

reports to PIU, while PIU submits quarterly reports to the PMCU. Consistent with reporting requirements set out in the Project Administration Manual, PMCU will prepare and submit reports to ADB on a semi-annual basis. The submission of semi-annual environmental monitoring reports to ADB will continue until ADB issues a Project Completion Report for the project.

Conclusion. The overall finding of this IEE is that the subproject will result in significant environmental benefits because the current conditions of roads will be improved and will be much better for local residents. Severe traffic congestion will be lessened and thereby reducing vehicle noise (honking of horns) and air pollution (idling vehicles) in the subproject areas. Ultimately, the subproject will result in significant economic benefit because the road network could cater to more inclusive and environmentally sustainable economic growth in the Dhaka city region. The subproject will not have diverse, irreversible or unprecedented adverse environmental impacts and the potential significant impacts identified are associated with the construction phase, which can be managed through effective implementation of the EMP. No further environmental assessment is therefore required and the classification of Category B per ADB SPS, 2009 is confirmed.

This IEE has been prepared based on preliminary designs of the subproject. The PMCU shall update this draft IEE based on final detailed design and submit to ADB for review and disclosure. The approved updated IEE shall be treated as the final IEE and shall be attached in the bid and contract documents. No works can commence until (i) the final IEE approved by ADB is provided to the Contractor; and (ii) the SEMP prepared by the Contractor is approved by Savar PIU. If circumstances would require, the IEE will be further updated for ADB's review during the implementation period. In the event of unanticipated impact or any design change and/or non-compliance during subproject implementation period, the IEE shall be updated to include (i) assessment of the unanticipated impact and corresponding mitigation measures; or (ii) information on the design change and assessment of associated environmental impacts, if any; and/or (iii) corrective actions, associated cost and schedule; respectively.

I. INTRODUCTION

A. Background

1. The Second City Region Development Project (the project) will support development in the city regions of Dhaka and Khulna by building upon infrastructure and capacity building initiatives implemented during the first City Region Development Project(CRDP)[1] funded by the Asian Development Bank (ADB). The project will finance additional crucial infrastructure in urban and peri-urban areas needed to stimulate growth and improve livability in Dhaka and Khulna, two densely populated rapidly growing city regions of Bangladesh. The project will also continue strengthening capacity for project development, sustainable service delivery, and community awareness. The project will be implemented over a five-year period. Specifically, the project will support the (i) construction, upgrade and rehabilitation of selected Dhaka city region roads, bridges and culverts, including drainage; (ii) construction, upgrade and rehabilitation of drainage in Khulna city region; and (iii) development of a Khulna city corporation comprehensive solid waste management plan and small works.

2. The project will be implemented over a five-year period. The indicative list of subprojects is summarized in the environmental assessment and review framework drafted for the project. The subprojects are largely built around 'integrated area planning' which seeks to enhance economic activity in the city regions and provides opportunities for investment, including (i) transport infrastructure upgrading; and (ii) solid waste management.

3. The project has been classified as environmental category B per ADB Safeguard Policy Statement (SPS), 2009.[2] Project preparation was supported by (i) A project preparatory technical assistance (TA);[3] and (ii) a project design advance loan of $5 million to finance preparation, design and supervision consultancy services. Part of the preparatory work was the preparation of the environmental assessment and review framework (EARF) and initial environmental examination (IEE) reports in accordance with the requirements of ADB SPS, 2009. Further support was provided by ADB in preparing the EARF and IEE reports for sample subprojects to meet the requirements for projects proposed under a sector loan modality.

This IEE report has been prepared for the subproject covered by Package Number CRDP-II/LGED/Dhaka/Savar UZ/NCB/2018/W-02, which includes combination of construction and rehabilitation of roadway and/or drain for the following road alignments or components in the Savar Upazila of Dhaka city region: (i) Road 1- ID 2004: Improvement of Nayarhat GC to Savar GC Road (8.20 km); (ii) Road 2- ID 3024: Improvement of Dhaka - Aricha RHD at Dairy Farm Gate - Pathalia

[1] ADB. 2010. *People's Republic of Bangladesh: City Region Development Project*. Manila.

[2] ADB's Environment and Safeguards Division confirmed the Category B classification of the project on 27 August 2018. A project's category is determined by the category of its most environmentally sensitive component, including direct, indirect, cumulative, and induced impacts in the project's area of influence. Each proposed project is scrutinized as to its type, location, scale, and sensitivity and the magnitude of its potential environmental impacts. Projects are assigned to one of the following four categories: (i) **Category A**. A proposed project is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment is required. (ii) **Category B**. A proposed project is classified as category B if its potential adverse environmental impacts are less adverse than those of category A projects. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. An initial environmental examination is required. (iii) **Category C**. A proposed project is classified as category C if it is likely to have minimal or no adverse environmental impacts. No environmental assessment is required although environmental implications need to be reviewed. (iv) **Category FI**. A proposed project is classified as category FI if it involves investment of ADB funds to or through a financial intermediary. ADB Environment and Safeguards Division confirmed this categorization on 27 August 2018.

[3] ADB. *People's Republic of Bangladesh: City Region Development Project II*.

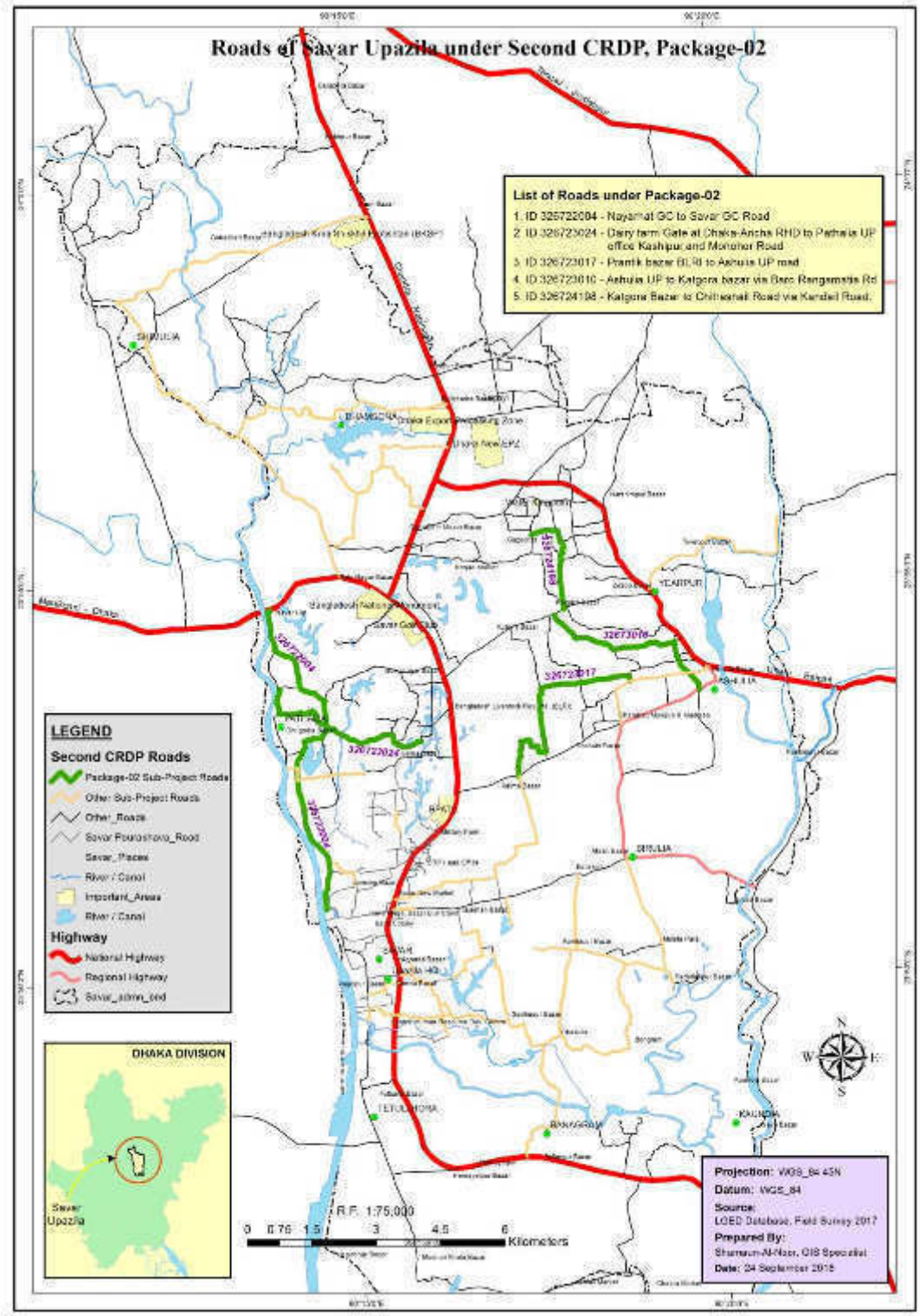
UP Office Kashipur and Monohor Road, (4.567 km); (iii) Road 3- ID 3017: Improvement of Prantik bazar BLRI (RHD) – Ashulia UP Road, (5.51 km); (iv) Road 4- ID 3010: Improvement of Ashulia UP-Katgora Bazar via Boro Rangamatia Road, (4.761 km) and (v) Road 5- 4198: Improvement of Katgora Bazar - Chitrashail Road via Kandail Road, (2.787 km). These roads are bounded by the Dhaka- Aricha Highway and River Bangshi on the west and by the Dhaka-Baipail via Ashulia Highway and River Turag on the eastside.

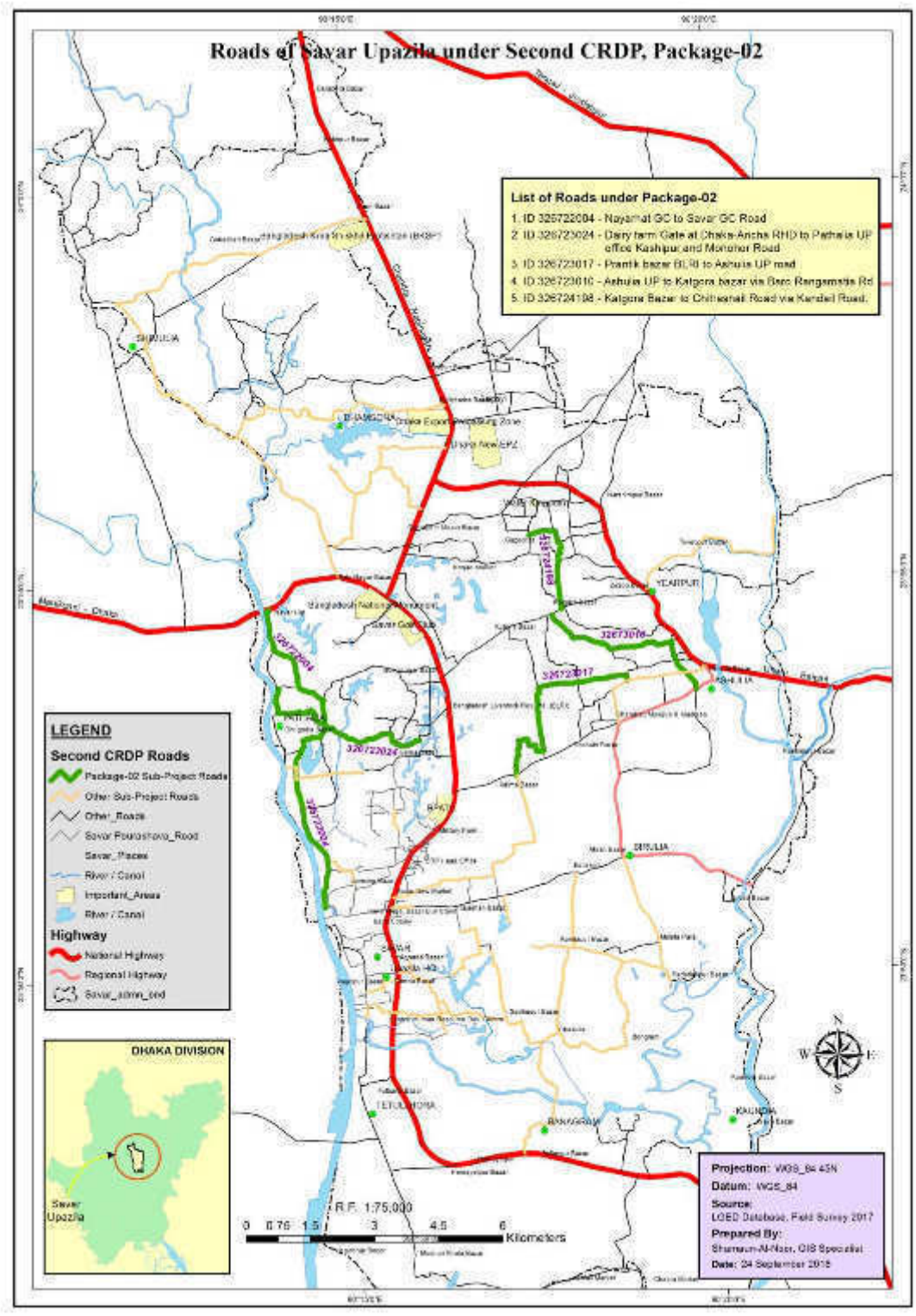
B. Purpose of the Initial Environmental Examination

4. The purpose of this IEE is to describe the assessment of environmental impacts due to the proposed subproject based on the detailed design produced under the project, and to specify measures to address impacts. This IEE is based on engineering design information,a field visit, and secondary data to characterize the environment. It contains the results of interviews and consultations with stakeholders. This IEE includes an environmental management plan (EMP) outlining mitigation measures and monitoring requirements, and environmental specifications to be appended to contract documents.

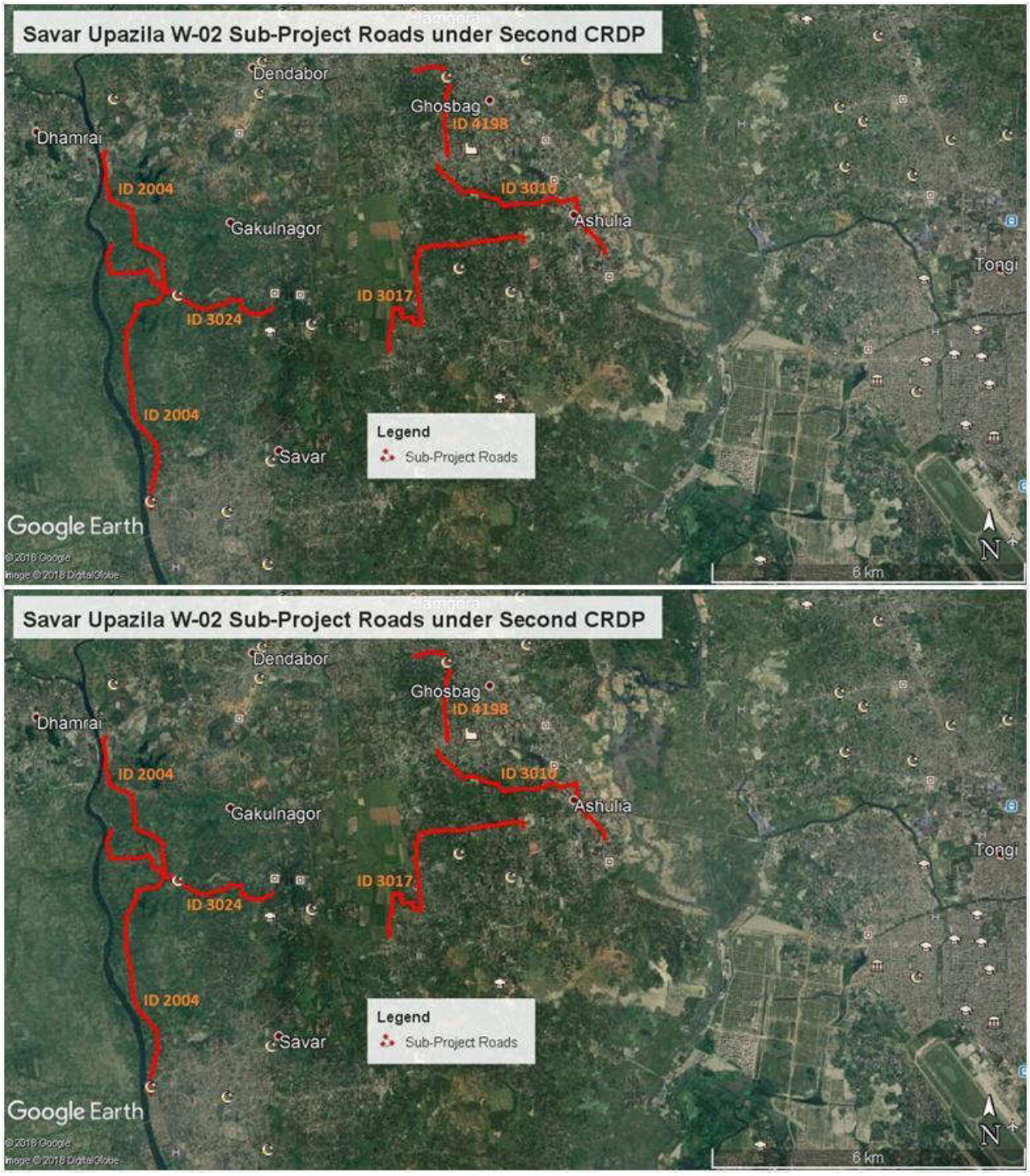
5. Screening using ADB's Rapid Environmental Assessment Checklist for Road (**Appendix 1**) was initially conducted, and results of the rapid assessment show that the project is unlikely to cause any diverse, irreversible or unprecedented significant impacts, and therefore classified under Category B per ADB SPS, 2009. ADB's Environment and Safeguards Division confirmed this categorization on 27 August 2018. Thus, this IEE has been prepared in accordance with ADB SPS, 2009 requirements for environment category B projects. The location of the subproject is shown in **Figure 1**.

Figure 1: Location Map of Subproject (Green Lines)




Roads of Savar Upazila under Second CRDP, Package-02
List of Roads under Package-02
1. ID 326722004 - Nayarhat GC to Savar GC Road
2. ID 326723024 - Dairy farm Gate at Chaka-Ancha RHD to Pathaila UP office Kashipur and Motohor Road
3. ID 326723017 - Prantik bazar BLRI to Ashulia UP road
4. ID 326723010 - Ashulia UP to Kalgora bazar via Bara Rangamatia Rd
5. ID 326724108 - Kalgora Bazar to Chitrasali Road via Kandail Road.
LEGEND
Second CRDP Roads
Package-02 Sub-Project Roads
Other Sub-Project Roads
Other_Roads
Savar Paurashava_Road
Savar_Places
River / Canal
Important_Areas
River / Canal
Highway
National Highway
Regional Highway
Savar_admn_bnd
DHAKA DIVISION
Savar Upazila
R.F. 1:75,000
0 0.75 1.5 3 4.5 6
Kilometers
Projection: WGS_84 45N
Datum: WGS_84
Source:
LOED Database, Field Survey 2017
Prepared By:
Shamsun-Al-Noor, GIS Specialist
Date: 24 September 2018

Subproject Location Map on Google Earth (Red Lines for Roads & Blue Lines for Drains



C. Extent of the Study

6. This IEE has been carried out based on most up-to-date subproject details and concept designs provided by the design team during the preparation of this report. Minor changes may occur in the structural component of the subprojects at the detailed designing stage. The scope of the IEE study has been confined to project related activities associated with design, construction (e.g. site clearing, earth borrowing, quarrying, material transportation, paving, camping) and operation stages.

D. Methodology

7. This IEE has been carried out using reconnaissance survey, field visits, consultation with stakeholders and others, Non-Government Organizations (NGOs), review of existing data, assessment to identify adverse impacts and preparation of EMP and monitoring program at all stages of subproject implementation. Physical assessments were made for entire corridors with respect to terrestrial and aquatic resources, including physical cultural resources and other natural and man-made structures.

II. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

8. ADB will not finance any project if it does not comply with ADB SPS, 2009 nor will it finance any project if it does not comply with its host country's environmental and social safeguard laws. Where discrepancy between ADB and Government policies exist, the stricter policy will prevail. Moreover, ADB SPS, 2009 applies to all ADB-financed and/or ADB-administered sovereign projects, and their components regardless of the source of financing, including investment projects funded by a loan; and/or a grant; and/or other means.

1. ADB Safeguard Policy Statement

9. ADB SPS, 2009 requires borrowers to meet a set of requirements (Safeguards Requirements 1) when delivering environmental safeguards for projects supported by ADB. The objectives are to ensure the environmental soundness and sustainability of projects, and to support the integration of environmental considerations into the project decision-making process. Hence, the project is required to comply with these requirements. Summary of the step by step process is discussed below in this section. Detailed discussions are provided in the ADB SPS, 2009.[4]

10. **Screening and Categorization.** Subprojects are to be screened for their expected environmental impacts and are assigned to a specific category (footnote 3). Categorization is to be based on the most environmental sensitive component. However, for subproject(s) with component(s) that can trigger Category A or with potentially significant adverse impacts that are diverse, irreversible, or unprecedented, project management and coordination unit (PMCU) shall examine alternatives to the subproject's location, design, technology, and components that would avoid, and, if avoidance is not possible, minimize adverse environmental impacts and risks, and to meet Category B categorization. The rationale for selecting the subproject location, design, technology, and components will be properly documented, including, cost-benefit analysis, taking environmental costs and benefits of the various alternatives considered into account. The "no action" alternative will be also considered. In general, criteria that can trigger subproject's 'Category A' are discussed in Section II of the EARF.

11. **Environmental Assessment.** Environmental assessment shall include description of environmental and social baseline to provide an understanding of current conditions forming the benchmark against which subproject impacts are assessed. Environmental impacts and risks will be analyzed for all relevant stages of the project cycle, including design and planning stage, construction, operations, decommissioning, and post-closure activities such as rehabilitation or restoration. This IEE may be used as model document for other future roads subprojects.

12. **Environmental Planning and Management.** The PMCU shall prepare environmental management plan (EMP) to be included in the IEE report. The EMP shall describe and address the potential impacts and risks identified by the environmental assessment. The level of detail and complexity of the EMP and the priority of the identified measures and actions will be commensurate with the subproject's impact and risks. The EMP shall include the proposed mitigation measures, environmental monitoring and reporting requirements, emergency response procedures, related institutional or organizational arrangements, capacity development and training measures, implementation schedule, cost estimates, and performance indicators.

[4] ADB. 2009. *Safeguard Policy Statement*. Manila.

13. **Public Disclosure**. The Local Government Engineering Department (LGED), through PMCU, shall submit to ADB for disclosure on ADB website so affected people, other stakeholders, and the public can provide meaningful inputs into the subproject design and implementation: [5]

(i) final IEE upon receipt;
(ii) a new or updated IEE and corrective action plan prepared during subproject implementation, if any; and
(iii) environmental monitoring reports submitted during subproject implementation upon receipt.

14. **Consultation and Participation.** The PMCU and Savar PIU shall carry out meaningful consultation[6] with affected people and other concerned stakeholders, including civil society, and facilitate their informed participation. The consultation process and its results are to be documented and reflected in the environmental assessment report.

15. **Grievance Redress Mechanism.** The LGED, through PMCU, shall establish a mechanism to receive and facilitate resolution of affected peoples' concerns, complaints, and grievances about the subproject's environmental performance. The grievance mechanism shall be scaled to the risks and adverse impacts of the subproject. As of the ADB loan processing for the project, a grievance redress mechanism (GRM) has been established and discussed in detail in Section VI below.

16. **Monitoring and Reporting.** The PMCU shall monitor, measure and document the progress of implementation of the EMP. If necessary, PMCU will identify the necessary corrective actions, and reflect them in a corrective action plan. PMCU will prepare and submit to ADB semi-annual environmental monitoring reports that describe progress with implementation of the EMP and compliance issues and corrective actions, if any. For subprojects likely to have significant adverse environmental impacts during operation, reporting will continue until ADB issues a project completion report.

17. **Unanticipated Environmental Impacts.** Where unanticipated environmental impacts become apparent during subproject implementation, PMCU shall update the environmental assessment and EMP or prepare a new environmental assessment and EMP to assess the potential impacts, evaluate the alternatives, and outline mitigation measures and resources to address those impacts.

18. **Pollution Prevention and Control Technologies**. During the design, construction, and operation of the subproject the PMCU and Savar PIU shall apply pollution prevention and control

[5] Per ADB SPS, 2009, prior to disclosure on ADB website, ADB reviews the "borrower's/client's social and environmental assessment and plans to ensure that safeguard measures are in place to avoid, wherever possible, and minimize, mitigate, and compensate for adverse social and environmental impacts in compliance with ADB's safeguard policy principles and Safeguard Requirements 1-4."

[6] Per ADB SPS, 2009, meaningful consultation means a process that (i) begins early in the project preparation stage and is carried out on an ongoing basis throughout the project cycle; (ii) provides timely disclosure of relevant and adequate information that is understandable and readily accessible to affected people; (iii) is undertaken in an atmosphere free of intimidation or coercion; (iv) is gender inclusive and responsive, and tailored to the needs of disadvantaged and vulnerable groups; and (v) enables the incorporation of all relevant views of affected people and other stakeholders into decision making, such as project design, mitigation measures, the sharing of development benefits and opportunities, and implementation issues.

technologies and practices consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's Environmental, Health and Safety Guidelines. These standards contain performance levels and measures that are normally acceptable and applicable to subprojects. When the Government regulations differ from these levels and measures, the subproject shall achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific subproject circumstances, LGED through PMCU will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS, 2009.

19. **Occupational Health and Safety.** PMCU[7] shall ensure that workers[8]are provided with a safe and healthy working environment, considering risks inherent to the sector and specific classes of hazards in the subproject work areas, including physical, chemical, biological, and radiological hazards. PMCU shall ensure to take steps to prevent accidents, injury, and disease arising from, associated with, or occurring during the course of work by (i) identifying and minimizing, so far as reasonably practicable, the causes of potential hazards to workers; (ii) providing preventive and protective measures, including modification, substitution, or elimination of hazardous conditions or substances; (iii) providing appropriate equipment to minimize risks and requiring and enforcing its use; (iv) training workers and providing them with appropriate incentives to use and comply with health and safety procedures and protective equipment; (v) documenting and reporting occupational accidents, diseases, and incidents; and (vi) having emergency prevention, preparedness, and response arrangements in place.

20. PMCU shall ensure to apply preventive and protective measures consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's Environmental, Health and Safety Guidelines.[9]

21. **Community Health and Safety.** The PMCU shall ensure to identify and assess the risks to, and potential impacts on, the safety of affected communities during the design, construction, operation, and decommissioning of the subproject, and will establish preventive measures and plans to address them in a manner commensurate with the identified risks and impacts. This includes specific community road safety especially for children and elderly persons.

22. **Physical Cultural Resources**. The PMCU is responsible for siting and designing the subproject to avoid significant damage to physical cultural resources. Such resources likely to be affected by the subproject will be identified, and qualified and experienced experts will assess the subproject's potential impacts on these resources using field-based surveys as an integral part of the environmental assessment process. When the proposed location of a subproject component is in areas where physical cultural resources are expected to be found as determined during the environmental assessment process, chance finds procedures shall be included in the EMP.

23. **Environmental Audit.** When the subproject involves existing activities or facilities, PMCU is responsible to ensure that relevant external experts will perform environmental audits to determine the existence of any areas where the subproject may cause or is causing

[7]In case where responsibility is delegated to subproject contractors during construction phase, project management and coordination unit (PMCU) shall ensure that the responsibilities on occupational health and safety as described herein are included in the contract documents.

[8]Including nonemployee workers engaged by Local Government Engineering Department (LGED) through contractors or other intermediaries to work on project sites or perform work directly related to the project's core functions.

[9]World Bank Group, 2007. *Environmental, Health, and Safety General Guidelines.* Washington, DC.

environmental risks or impacts. If the subproject does not foresee any new major expansion, the audit constitutes the environmental assessment for the subproject.

24. **Bidding and Contract Documents.** IEE, which contain the EMP, shall be included in bidding and contract documents and verified by Savar PIU. The PMCU and Savar PIU shall also ensure that bidding and contract documents include specific provisions requiring contractors to (i) comply with all other conditions required by ADB,[10] and (ii) to submit to Savar PIU, for review and approval, a site-specific environmental management plan (SEMP), including (i) proposed sites/locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes; (ii) specific mitigation measures following the approved EMP; (iii) monitoring program as per EMP; and (iv) budget for SEMP implementation, among others as may be required. No works can commence prior to approval of SEMP. A copy of the EMP and/or approved SEMP will be kept on site during the construction period at all times. Non-compliance with, or any deviation from, the conditions set out in the EMP and/or SEMP constitutes a failure in compliance and shall require corrective actions.

25. **Conditions for Award of Contract and Commencement of Work.** PMCU shall not award any Works contract under the subproject until (i) relevant provisions from the EMP are incorporated into the Works contract; (ii) this IEE is updated to reflect subproject's detailed design and PMCU has obtained ADB's clearance of such updated IEE; and (iii) IEE (i.e., IEE in compliance with Environmental Conservation Rules [ECR], 1997) approved by the Department of Environment (DOE) and other necessary permits from relevant government agencies have been obtained. For "design, build, and operate" type contracts, PMCU shall ensure no works for a subproject which involves environmental impacts shall commence until (i) relevant provisions from the EMP are incorporated into the Works contract; and (ii) this IEE is updated to reflect subproject's detailed design and PMCU has obtained ADB's clearance for such updated IEE.

2. National Environmental Impact Assessment Law

26. **Environmental Conservation Act (ECA), 1995**. Provides for the conservation of environment, improvement of environmental standards and control and mitigation of environmental pollution. In line with these provisions of the Act, the Environmental Conservation Rules, 1997 have been framed. This act provides for (i) remedial measures for injury to ecosystem; (ii) provides for any affected person due to environmental pollution to apply to DOE for remediation of the damage; (iii) discharge of excessive environmental pollutants; (iv) inspection of any activity for testing any equipment or plant for compliance to the environment act, including power to take samples for compliance; (v) power to make rules and standards with reference to environment; and (vi) penalty for non-conformance to environment act under the various sections.

27. **Environmental Conservation Rules, 1997**. The Rules outline the processes and requirements of environmental clearances for specific type of projects indicated therein and stipulates that "no industrial unit or project shall be established or undertaken without obtaining, in the manner prescribed by rules, an Environmental Clearance Certificate (ECC) from the Director General" of the DOE. Schedule 1 of the Rules classifies industrial units and projects into four categories according to their site and impact on the environment, namely (i) green, (ii) orange-A,

[10] Contractors to comply with (i) all applicable labor laws and core labor standards on (a) prohibition of child labor as defined in national legislation for construction and maintenance activities; (b) equal pay for equal work of equal value regardless of gender, ethnicity, or caste; and (c) elimination of forced labor; and with (ii) the requirement to disseminate information on sexually transmitted diseases, including HIV/AIDS, to employees and local communities surrounding the project sites.

(iii) orange–B, and (iv) red. The rules specify the procedures for issuing ECC for the various categories of projects. **Table 1***:* summarizes the requirements for environmental clearance application for each category.

Table 1: Summary Environmental Clearance Application Requirements Per Category[a]

Category	Requirements
Green	(i) Completed Application for Environmental Clearance Certificate (ECC); (ii) Payment of the appropriate fee based on Schedule 3 of Environmental Conservation Rules (ECR), 1997; (iii) General information about the project; (iv) Exact description of the raw materials to be used and the product to be manufactured (where relevant); and (v) No objection certificate from the local authority.
Orange-A	(i) Completed Application for ECC; (ii) Payment of the appropriate fee based on Schedule 3 of ECR, 1997; (iii) General information about the project; (iv) Exact description of the raw materials to be used and the product to be manufactured (where relevant); (v) No objection certificate from the local authority; (vi) Prior issued location clearance certificate (LCC) from Department of Environment (DOE); (vii) Process flow diagram; (viii) Layout plan (showing location of Effluent Treatment Plant (ETP); (ix) Effluent discharge arrangement; and (x) Outlines of the plan for relocation and rehabilitation (if applicable).
Orange-B	(i) Completed Application for ECC; (ii) Payment of the appropriate fee based on Schedule 3 of ECR, 1997; (iii) Report on the feasibility of the project (if still being proposed); (iv) Report on the initial environmental examination (IEE) of the project, including process flow diagram, layout plan (showing ETP), design of ETP of the project (if still being proposed); (v) Report on the environmental management plan (EMP); (vi) No objection certificate from the local authority; (vii) Prior issued LCC from DOE; (viii) Emergency plan relating to adverse environmental impact and plan for mitigation of the effect of pollution; (ix) Outline of the relocation and rehabilitation plan (where applicable); and (x) Other necessary information as may be required.
Red	(i) Completed Application for ECC; (ii) Payment of the appropriate fee based on Schedule 3 of ECR, 1997; (iii) Report on the feasibility of the project (if still being proposed); (iv) Report on the IEE of the project and the terms of reference (TOR) for environmental impact assessment of the project; or environmental impact assessment (EIA) report on the basis of the TOR previously approved by DOE, including process flow diagram, layout plan (showing ETP), design of ETP of the project (if still being proposed); (v) Report on the EMP; (vi) No objection certificate from the local authority; (vii) Prior issued LCC from DOE; (viii) Emergency plan relating to adverse environmental impact and plan for mitigation of the effect of pollution; (ix) Outline of the relocation and rehabilitation plan (where applicable); and (x) Other necessary information as may be required.

DOE = Department of Environment, ECC = Environmental Clearance Certificate, ECR = Environmental Conservation Rules, EIA = environmental impact assessment, EMP = environmental management plan, ETP = Effluent Treatment Plant, IEE = initial environmental examination, LCC = location clearance certificate, TOR = term of reference.

[a] A Guide to Environmental Clearance Procedure, DOE, Bangladesh Ministry of Environment and Forests, August 2010.

28. Schedule 1 of ECR, 1997 provides the classification for industrial projects and types of development that are common in Bangladesh. **Table 2** indicates the subproject's category and its likely classifications based on this schedule.

Table 2: Government of Bangladesh Classification of the Subproject

	Subproject	Component	Equivalent in Schedule I of Environmental Conservation Rules	Department of Environment Classification
1.	Roads	Roads	Construction, re-construction and extension of road (feeder road, local road)	Orange – B
		Bridges and culverts	Construction, re-construction and extension of bridge/culvert (length below 100 meters)	Orange – B

3. Application for Environmental Clearance

29. The application and requirement for issuance of ECC are described in the ECR, 1997 and summarized in **Table 1*:* .** This involves the completion and submission of an application using a form available from the DOE website,[11]which is revised from time to time. See **Appendix 2** for template being used of this date. The accomplished application form is submitted to DOE together with requirements as enumerated in **Table 1*:*** . The proponent is also required to pay equivalent application fee prescribed in Schedule 13 of ECR, 1997.

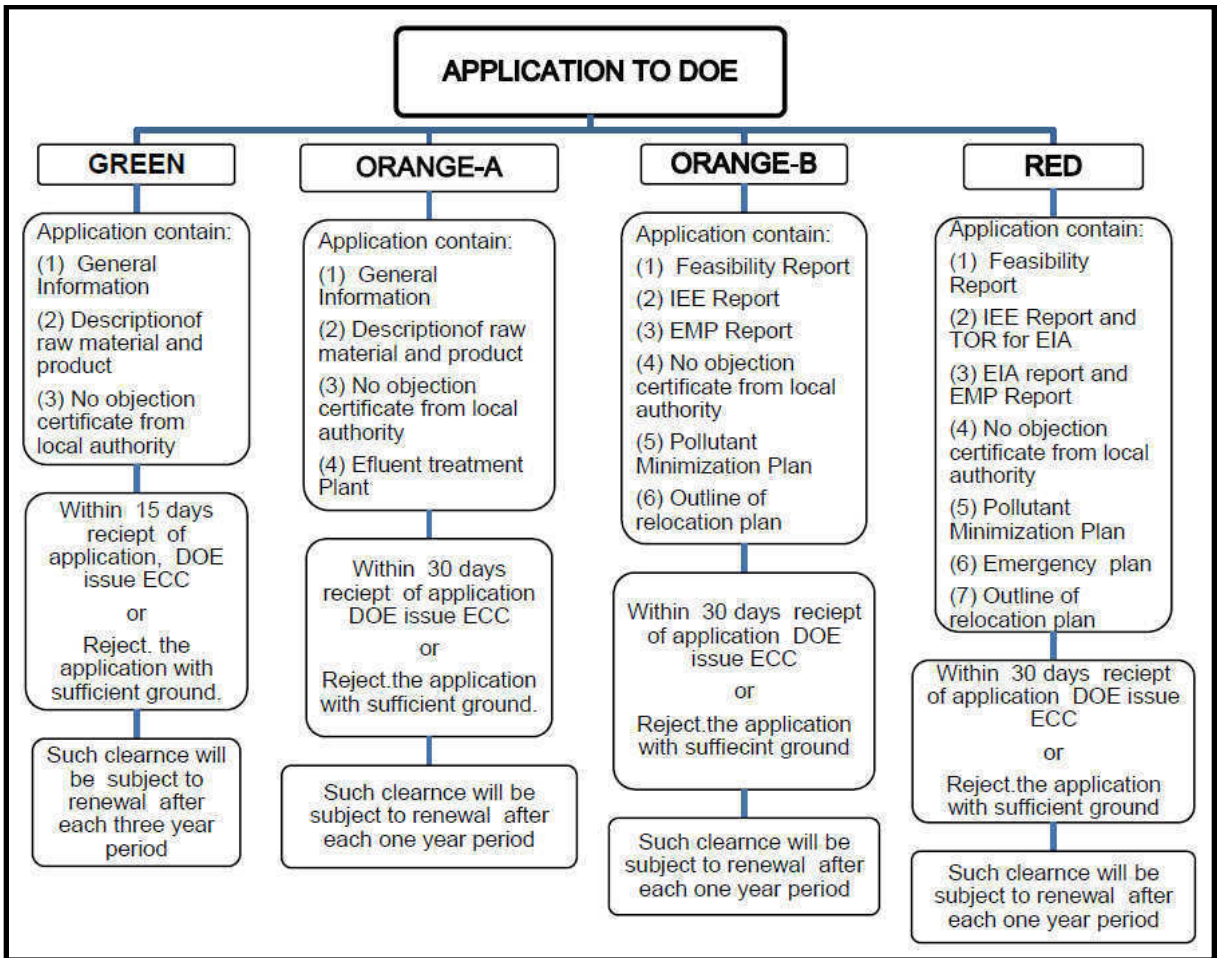
30. The ECC is issued within 30 days from receipt of the application by DOE. Such ECC is required to be renewed every year from the date of its effectivity. For the project, PMCU is responsible for application for ECC. This ECC will cover all subprojects identified under the project. Application for said ECC is ongoing.[12]

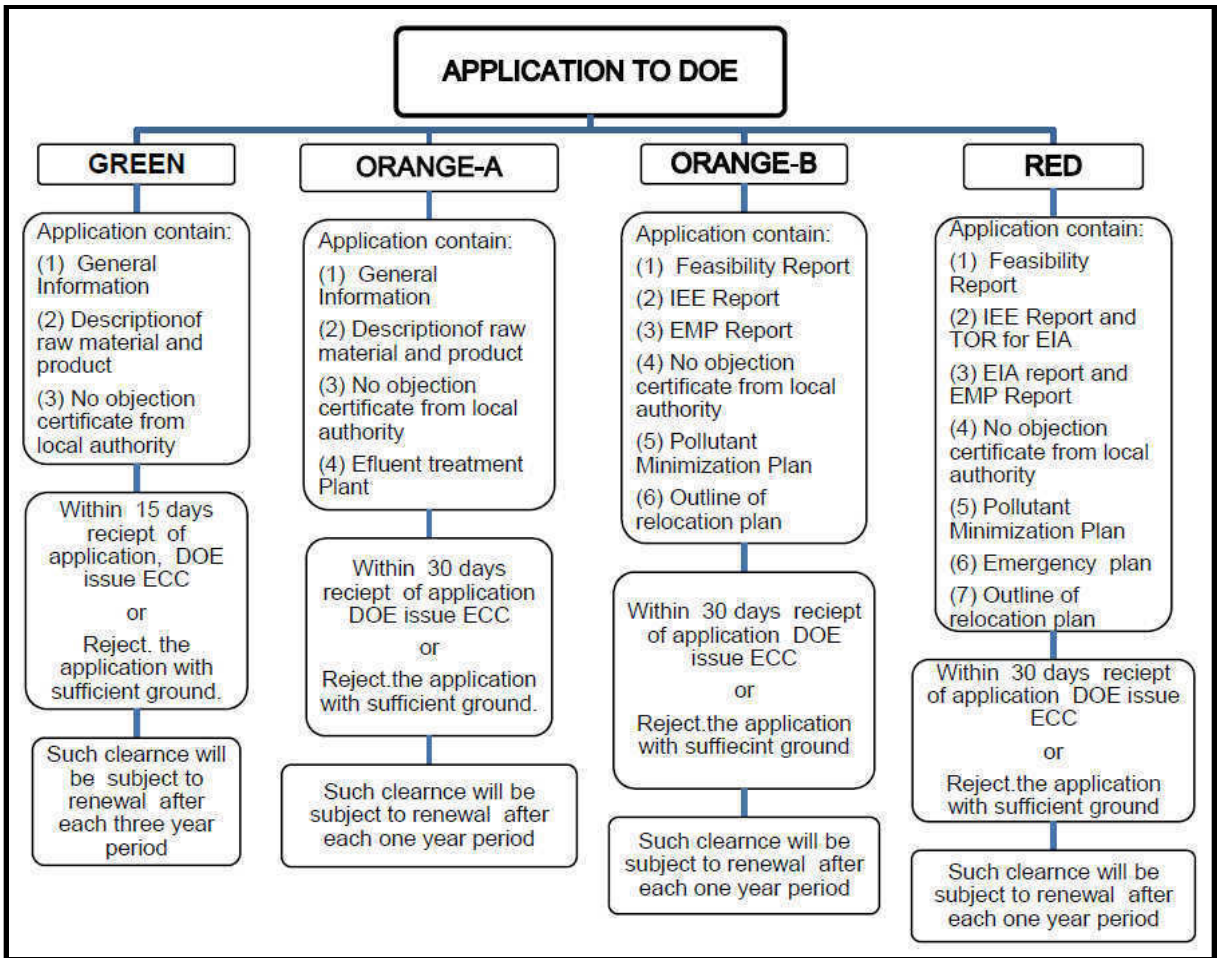
Figure 2 shows the summary of review process and timelines set under ECR, 1997, leading to the issuance of ECC by DOE.

[11] Government of Bangladesh. .

[12]Per information from project management and coordination unit (PMCU), the required fee for Environmental Clearance Certificate (ECC) application and other necessary documents have been submitted to Department of Environment (DOE) as of July 2018. Once approved for Asian Development Bank (ADB) project processing, this initial environmental examination (IEE) will be used in the ECC application with DOE.

Figure 2: Government Environmental Clearance Process





4. Applicable Environmental Standards

31. The ECR, 1997 also provides the environmental standards applicable to the project. Schedule 2 of the ECR presents the national standards for ambient air quality and Schedule 4 of the ECR presents the national standards for ambient noise. Following requirements of ADB SPS, 2009, the subproject shall apply pollution prevention and control technologies and practices consistent with international good practice, as reflected in EHS Guidelines. When the Government regulations differ from these levels and measures, the subproject shall achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific subproject circumstances, LGED through PMCU will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS, 2009. and . In view of this, **Table 3** & **Table 4** show the ambient air quality standards and noise level standards to be followed by the subproject.

Table 3: Ambient Air Quality Standards

Parameter	Location	Bangladesh Ambient Air Quality Standard (µg/m^3)[a]	WHO Air Quality Guidelines (µg/m^3)		Applicable to Subproject Per ADB Safeguard Policy Statement[d] (µg/m^3)
			Global Update[b] 2005	Second Edition[c] 2000	
TSP	Industrial and Mixed	500	-	-	500
	Commercial and Mixed	400			400
	Residential and Rural	200			200
	Sensitive	100	-	-	100
PM_{10}	Industrial and Mixed	-	50 (24-h)	-	50 (24-h)
	Commercial and Mixed	-	50 (24-h)		50 (24-h)
	Residential and Rural	-	50 (24-h)		50 (24-h)
	Sensitive	-	50 (24-h)	-	50 (24-h)
$PM_{2.5}$	Industrial and Mixed	-	25 (24-h)	-	25 (24-h)
	Commercial and Mixed	-	25 (24-h)		25 (24-h)
	Residential and Rural	-	25 (24-h)		25 (24-h)
	Sensitive	-	25 (24-h)	-	25 (24-h)
SO_2	Industrial and Mixed	120	20 (24-h)	-	20 (24-h)
	Commercial and Mixed	100	20 (24-h)	-	20 (24-h)
	Residential and Rural	80	20 (24-h)		20 (24-h)
	Sensitive	30	20 (24-h)	-	20 (24-h)
NO_2	Industrial and Mixed	100	200 (1-h)	-	100
	Commercial and Mixed	100	200 (1-h)	-	100
	Residential and Rural	80	200 (1-h)		80
	Sensitive	30	200 (1-h)	-	30
CO	Industrial and Mixed	5,000	-	10,000 (8-h) 100,000 (15-min)	5,000
	Commercial and Mixed	5,000	-	10,000 (8-h) 100,000 (15-min)	5,000
	Residential and Rural	2,000	-	10,000 (8-h) 100,000 (15-min)	2,000
	Sensitive	1,000	-	10,000 (8-h) 100,000 (15-min)	1,000

ADB = Asian Development Bank, CO = carbon oxide, h = hour, µg/m^3 = microgram per cubic meter, min = minute, NO_2 = nitrogen dioxide, $PM_{2.5}$ = particulate matter 2.5, PM_{10} = particulate matter 10, SO_2 = sulfur dioxide, TSP = total suspended particle, WHO = World Health Organization.

[a] Schedule 2 of ECR, 1997.

[b] IFC World Bank Group. 2007. Environmental, Health and Safety General Guidelines. Washington, D.C.

[c] WHO Regional Office for Europe. 2000. Air Quality Guidelines for Europe, Second Edition. Copenhagen.

[d] If less stringent levels or measures are appropriate in view of specific project circumstances, PMCU will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS, 2009.

Table 4: Ambient Noise Quality Standards

Receptor/ Source	National Noise Standard Guidelines, 1997[a] (dB)		WHO Guidelines Value For Noise Levels Measured Out of Doors[b] (One Hour LA_q in dBA)		Applicable to Subproject Per ADB Safeguard Policy Statement[c] (dBA)	
	Day	Night	07:00 – 22:00	22:00 – 07:00	Day time	Night time
Industrial area	75	70	70	70	70	70
Commercial area	70	60	70	70	70	60
Mixed Area	60	50	55	45	55	45
Residential Area	50	40	55	45	50	40
Silent Zone	45	35	55	45	45	35

[a] Schedule 4 of ECR, 1997.

[b] World Health Organization . 1999. Guidelines for Community Noise**;** World Bank Group. 2007. Environmental, Health and Safety General Guidelines. Washington, D.C.

[c] If less stringent levels or measures are appropriate in view of specific project circumstances, PMCU will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS, 2009.

5. Other Relevant National Laws

32. The implementation of subprojects proposed under the project will be governed by Government Environmental Acts, Rules, Policies, and Regulations. **Table 5** summarizes the applicable national and local laws, regulations, and standards for environmental assessment and management, including applicable international environmental agreements.

Table 5: Summary of Relevant Government Laws, Regulations, and Environmental Standards

Laws, Regulations, and Standards	Details	Relevance to Subproject
Environmental Court Act, 2000	Enacted to establish environment courts and make rules for protection of environmental pollution. Environment Courts are situated at the District level but Government may by notification in the official Gazette, establish such courts outside the districts. Environment Courts were given power to directly take into cognizance of any offence relating to environmental pollution. Proceeding of this Court will be similar to criminal courts. One important feature of this Act is that it has been given retrospective effect of any crime committed under environment laws and thus any crime previously committed but is not taken before any court can be taken before the Environment Court or any special Magistrate.	Environmental court has been established in Dhaka where the subproject is located. This court has jurisdiction over any subproject-related environmental cases or litigations or complaints elevated to it.
The Pourashava (Municipality) Ordinance of 1977, the City Corporation Ordinances of 1983 and the recently revised unified ordinance for all City Corporations of 14 May 2008 (Local Government Ordinances 16, and 17 of 2008); City Corporation Act 2009, 15	These ordinances have clearly assigned responsibilities to the LGIs to ensure the provision of a wide range of primary and public health services including primary health care, sanitation, water supply, drainage, food and drink, birth and death registration, vector and infectious disease control, etc. for the residents. LGIs have the authority to address all related issues within their legal and administrative mandate.	The subproject aims to help Savar Upazila (as the LGI) achieve or fulfill these mandates.

Laws, Regulations, and Standards	Details	Relevance to Subproject
Oct 2009, and; Pourashava Act 2009, 6 Oct 2009.		
National Forestry Policy, 2016	This policy specifically states the following relevant objectives (among many other objectives): (i)to arrest deforestation, and degradation of forest resources, enrich and extend areas under tree cover, through appropriate programs and projects, to ensure that at least 20% of the country comes under tree cover by 2035, with at least a canopy density of 50%; and (ii) to significantly increase tree cover outside state forest, through appropriate mechanisms, in both public and private land including urban areas.	The subproject will have potential tree cutting activities during construction or rehabilitation works. However, the subproject EMP will ensure to implement measures to comply with and support the policy objectives.
Bangladesh Labor Act, 2006	The Bangladesh Labor Act, 2006 provides the guidance of employer's extent of responsibility and workmen's extent of right to get compensation in case of injury by accident while working.	Provides for security and safety of work force during construction period. Compliance with this law will be included in the responsibility of the Contractor.

EMP = environmental management plan, LGI = local government institutions.

6. International Environmental Agreements

33. **Table 6** below lists the relevant international environmental agreements that the government is party to, and their relevance to the subproject.

Table 6: International Environmental Agreements Relevant to Second City Region Development Project

International Environmental Agreement	Year Ratified	Details	Relevance
United Nations Framework Convention on Climate Change (UNFCCC)	1997	Parties to take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects.	The subproject is subject to impact of climate change. Engineering designs of the subproject consider climate change impacts, such as flooding and river water level rise. A climate change vulnerability assessment has been conducted for the geographic coverage of the entire Second City Region Development Project (the project), which covers the location of the subproject.

International Environmental Agreement	Year Ratified	Details	Relevance
Paris Convention on Protection of the World Cultural and Natural Heritage, 1972	1983	Parties to ensure the protection and conservation of the cultural and natural heritage situated on territory of, and primarily belonging to, the State	There is no World Heritage Site within or near any of the subproject alignments. However, The road and drainage works may impact undiscovered underground cultural and natural heritage relics during construction phase. The subproject environmental management plan (EMP) ensures measures for chance finds.
Ramsar Convention on Wetlands of International Importance, 1971	1992	Parties to conserve and wisely use wetlands (i.e., maintaining their ecological character) as a contribution towards achieving sustainable development locally and throughout the world	Road and drainage construction works may impact wetlands. The subproject EMP ensures measures are in place to protect significant wetland and prevent draining or filling into the wetlands during construction.
Convention on Biological Diversity, 1992	1997	Parties to require the environmental assessment of projects that are likely to have significant adverse effects on biological diversity with a view of avoiding or minimizing such effects	Biodiversity sites and species not previously identified might be discovered during construction works along the alignments. The subproject EMP ensures measures to protect biodiversity, if any, during construction and post-construction activities.

EMP = environmental management plan, UNFCCC = United Nations Framework Convention on Climate Change.

III. DESCRIPTION OF THE SUBPROJECT

A. Subproject Scope and Components

34. The proposed subproject is a combination of construction and rehabilitation of roadway and/or drain for the following road alignments or components in the Savar Upazila of Dhaka region: (i) Road 1- ID 2004: Improvement of Nayarhat GC to Savar GC Road (8.20 km); (ii) Road 2- ID 3024: Improvement of Dhaka - Aricha RHD at Dairy Farm Gate - Pathalia UP Office Kashipur and Monohor Road, (4.567 km); (iii) Road 3- ID 3017: Improvement of Prantik bazar BLRI (RHD) – Ashulia UP Road, (5.51 km); (iv) Road 4- ID 3010: Improvement of Ashulia UP-Katgora Bazar via Boro Rangamatia Road, (4.761 km) and (v) Road 5- ID 4198: Improvement of Katgora Bazar - Chitrashail Road via Kandail Road, (2.787 km). These roads are bounded by the Dhaka- Aricha Highway and River Bangshi on the west and by the Dhaka-Baipail via Ashulia Highway and River Turag on the eastside. Description of road and drain works is presented in **Table 7**. All construction works and improvements will be conducted within existing rights-of-way (ROWs).The road widths along the alignments will be varied at different chainage depending on the available space within the existing ROWs to ensure that no encroachment to private properties.

Table 7: Roadway and Drainage Improvement Components

Package No.	SL No	Name of Subproject	Subproject Component	Length (km)	Existing Carriage way Width (m)	Existing Road Width (m)
CRDP-II/LGED/ Dhaka/Savar Upazila/ NCB/2018/W-02	1	Nayarhat GC to Savar GC Road, (Road ID: 326722004).	Roadway & Drainage	8.200	3.0~10.10	6.80~11.20
	2	Dhaka - Aricha RHD at Dairy Farm Gate - Pathalia UP Office Kashipur and Monohor Road, (Road ID: 326723024).	Roadway	4.567	2.7 ~ 3.6	4.7 ~ 7.3
	3	Prantik bazar BLRI (RHD) – Ashulia UP Road, (Road ID:326723017).	Roadway & Drainage	5.510	3.0	4.5 ~ 8.7
	4	Ashulia UP-Katgora Bazar via Boro Rangamatia Road, (Road ID: 326723010).	Roadway	4.761	3.0~4.5	5,6 ~ 9.2
	5	Katgora Bazar Chitrashail Road via Kandail Road, (Road ID:326724198).	Roadway & Drainage	2.787	3.0	5.3 ~ 7.70

B. Existing Condition of Subproject Components

1. Road-1 (ID 2004): Improvement of Road Nayarhat GC to Savar GC Road (8.20 km)

35. This Road Subproject is 8.20 km long, which stretches from Nayarhat Bridge approach (starting coordinates N 23^0 50' 53.8" and E 90^0 14' 34.1") to Radio Colony Road near Nama Bazar,

Savar (ending coordinates N 23^0 54' 41.6" and E 90^0 13' 52.6"). This road subproject connects two Growth Centres and passes through several villages of Savar Upazila.

36. **Road Condition**: The proposed road subproject passes through shops and residential areas, and crosses khals an water bodies at places. The existing road surface consists of types BC (bituminous carpet), BFS (brick flat soling), HBB (herring bone bond) and RCC at different sections. The major portion of the road surface is comprised of 6.0 km BC, whereas BFS portion is 0.528 km, HBB is 1.738 km and RCC is 0.202 km. However, the existing road pavement including the non-metal portion needs to be improved at various sections that have suffered wear and tear with cracks, pot-holes, broken edges and depressions. The existing vacant road width is varying in between 6.00~ 11.20 m and the existing carriageway width is varying in between 3.00 ~ 10.10 m.The distressed condition of the road is due to mainly improper drainage facilities and movement of heavy vehicular traffic for a long time without any proper maintenance work. There are several sub-standard horizontal curves. **Figure 3** shows the existing condition of this road.

37. **Drains and its Condition**: There is a roadside drain on the left side of the alignment from Ch.7+425 - 8+200 km, but its condition is poor and almost non-functional. As a result, accumulation of rainfall and run-off water at this section takes place and in turn, causes water logging. Besides this section, there is a section from Ch.0+000 - 1+050 km, which does not have drainage facilities, suffers water logging at this section alignment adjacent place. In order to remove such water logging at sections of roadside areas, the improvement of the existing road side drain and construction of new drains as well at sections noted above has been proposed. Improper drainage facilities alongside theis road alignment seriously hamper movement of pedestrian and vehicular traffic for a long time.

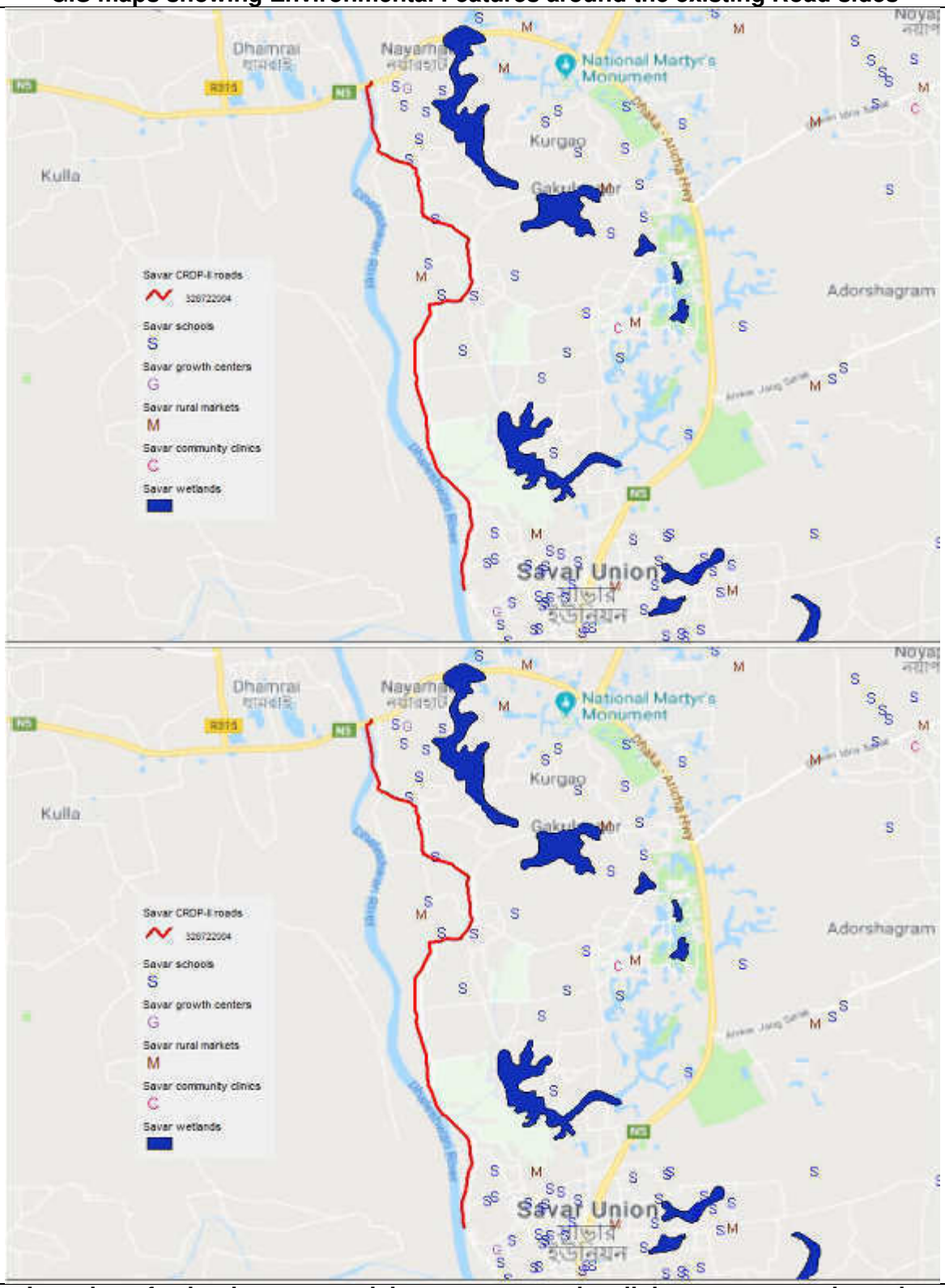
38. **Drainage Structures**: There are 3 (three) Box culverts of sizes 2 x 3.70m x 3.70m, 2.00m x 2.50m and 4.00m x 4.00m at Ch. 2+925, 4+150 and 4+460 km respectively, and all these culverts are in good condition. Also there are 4 (four) Pipe culverts of sizes ∅ 0.90m at different Ch. 4+895, 5+435, 5+880 and 6+025 km; all these pipe culverts are in poor condition and their replacement has been proposed, for example pipe culvert at Ch. 4+895 km shall be replaced by a Box culvert of size 1.50m x 2.00m, and the rest of the pipe culverts shall be replaced with bigger ∅ pipes of 1.0m. Further there are 3 (three) RCC Girder bridges on this road alignment, one is of length 3x13.0m at Ch.6+785 km and each of the other two at Ch.7+210 and 8+470 km has equal length of 13.0m; all these are in poor condition, and shall be replaced with larger span bridge.

39. **Existing Alignment and Rights-of-Way**. The subproject road is 2-lane road, and it will be improved within existing alignment RoW. The existing road width is varying between 6.00~11.20 m and the carriageway between 3.0~10.10 m. The proposed road width varies between 6.0 ~ 11.2 m and will be undertaken on the carriageway of which width varies between 3.7~ 7.3 m. The side slope of road embankment will be of 1:1.5. From field investigation, no tree is found along the proposed carriageway. No trees will be cut and all trees found along the sides of the proposed carriageway will be preserved per detailed design.

40. **Strip Map**. The strip map showing the locations of the structures along this alignment is in **Appendix 3**. The strip map was drawn as a result of the field surveys conducted along the alignment and show that no physical cultural resources will be encroached or affected.

41. **GIS Map**. The GIS map of Improvement of Road Nayarhat GC to Savar GC Road is displayed here below to exhibit the environmental attributes alongside the existing alignment of the road.

GIS maps showing Environmental Features around the existing Road sides



Location of schools, commercial areas, community clinics, streams and canals

As regards the Environmental Features, namely school, growth centre, market, community clinic

etc. around the existing alignment of Nayarhat GC to Savar GC Road, GIS map shows that there are no such environmental features are found to exist at the close vicinity of the road alignment. There are only 4(four) schools alongside the road alignment which are not within 50 meter (core zone) area on both sides of the road. Hence no environmental impact issue is envisaged due to the above mentioned environmental attributes.

Figure 3: Site Photograph from Nayarhat GC to Savar GC Road(Road ID: 2004)

Condition of existing HBB road surface at Ch. 3+700 km

2. Road-2 (ID 3024) : Improvement of the road from Dhaka - Aricha RHD at Dairy Farm Gate - Pathalia UP Office Kashipur and Monohor Road (4.567 km)

42. The subproject is 4.567 km long, which stretches from Dhaka - Aricha RHD at Dairy Farm Gate - Pathalia UP Office Kashipur and Monohor Road (start coordinate is N 23^0 52' 59.5" and E 90^0 15' 54.7") and end-up to near Pathalia (end coordinate is (N 23^0 53' 40.9" and E 90^0 13' 59.0"). . It has three link roads.

43. **Road Condition**: The proposed road subproject passes through roadside built-up areas, villages, agricultural lands, and crosses a waterbody at Ch. 3+217 km. The existing road surface consists of types BC (bituminous carpet), BFS (brick flat soling), HBB (herring bone bond) and Earthen at different sections. The major portion of the road surface is comprised of 1.998 km BFS, whereas BC portion is 1.228 km, Earthen is 0.91 m and HBB is 0.431 km. However, the existing road pavement including the non-metal portion needs to be improved at various sections that have suffered wear and tear with cracks, pot-holes, broken edges and depressions. The existing vacant road width is varying in between 4.00~ 7.30 m and the existing carriageway width is varying in between 2.70 ~ 3.50 m. The distressed condition of the road is due to mainly improper drainage facilities and movement of heavy vehicular traffic for a long time without any proper maintenance work. There are several sub-standard horizontal curves. **Figure 4** shows the existing condition of this road.

44. **Drains:** There are 4 (four) U-Drain at Ch.1+852 km, Ch.4+048 km, Ch.4+345 km, and Ch.5+390 km, all these are in good condition.

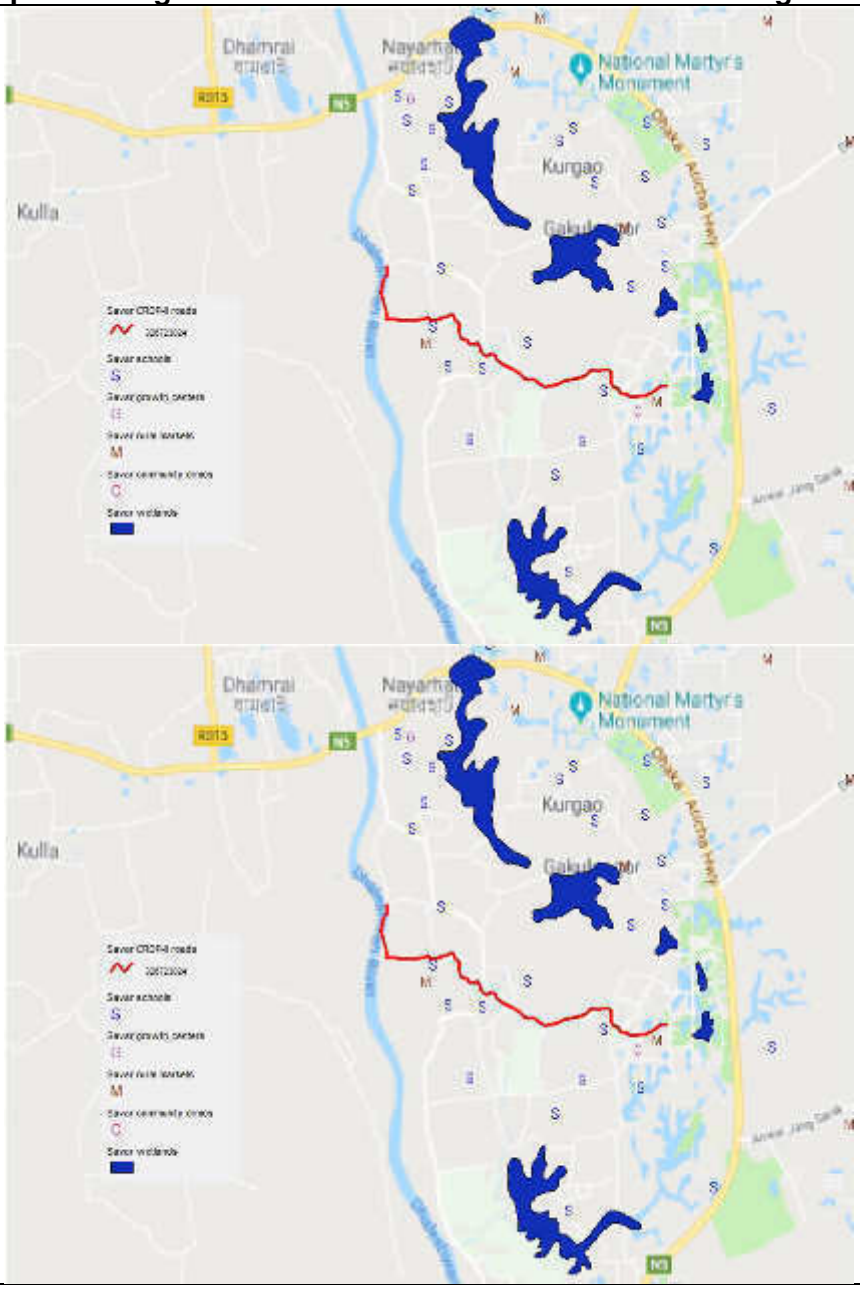
45. **Drainage Structures:** There are 16 (sixteen) Pipe culverts of variable pipe diameter either 0.30 m or 0.60 m at different Ch Ch.1+152m, Ch.1+313m,Ch.1+575m, Ch.1+616m, Ch.1+655m, Ch.2+140m, Ch,2+680m, Ch.2+948m, Ch.3+094m, Ch.3+780m, Ch.3+836m, Ch.4+391m, Ch.4+480m, Ch.4+757m, Ch.5+019m, Ch.5+657m. All these pipe culverts are in good condition except the 2 (two) located at Ch.1+152m & Ch.1+313m, and these two will be replaced with bigger diameter pipes of 1.0 m. Also there is a 60 m RCC Girder Foot-bridge of poor condition at Ch.3+230m, and its replacement with 42m Double Lane Bridge has been proposed.

46. **Existing Alignment and Right-of-Ways (RoW)*:*** The subproject road is 2-lane road, and it will be improved within existing alignment RoW. The existing road width is varying between 4.0 ~ 7.3 m and the carriageway between 2.70 ~ 3.60 m. The proposed road width shall vary between 4.0 ~ 5.5 m and will include carriageway of width 3.0 m. The side slope of road embankment will be of 1:1.5. From field investigation, no tree is found along the proposed carriageway. No trees will be cut and all trees found along the sides of the proposed carriageway will be preserved per detailed design.

47. **Strip Map**. The strip map showing the locations of the structures along this alignment is in **Appendix 4**. The strip map was drawn as a result of the field surveys conducted along the alignment and show that no physical cultural resources will be encroached or affected.

48. **GIS Map**. The GIS map of Improvement of the road from Dhaka - Aricha RHD at Dairy Farm Gate - Pathalia UP Office Kashipur and Monohor Road is displayed here below to exhibit the environmental attributes alongside the existing alignment of the road. There are only 2 (two) schools and 1 (one) alongside the road alignment which are not within 50 meter (core zone) area on both sides of the road. Hence no environmental impact issue is envisaged due to the above mentioned environmental attributes.

GIS maps showing Environmental Features around the existing Road sides



Location of schools, commercial areas, community clinics, streams and canals

As regards the Environmental Features, namely school, growth centre, market, community clinic etc. around the existing road alignment of Dhaka - Aricha RHD at Dairy Farm Gate - Pathalia UP Office Kashipur and Monohor Road, GIS map shows that there are no such environmental features are found to exist at the close vicinity of the roar alignment. Hence no environmental impact issue is envisaged due to the above mentioned environmental attributes.

Figure 4: Photographs of existing condition of Dhaka - Aricha RHD at Dairy Farm Gate - Pathalia UP Office Kashipur and Monohor Road (Road ID: 3024)

Condition of existing road at Kashipur

3. Road-3 (ID 3017): Improvement of the Road from Prantik bazar BLRI (RHD) – Ashulia UP Road (5.510 km)

49. The subproject is 5.510 km long, which stretches from Kolma Bus Stand (start coordinate is N 23^0 52' 31.9" and E 90^0 17' 14.9") and end-up to near Gauripur (end coordinate is N 23^0 53' 41.7" and E 90^0 18' 47.4").

50. **Road Condition**: The proposed road subproject passes through roadside built-up areas, villages, agricultural lands, and crosses a small water body at Ch. 3+462 km. The existing road surface consists of types BC (bituminous carpet) and BFS (brick flat soling). The major portion of the road surface is comprised of 5.095 km BC, where BFS portion is 0.415 km. However, the existing road pavement needs to be improved at various sections that have suffered wear and tear with cracks, pot-holes, broken edges and depressions. The existing vacant road width is varying in between 4.50~ 8.70 m and the existing carriageway width is 3.0 m. The distressed condition of the road is due to mainly improper drainage facilities and movement of heavy vehicular traffic for a long time without any proper maintenance work. There are several sub-standard horizontal curves. **Figure 5** shows the existing condition of this road.

51. **Drains and its Condition**: There is an U-Drain at Ch.0+673 km, and it is in good condition. It is to be noted that at Ch.0+500 km there is stagnation of rainfall and run-off on the left side of the road alignment due to improper drainage facilities. However, construction of RCC Pipe drain of ∅ 1000 mm has been proposed at this section to remove the drainage of the area.

52. **Drainage Structures:** There is a Box-culvert of size 4.0m x 4.0m at Ch.3+462, and it is in good condition.

53. **Existing Alignment and Rights-of-Way.** The subproject road is 2-lane road, and it will be improved within existing alignment RoW. The existing road width varies between 4.5 ~ 8.7 m and the carriageway width is 3.0 m. The proposed road width shall vary between 4.5 ~ 7.3 m and will include carriageway of width 3.0 m. The side slope of road embankment will be of 1:1.5. From field investigation, no tree is found along the proposed carriageway. No trees will be cut and all trees found along the sides of the proposed carriageway will be preserved per detailed design.

53. **Strip Map**. The strip map showing the locations of the structures along this alignment is in **Appendix 5**. The strip map was drawn as a result of the field surveys conducted along the alignment and show that no physical cultural resources will be encroached or affected.

54. **GIS Map**. As noted from GIS map, there are no environmental features, namely school, growth centre, market, community clinic etc. are found to exist at the close vicinity of the subproject alignment. Hence no environmental impact issue is envisaged due to the above mentioned environmental attributes.

GIS maps showing Environmental Features around the existing Road sides

Location of schools, commercial areas, community clinics, streams and canals

As regards the Environmental Features, namely school, growth centre, market, community clinic etc. around the existing road alignment of Prantik bazar BLRI (RHD) – Ashulia UP Road, GIS map shows that there are no such environmental features are found to exist at the close vicinity of the roar alignment. Hence no environmental impact issue is envisaged due to the above mentioned environmental attributes.

Figure 5: Photographs of existing condition of Prantik bazar BLRI (RHD) – Ashulia UP Road, (Road ID: 3017)

Road condition at chainage 5000

4. Road-4 (ID 3010): Improvement of the road from Ashulia UP-Katgora Bazar via Boro Rangamatia Road (4.761 km)

55. The subproject is 4.761 km long, which stretches from Ashulia UP (start coordinate is N 23^0 53' 33.8" and E 90^0 19' 44.6") and end-up to Katgora Bazar (end coordinate is N 23^0 54' 32.8" and E 90^0 17' 46.6").

56. **Road Condition**: The proposed road subproject starts at Asulia UP and ends at Katgora; it passes through roadside built-up areas, villages, agricultural lands, and crosses small ditches. The existing road surface consists of types BC (bituminous carpet) and HBB (herring bone bond). The major portion of the road surface is comprised of 3.045 km BC, where HBB portion is 1.716 km. However, the existing road pavement needs to be improved at various sections that have suffered wear and tear with cracks, pot-holes, broken edges and depressions. The existing vacant road width is varying in between 5.60~ 9.20 m and the existing carriageway width is varying between 3.00 ~ 4.50 m. The distressed condition of the road is due to mainly improper drainage facilities and movement of heavy vehicular traffic for a long time without any proper maintenance work. There are several sub-standard horizontal curves. **Figure 6** shows the existing condition of this road.

57. **Drains:** Noted no water logging situation alongside this subproject road alignment. As a result, this alignment does not contain any roadside drain facilities.

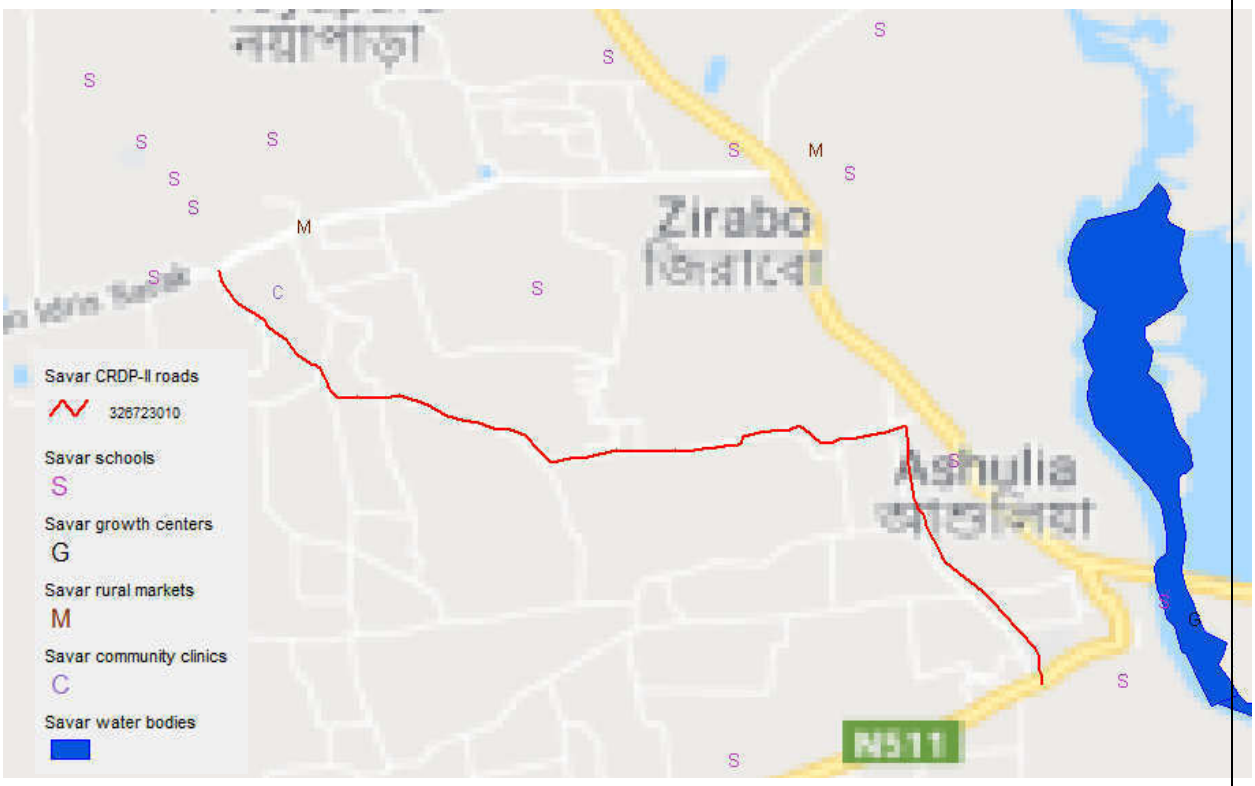
58. **Drainage Structures:** There is a Box-culvert of size 2 x 3.7m x 3.7m on the road alignment at Ch. 1+716 km, and it is in good condition.

59. **Existing Alignment and Rights-of-Way**. The subproject road is 2-lane road, and it will be improved within existing alignment RoW. The existing road width is varying between 5.60 ~ 9.20 m and the carriageway between 3.00 ~ 4.50 m. The proposed road width shall vary between 5.6 ~ 7.3 m and will include carriageway of width varying between 3.0 ~ 5.5 m. The side slope of road embankment will be of 1:1.5. From field investigation, no tree is found along the proposed carriageway. No trees will be cut and all trees found along the sides of the proposed carriageway will be preserved per detailed design.

60. **Strip Map**. The strip map showing the locations of the features along this alignment is in **Appendix 6**. The strip map was drawn as a result of the field surveys conducted along the alignment and show that no physical cultural resources will be encroached or affected.

61. **GIS Map**. The GIS map of Improvement of the road from Ashulia UP-Katgora Bazar via Boro Rangamatia Road is displayed here below to exhibit the environmental attributes alongside the road

GIS maps showing Environmental Features around the existing subproject Road



Location of schools, commercial areas, community clinics, streams and canals

As regards the Environmental Features, namely school, growth centre, market, community clinic etc. around the existing alignment of road from Ashulia UP-Katgora Bazar via Boro Rangamatia Road, GIS map shows that there are no such environmental features are found to exist at the close vicinity of the subproject alignment. Hence no environmental impact issue is envisaged due to the above mentioned environmental attributes.

Figure 6: Photographs of existing condition of Ashulia UP-Katgora Bazar via Boro Rangamatia Road, (Road ID: 3010)

Road condition at chainage 2960

5. Road-5 (ID 4198): Improvement of the road from Katgora Bazar - Chitrashail Road via Kandail Road (2.637 km)

62. The subproject is 2.637 km long, which stretches from Katgora Bazar - Chitrashail Road via Kandail Road (start coordinate is N 23^0 54' 37.0" and E 90^0 17' 54.1") and end-up to near Kandail (end coordinate is N 23^0 55' 33.9" and E 90^0 17' 29.3").

63. **Road Condition**: The proposed road subproject starts from Katgora Bazar, passes through homesteads, schools, wetlands and ends at Kandail. The existing road surface consists of types BC (bituminous carpet) and HBB (herring bone bond). The major portion of the road surface is comprised of 2.039 km HBB, where BC portion is 0.598 km. However, the existing road pavement needs to be improved at various sections that have suffered wear and tear with cracks, pot-holes, broken edges and depressions. The existing vacant road width is varying in between 5.30~ 7.70 m and the existing carriageway width is 3.00 m. The distressed condition of the road is due to mainly improper drainage facilities and movement of heavy vehicular traffic for a long time without any proper maintenance work. There are several sub-standard horizontal curves. **Figure 7** shows the existing condition of this road.

64. **Drains:** There are 2 (two) U-Drains on the road alignment at Ch.1+006 and 1+900 km, and both the U-Drains are in good condition.

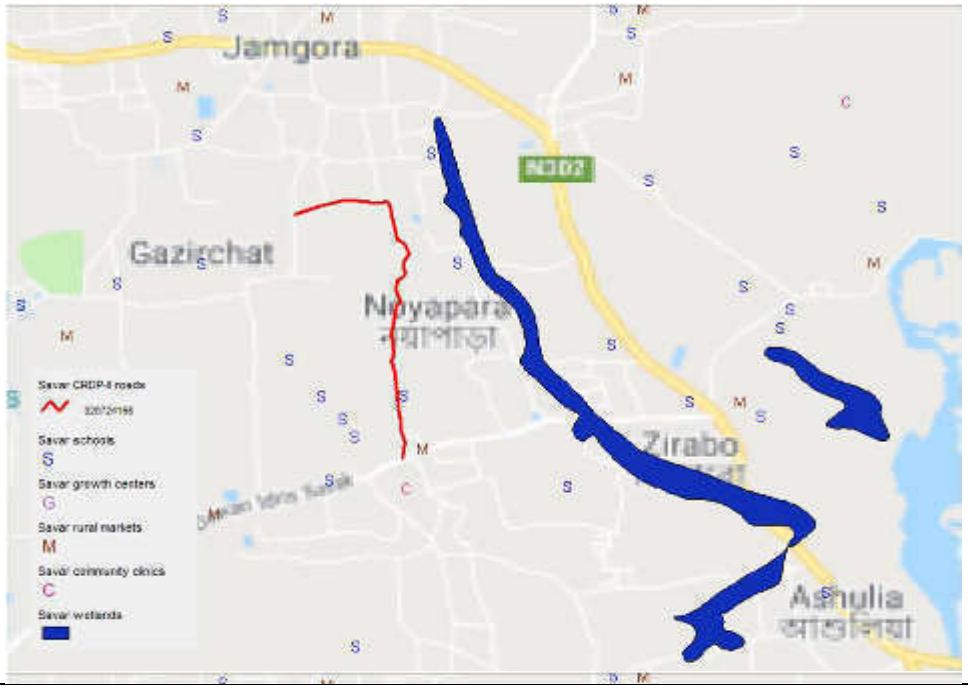
65. **Drainage Structures:** There are no cross drainage structures at any section on this road alignment. As it appears from field investigation, there is no cross drainage issue pertaining to balancing water level of roadside khals of either side.

66. **Existing Alignment and Right-of-Ways (RoW)*:*** The subproject road is 2-lane road, and it will be improved within existing alignment RoW. The existing road width is varying between 5.30~ 7.70 m and the carriageway between 3.00 ~ 5.50 m. The proposed road width shall vary between 5.3 ~ 7.3 m and will include carriageway of width 3.0 m. The side slope of road embankment will be of 1:1.5. From field investigation, no tree is found along the proposed carriageway. No trees will be cut and all trees found along the sides of the proposed carriageway will be preserved per detailed design.

67. **Strip Map**. The strip map showing the locations of the features along this alignment is in **Appendix 7**. The strip map was drawn as a result of the field surveys conducted along the alignment and show that no physical cultural resources will be encroached or affected.

68. **GIS Map**. The GIS map of Improvement of the road from from Katgora Bazar - Chitrashail Road via Kandail Road is displayed here below to exhibit the environmental attributes alongside the road.

GIS maps showing Environmental Features around the existing subproject Road



Location of schools, commercial areas, community clinics, streams and canals

As regards the Environmental Features, namely school, growth centre, market, community clinic etc. around the existing alignment of road from Katgora Bazar - Chitrashail Road via Kandail Road, GIS map shows that there are no such environmental features are found to exist at the close vicinity of the subproject alignment. There are only 1(one) school alongside the road alignment which is not within 50 meter (core zone) area on both sides of the road. Hence no environmental impact issue is envisaged due to the above mentioned environmental attributes.

Figure 7: Photograph of existing condition of Katgora Bazar- Chitrashail Road via Kandail Road, (Road ID:4198)

Road condition at chainage 950

C. Proposed Interventions or Development

1. Road-1 (ID 2004): Improvement of Road Nayarhat GC to Savar GC Road (8.20 km)

69. Proposed interventions planned for the Existing Road (ID No. 2004): Improvement of Road Nayarhat GC to Savar GC Road are as follows

(i) Improvement of the existing road, including footpaths at both sides of the road within ROW;

(ii) Construction of BC carriageway of width 3.7 m ~ 7.3 m as per design, and it will include hard shoulder/s or walkway/s and soft shoulders on either sides depending on the availability of vacant road width;

(iii) Construction of RCC Pipe Drain with or without footpath with drain pits and/or catch pits on either sides of the road alignment to remove the roadside rainfall and run-off stagnant water:

- at Ch.0+00 - 0+540 km (900 mm ∅ RCC pipe on both Left & Right sides, with Footpath plus Drain Pits);
- at Ch.0+540 - 1+050 km (1000 mm ∅ RCC pipe on both Left & Right sides, without Footpath plus Drain Pits and Catch Pits);
- at Ch. 7+225 - 8+200 km (900 mm ∅ RCC pipe on both Left & Right sides, with Footpath plus Drain Pits);
- Outfall : (a) at Ch.0+540 km shall include 1000 mm ∅ RCC pipe and
  (b) at Ch.7+225 km shall include 900 mm ∅ RCC pipe

(iv) Road improvement based on design that considers the road safety requirements per LGED published guidelines and standards.

(v) Pavement works comprising construction of sub-grade, sub-base, base binder course and wearing course;

(vi) Protection works (pallisading) to be undertaken at locations where ditches and ponds adjacent to the road embankment are found. These will protect road edges from being eroded or sliding. Locations and lengths of proposed protection works at different sections of the alignment are shown in **Table 8** below:

Table 8: Locations and Lengths of Proposed Protection Works

Sl. no.	Left side (Chainage), km	Length (m)	Right side (Chainage), km	Length (m)
1	0+910 - 0+975	65	1+065 - 1+150	85
2	1+065 - 1+150	85	1+675 - 1+750	75
3	1+675 - 1+750	75	2+210 - 2+290	80
4	3+320 - 3+340	20	2+300 - 2+465	165
5	3+400 - 3+445	45	2+510 - 2+535	25
6	3+530 - 3+545	15	2+605 - 2+650	45
7	4+230 - 4+260	30	2+670 - 2+780	110
8	4+760 - 4+775	15	4+090 - 4+250	160
9	7+075 - 7+150	75	4+880 - 4+910	30
10			6+910 - 7+000	90
11			7+010 - 7+140	130

70. The existing status with proposed development interventions of this roadway drainage component is summarized in **Table 9.**

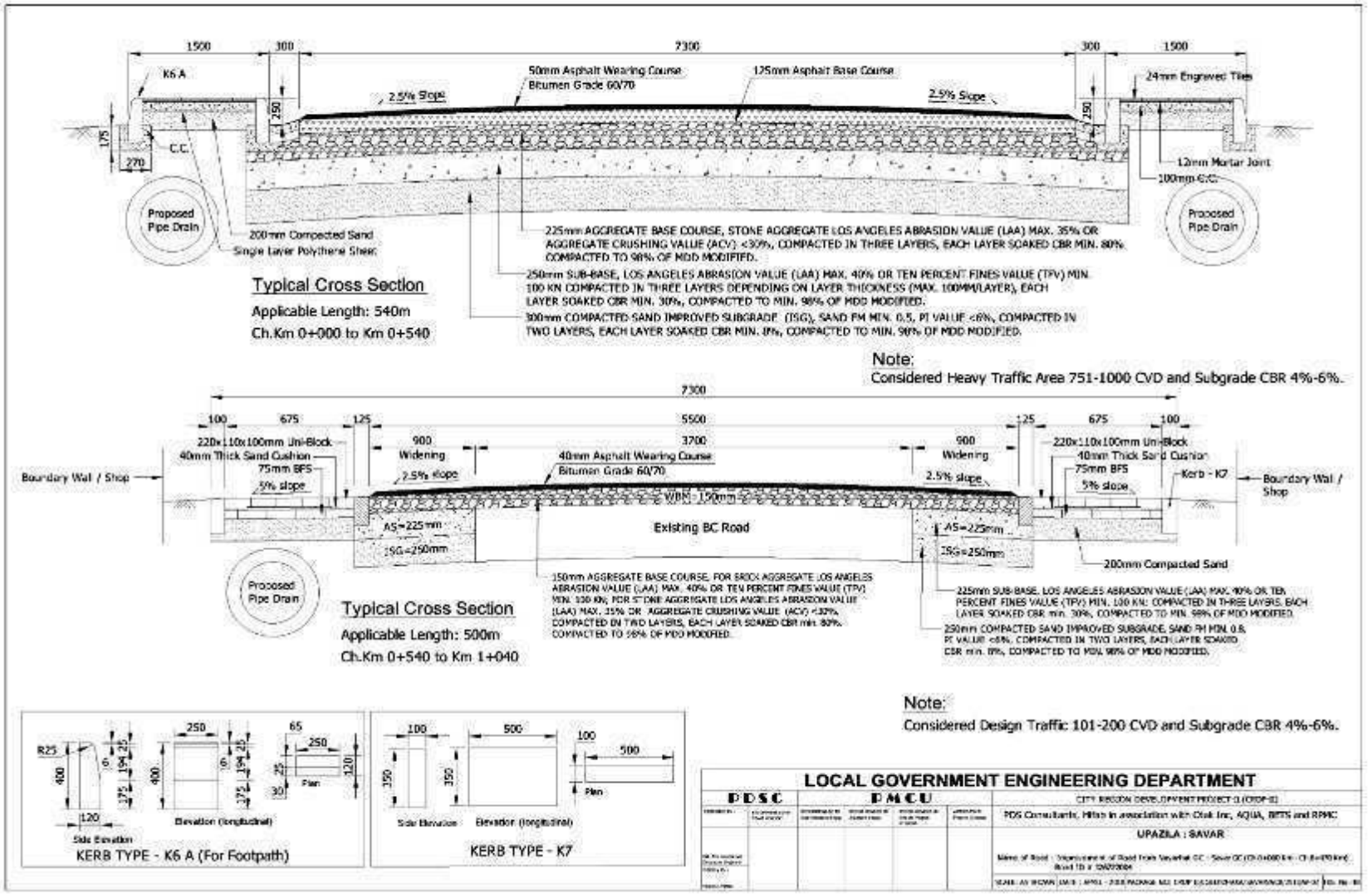
Table 9: Summary of Proposed Improvement of the Roadway and Drainage from Nayarhat GC to Savar GC Road (ID 2004)

Name of Subprojects	Length / Area	Subproject Components	Details of Proposed Works	Existing condition
Road-1 Improvement of Road from Nayarhat GC to Savar GC Road (ID 2004)	8.200 km	a. BC Pavement with hard shoulder (H/S) & footpath b. drainage, c. slope protection works, d. 3 (three) Bridges, e. 1 (one) Box Culvert, f. 3 (three) Pipe Culverts	**Road:** a. BC Road with 7.3m carriageway from Ch.00-540m with footpath. b. BC Road with 5.5m carriageway from Ch.540-1040m with H/S & Ch.7275-8200m with Footpath at left side. c. BC Road with 3.7m carriageway from Ch.1040-6830m with H/S, Ch.6869-7210m with H/S, Ch.7225-7275m With H/S, Ch.8440-8470m with H/S & Ch.8485-8515m with H/S. **Bridges:** 1) 42m Double Lane Bridge at Ch.6830m, 2) 15m Double Lane Bridge at Ch.7210m, 3) 15m Double Lane Bridge at Ch.8470m. **Box Culvert:** 1.5m X 2.00m Box Culvert at Ch.4895m **Pipe Culverts:** 1000mm ∅ 3 (three). Pipe Culverts - at Ch.5435m, Ch.5880m & Ch.6025m. **Slope Protection Works:** At 20 sections (for details **Table 8** may be referred).	**Road:** a. BFS Road with 5.5m carriageway from Ch.00-525m. b. BC Road with 3.7m carriageway from Ch.525-3670m, Ch. 4925-6830m, Ch.6869-6925m & Ch.7230-7825m. c. HBB Road with 3.7m carriageway from Ch.3670-4925m, Ch.6925-7030m, & Ch.7825-8200m. d. RCC Road with 3.7m carriageway from Ch.7030-7230m, **Bridges:** 1) 39m Single Lane Bridge at Ch.6830m, 2) 2) 13m Single Lane Bridge at Ch.7210m 3) 3) 12m Single Lane Bridge at Ch.8470m. **Pipe Culverts:** • 600mm ∅ Pipe Culvert at Ch.4895m; • 900mm ∅ Pipe Culvert at Ch.5435m, Ch.5880m & Ch.6025m. **Drainage:** 500mm width Open Brick Drain from Ch.7425m – Ch.8200mm.

			<u>Drainage</u>: • at Ch.0+00 - 0+540 km (900 mm ∅ RCC pipe on both Left & Right sides, with Footpath and Drain Pits); • at Ch.0+540 - 1+050 km (1000 mm ∅ RCC pipe on both Left side, without Footpath, Drain Pits and Catch Pits); • at Ch. 7+225 - 8+200 km (900 mm ∅ RCC pipe on Right side, with Footpath, Drain and catch Pits); with Outfall: (a) at Ch.0+540 km shall include 1000 mm ∅ RCC pipe and (b) at Ch.7+225 km shall include 900 mm ∅ RCC pipe. 1	

The typical section for the roadway drainage design considerations with their cross-sections are exhibited in the **Figures 8, 9, 10 and 11.**

Figure 8: Typical cross section (Ch. 0+000-0+540 & 0+540-1+040 km) (Road ID 2004)



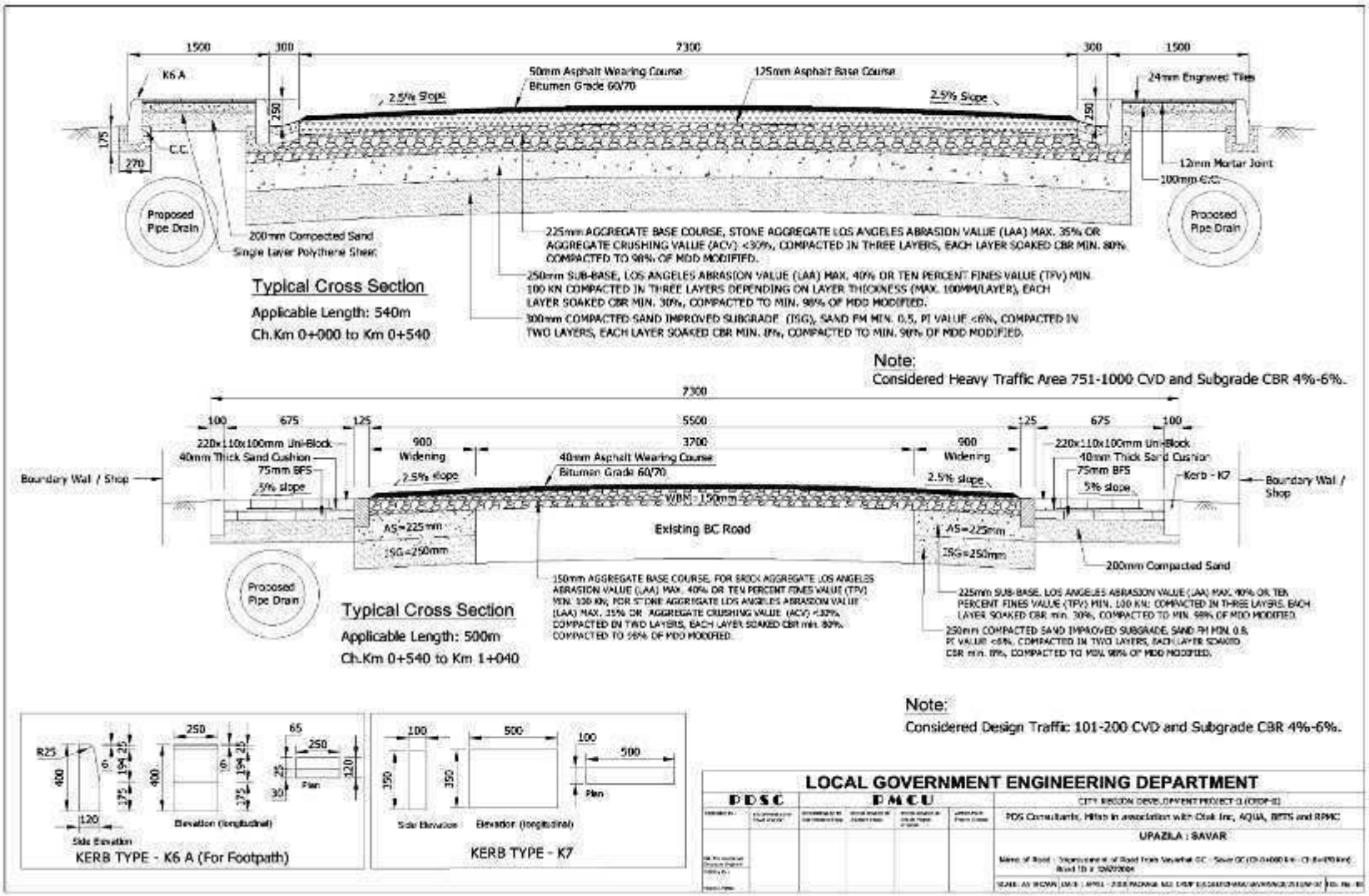
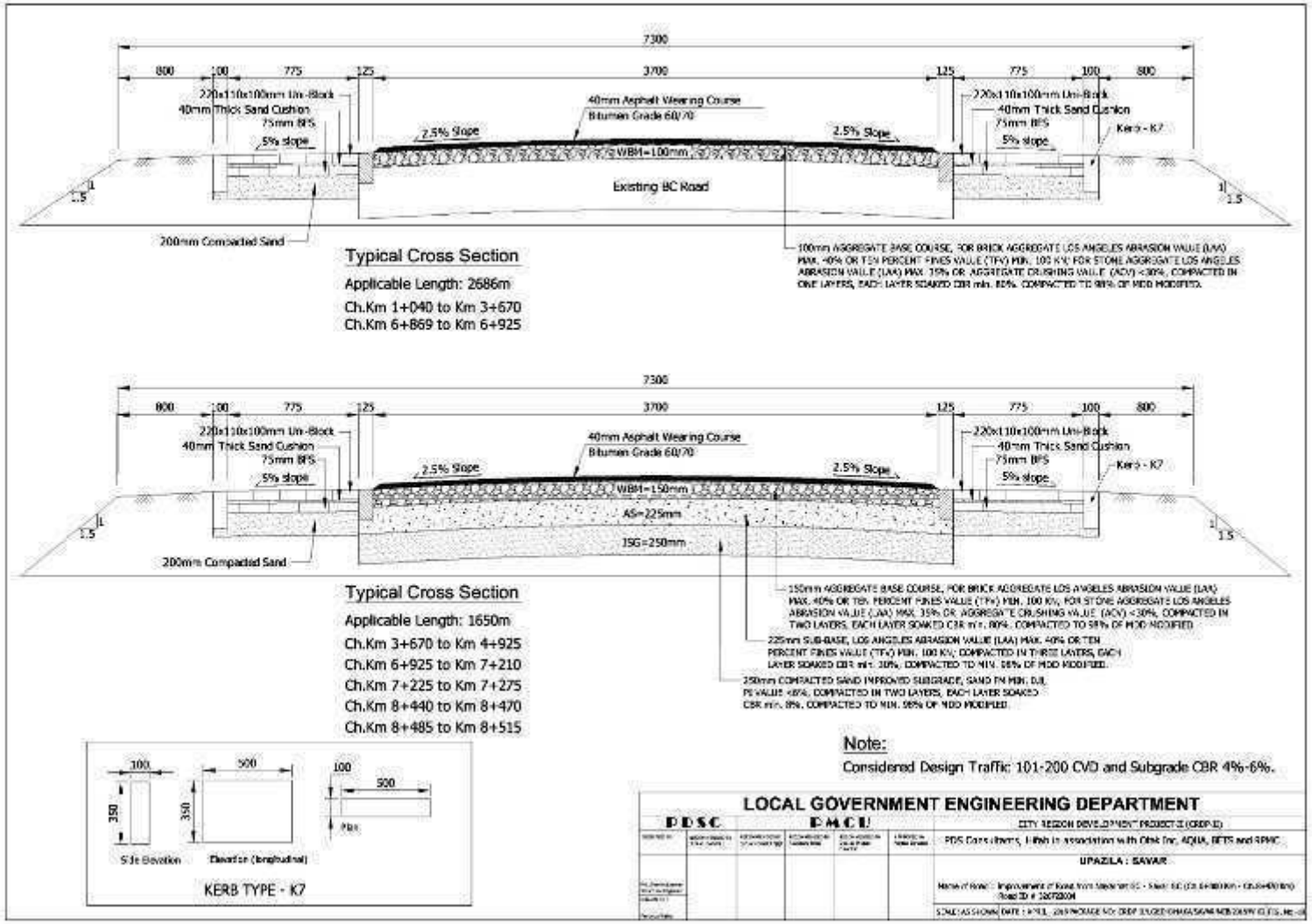
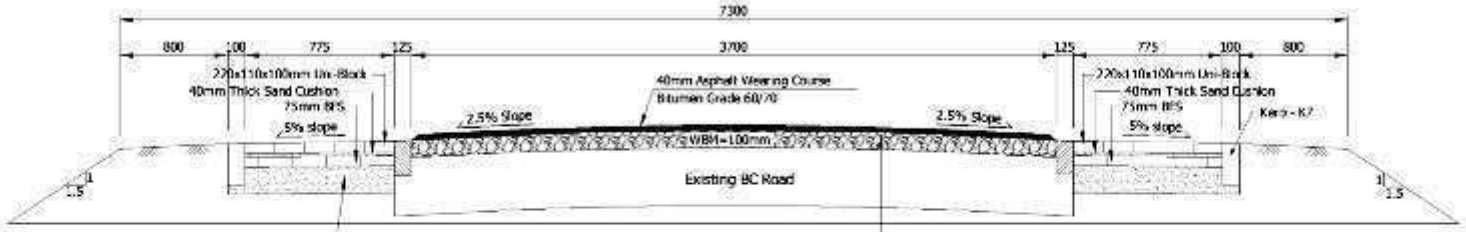

1500
300
7300
300
1500
K6 A
50mm Asphalt Wearing Course
Bitumen Grade 60/70
125mm Asphalt Base Course
2.5% Slope
2.5% Slope
24mm Engraved Tiles
250
250
175
270
C.C.
12mm Mortar Joint
100mm C.C.
Proposed Pipe Drain
Proposed Pipe Drain
200mm Compacted Sand
Single Layer Polythene Sheet
225mm AGGREGATE BASE COURSE, STONE AGGREGATE LOS ANGELES ABRASION VALUE (LAA) MAX. 35% OR AGGREGATE CRUSHING VALUE (ACV) <30%, COMPACTED IN THREE LAYERS, EACH LAYER SOAKED CBR MIN. 80% COMPACTED TO 98% OF MDD MODIFIED.
250mm SUB-BASE, LOS ANGELES ABRASION VALUE (LAA) MAX. 40% OR TEN PERCENT FINES VALUE (TPV) MIN. 100 KN COMPACTED IN THREE LAYERS DEPENDING ON LAYER THICKNESS (MAX. 100MM/LAYER), EACH LAYER SOAKED CBR MIN. 30%, COMPACTED TO MIN. 98% OF MDD MODIFIED.
300mm COMPACTED SAND IMPROVED SUBGRADE (ISG), SAND FM MIN. 0.5, PI VALUE <6%, COMPACTED IN TWO LAYERS, EACH LAYER SOAKED CBR MIN. 8%, COMPACTED TO MIN. 98% OF MDD MODIFIED.
Typical Cross Section
Applicable Length: 540m
Ch.Km 0+000 to Km 0+540
Note:
Considered Heavy Traffic Area 751-1000 CVD and Subgrade CBR 4%-6%.
7300
100
675
125
5500
3700
900
Widening
2.5% slope
40mm Asphalt Wearing Course
Bitumen Grade 60/70
220x110x100mm Uni-Block
40mm Thick Sand Cushion
75mm BFS
5% slope
Boundary Wall / Shop
WBM - 150mm
AS=225mm
ISG=250mm
Existing BC Road
Kerb - K7
200mm Compacted Sand
Proposed Pipe Drain
150mm AGGREGATE BASE COURSE, FOR BRICK AGGREGATE LOS ANGELES ABRASION VALUE (LAA) MAX. 40% OR TEN PERCENT FINES VALUE (TPV) MIN. 100 KN; FOR STONE AGGREGATE LOS ANGELES ABRASION VALUE (LAA) MAX. 35% OR AGGREGATE CRUSHING VALUE (ACV) <30%, COMPACTED IN TWO LAYERS, EACH LAYER SOAKED CBR min. 80% COMPACTED TO 98% OF MDD MODIFIED.
225mm SUB-BASE, LOS ANGELES ABRASION VALUE (LAA) MAX. 40% OR TEN PERCENT FINES VALUE (TPV) MIN. 100 KN; COMPACTED IN THREE LAYERS, EACH LAYER SOAKED CBR min. 30%, COMPACTED TO MIN. 98% OF MDD MODIFIED.
250mm COMPACTED SAND IMPROVED SUBGRADE, SAND FM MIN. 0.5, PI VALUE <6%, COMPACTED IN TWO LAYERS, EACH LAYER SOAKED CBR min. 8%, COMPACTED TO MIN. 98% OF MDD MODIFIED.
Typical Cross Section
Applicable Length: 500m
Ch.Km 0+540 to Km 1+040
Note:
Considered Design Traffic 101-200 CVD and Subgrade CBR 4%-6%.
R25
400
120
Side Elevation
250
65
Elevation (longitudinal)
Plan
KERB TYPE - K6 A (For Footpath)
100
500
350
Side Elevation
Elevation (longitudinal)
Plan
KERB TYPE - K7
LOCAL GOVERNMENT ENGINEERING DEPARTMENT
PDSC
PMCU
PDS Consultants, Hilfen in association with Oisk Inc, AQUA, BETS and RPMC
UPAZILA : SAVAR

Figure 9: Typical cross section (Ch. 1+040-3+670, 6+869-6+925, 3+670-4+925, 6+925-7+210, 7+225-7+275, 8+440-8+470 & 8+485-8+515 km) (Road ID 2004)



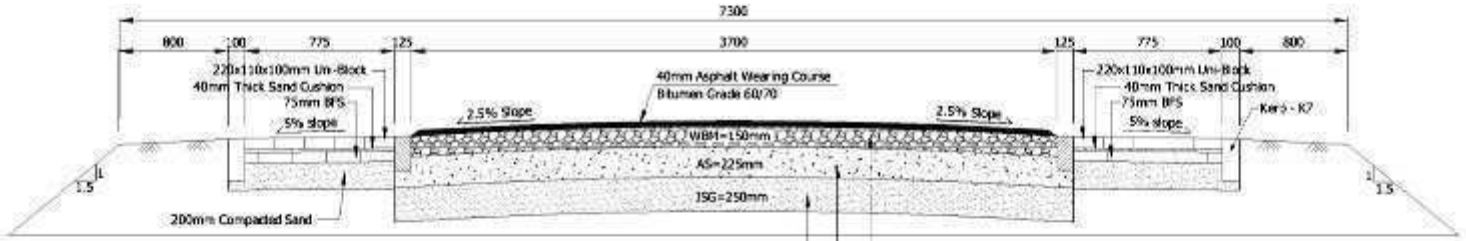


Typical Cross Section

Applicable Length: 2686m

Ch.Km 1+040 to Km 3+670
Ch.Km 6+869 to Km 6+925

100mm AGGREGATE BASE COURSE, FOR BRICK AGGREGATE LOS ANGELES ABRASION VALUE (LAA) MAX. 40% OR TEN PERCENT FINES VALUE (TFV) MIN. 100 KN, FOR STONE AGGREGATE LOS ANGELES ABRASION VALUE (LAA) MAX. 35% OR AGGREGATE CRUSHING VALUE (ACV) <30%, COMPACTED IN ONE LAYERS, EACH LAYER SOAKED CBR min. 80%. COMPACTED TO 98% OF MDD MODIFIED.



Typical Cross Section

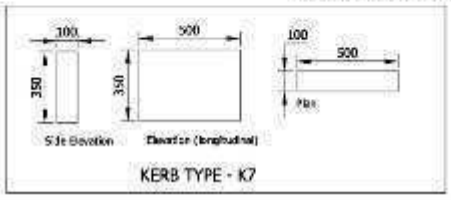
Applicable Length: 1650m

Ch.Km 3+670 to Km 4+925
Ch.Km 6+925 to Km 7+210
Ch.Km 7+225 to Km 7+275
Ch.Km 8+440 to Km 8+470
Ch.Km 8+485 to Km 8+515

150mm AGGREGATE BASE COURSE, FOR BRICK AGGREGATE LOS ANGELES ABRASION VALUE (LAA) MAX. 40% OR TEN PERCENT FINES VALUE (TFV) MIN. 100 KN, FOR STONE AGGREGATE LOS ANGELES ABRASION VALUE (LAA) MAX. 35% OR AGGREGATE CRUSHING VALUE (ACV) <30%, COMPACTED IN TWO LAYERS, EACH LAYER SOAKED CBR min. 80%. COMPACTED TO 98% OF MDD MODIFIED

225mm SUB-BASE, LOS ANGELES ABRASION VALUE (LAA) MAX. 40% OR TEN PERCENT FINES VALUE (TFV) MIN. 100 KN, COMPACTED IN THREE LAYERS, EACH LAYER SOAKED CBR min. 30%, COMPACTED TO MIN. 98% OF MDD MODIFIED.

250mm COMPACTED SAND IMPROVED SUBGRADE, SAND FM MIN. 0.8, PI VALUE <6%, COMPACTED IN TWO LAYERS, EACH LAYER SOAKED CBR min. 8%, COMPACTED TO MIN. 98% OF MDD MODIFIED



KERB TYPE - K7

Note:

Considered Design Traffic: 101-200 CVD and Subgrade CBR 4%-6%.

LOCAL GOVERNMENT ENGINEERING DEPARTMENT

PDSC | PMCU

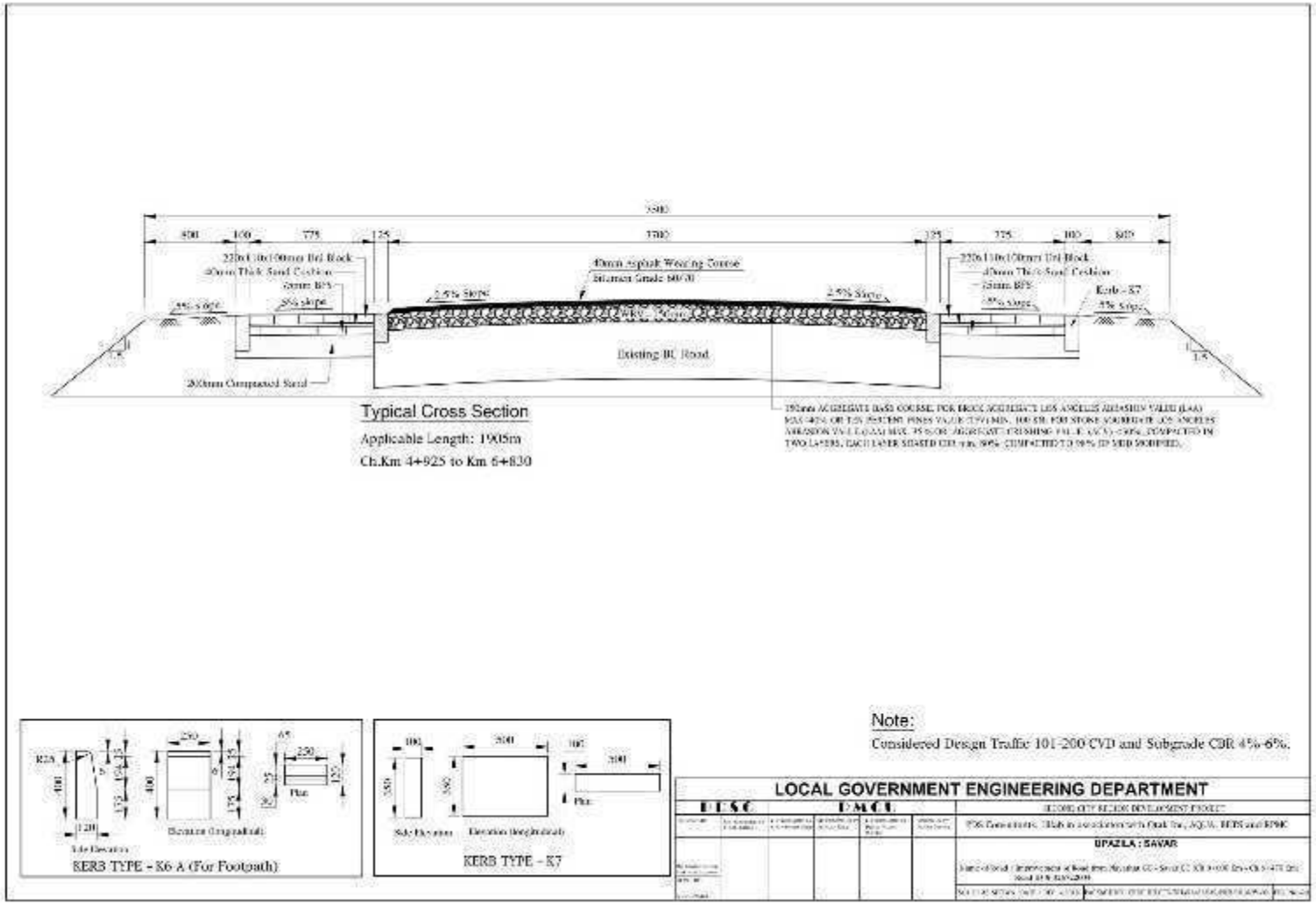
CITY REGION DEVELOPMENT PROJECT II (CRDP II)

PDS Consultants, Ltd in association with Oitek Inc, AQUA, BETS and RPMC

UPAZILA : SAVAR

Road ID # 10072004

Figure 10: Typical cross section (Ch. 4+925 - 6+830 km) (Road ID 2004)



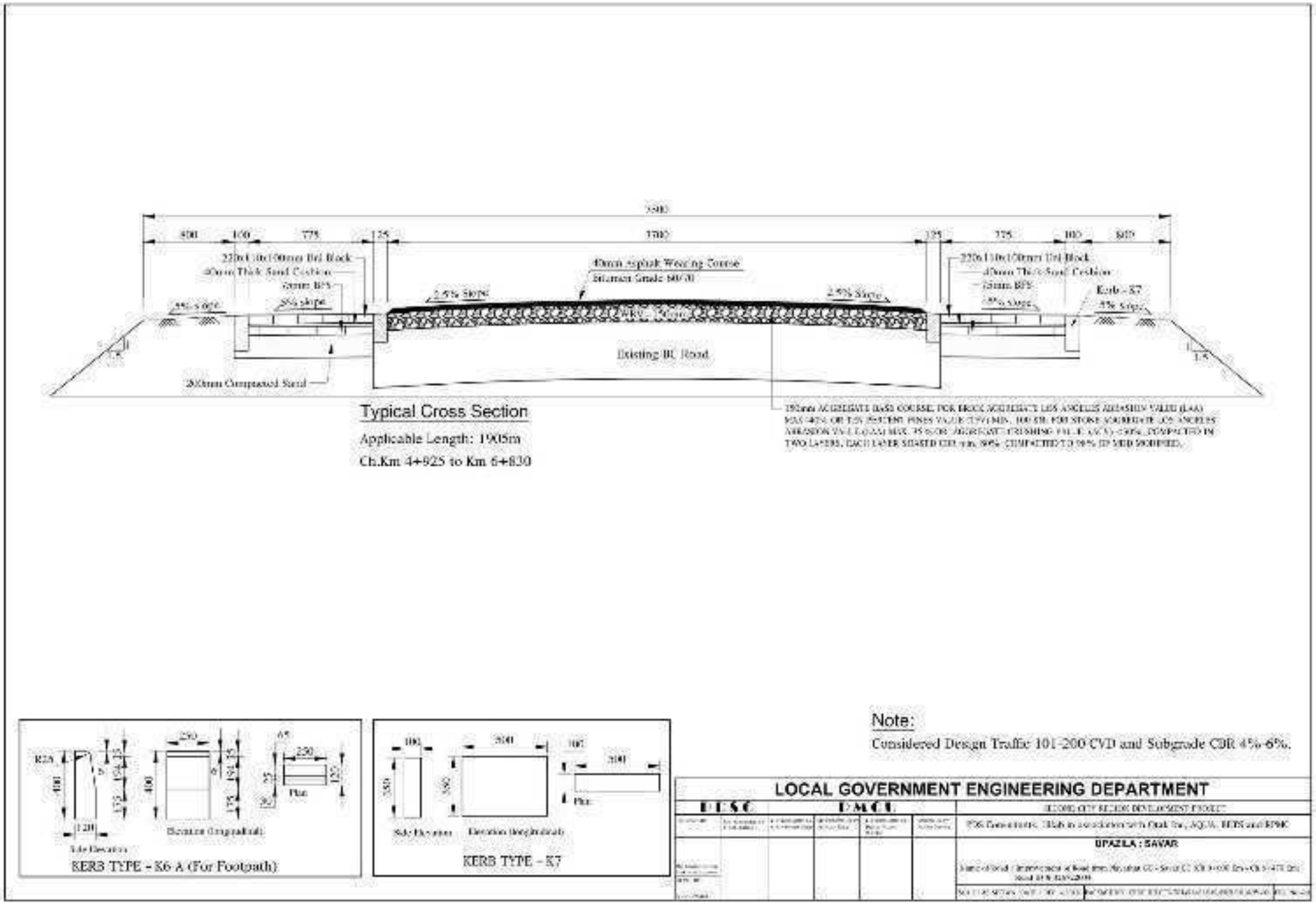
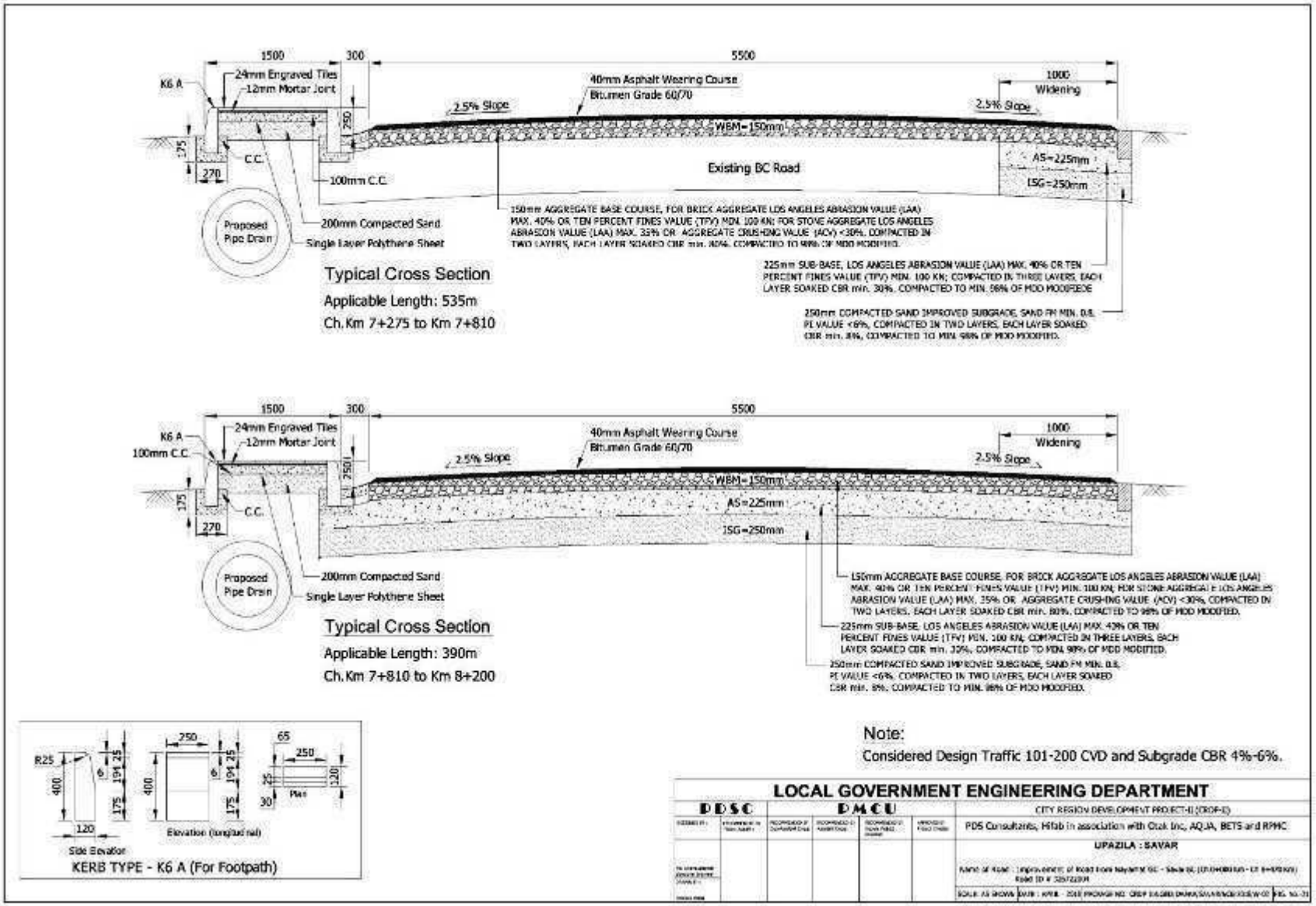
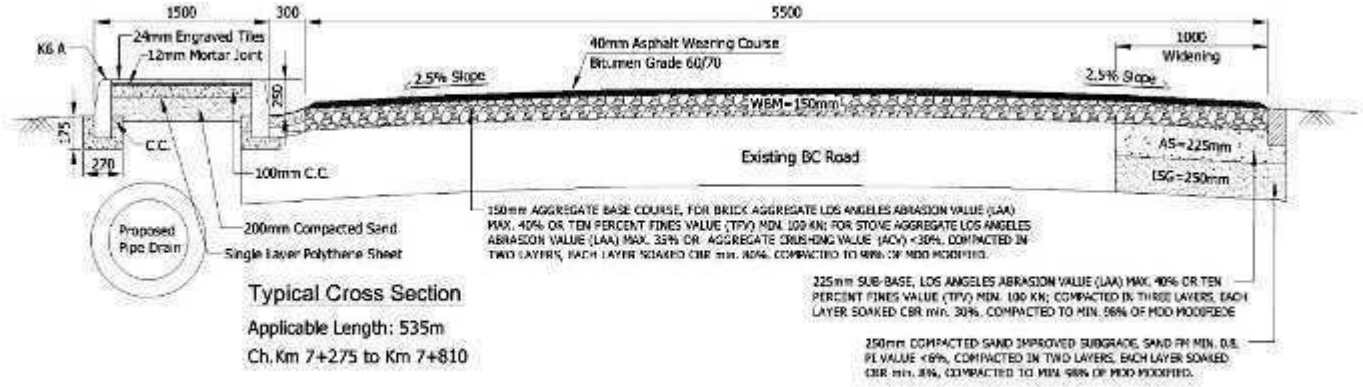

40mm Asphalt Wearing Course
Bitumen Grade 60/70
2.5% Slope
2.5% Slope
5% slope
Kerb - K7
200mm Compacted Sand
Existing BC Road
Typical Cross Section
Applicable Length: 1905m
Ch.Km 4+925 to Km 6+830
Note:
Considered Design Traffic 101-200 CVD and Subgrade CBR 4%-6%.
KERB TYPE - K6-A (For Footpath)
KERB TYPE - K7
LOCAL GOVERNMENT ENGINEERING DEPARTMENT
UPAZILA : SAVAR

Figure 11: Typical cross section (Ch. 7+275-7+810 km and Ch. 7+810-8+200) (Road ID 2004)

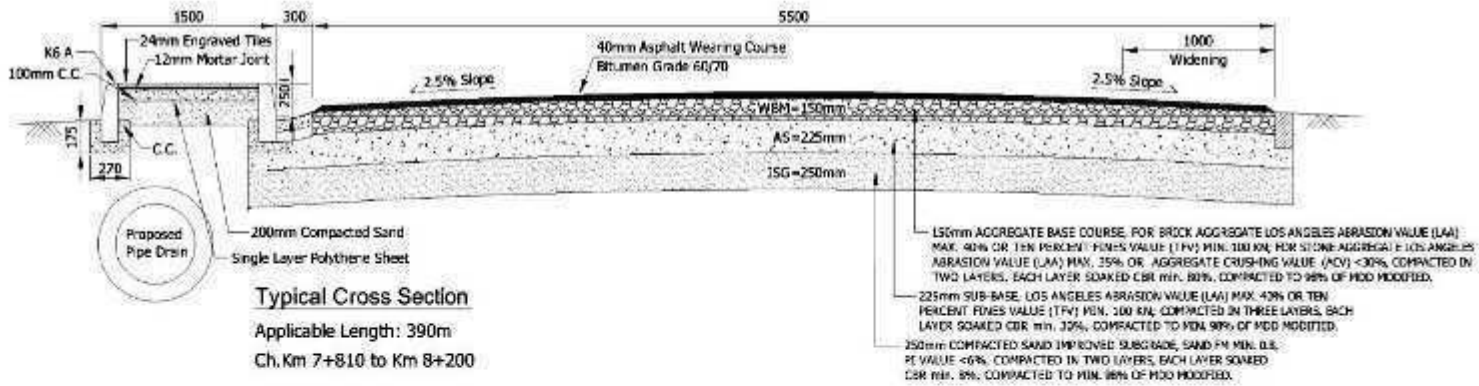




Typical Cross Section

Applicable Length: 535m

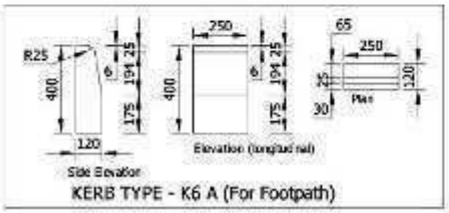
Ch.Km 7+275 to Km 7+810



Typical Cross Section

Applicable Length: 390m

Ch.Km 7+810 to Km 8+200



KERB TYPE - K6 A (For Footpath)

Note:

Considered Design Traffic 101-200 CVD and Subgrade CBR 4%-6%.

LOCAL GOVERNMENT ENGINEERING DEPARTMENT

PDSC	PMCU	CITY REGION DEVELOPMENT PROJECT-II (CRDP-II)
		PDS Consultants, Hifab in association with Otak Inc, AQUA, BETS and RPMC
		UPAZILA : SAVAR

Road-2 (ID 3024) : Improvement of the road from Dhaka - Aricha RHD at Dairy Farm Gate - Pathalia UP Office Kashipur and Monohor Road (4.567 km)

71. Proposed interventions planned for the Existing Road (ID No. 3024) : Improvement of the road from Dhaka - Aricha RHD at Dairy Farm Gate - Pathalia UP Office Kashipur and Monohor Road are as follows:

(i) Improvement of the existing road, including soft shoulder at both sides of the road within ROW;

(ii) Construction of BC carriageway of width 3.0 m as per design, and it will include soft shoulders on either sides of vacant road width;

(iii) Construction of 15 (fifteen) U-Drains at:

Ch.1575m, Ch.1655m, Ch.1616m, Ch.1852m, Ch.2140m, Ch,2680m, Ch.2948m, Ch.3094m, Ch.3780m, Ch.3836m, Ch.4391m, Ch.4480m, Ch.4757m, Ch.5019m, Ch.5657m;

(iv) Construction of 2 (two) Pipe Culverts of ∅ 1000mm at:

Ch.1575m and Ch.1655m

(v) Construction of a Cross-Drain of size 1.0m x 1.2m at Ch.3410m

(vi) Construction of a 42m Double Lane Bridge at Ch.3230m

(vii) Road improvement based on design that considers the road safety requirements per LGED published guidelines and standards.

(viii) Pavement works comprising construction of sub-grade, sub-base, base binder course and wearing course;

(vii) Protection works (pallisading) to be undertaken at 5 (five) locations where ditches and ponds adjacent to the road embankment are found. These will protect road edges from being eroded or sliding. Locations and lengths of proposed protection works at different sections of the alignment are shown in **Table 10** below:

Table 10: Locations and Lengths of Proposed Protection Works

Sl. no.	Left side (Chainage), km	Length (m)	Right side (Chainage), km	Length (m)
1	3+590 - 3+680	90	3+560 - 3+650	90
2	4+415 - 4+440	25	3+768 - 3+812	44
3			3+983 - 4+075	

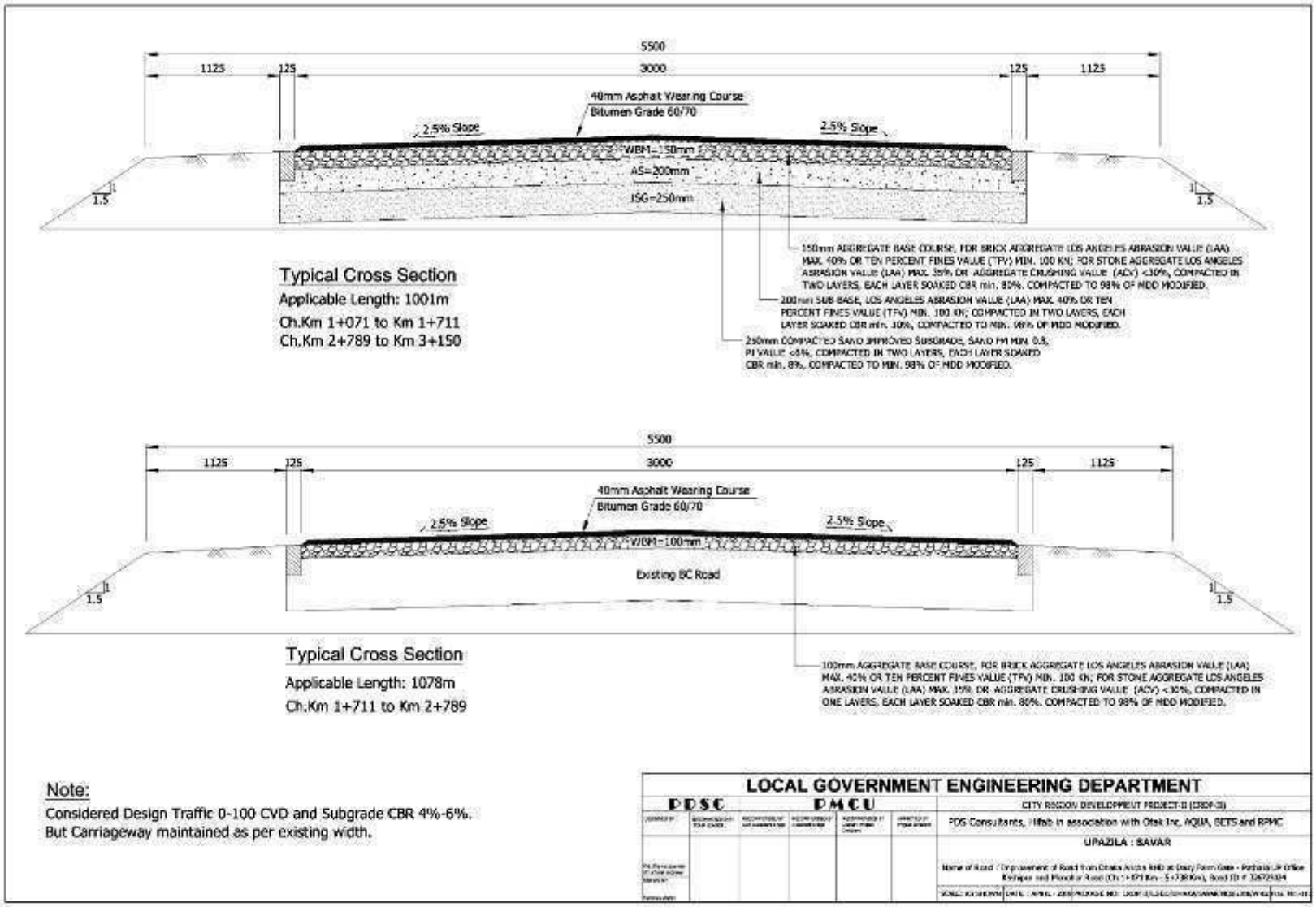
72. The existing status with proposed development interventions of this roadway drainage component is summarized in **Table 11.**.

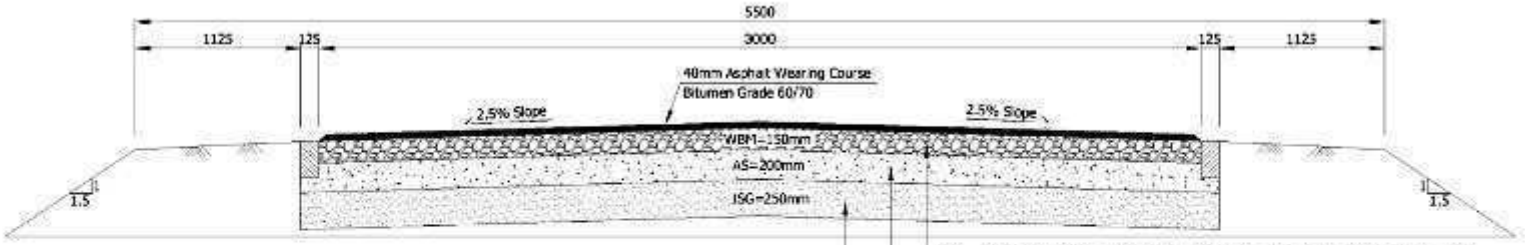
Table 11: Summary of Proposed Improvement of the road from Dhaka - Aricha RHD at Dairy Farm Gate - Pathalia UP Office Kashipur and Monohor Road (ID 3024)

Name of Subprojects	Length / Area	Subproject Components	Details of Proposed Works	Existing condition
Road-2 Improvement of the road from Dhaka - Aricha RHD at Dairy Farm Gate - Pathalia UP Office Kashipur and Monohor Road (ID 3024)	3.567 km	a. BC Pavement road b. Uni-Block Pavement road c. Drainage d. Slope protection works e. 1 (one) Bridge f. 1 (one) Cross-Drain g. 15 (fifteen) U-Drains h. 2 (two) Pipe Culverts	**Road:** a. BC Road with 3.0m Carriageway from Ch.1071-3150m & Ch.4280-5738m with soft shoulder b. Uni-Block Road with 3.0m Carriageway from from Ch.3150- Ch.4280m **Bridges:** 42m Double Lane Bridge at Ch.3230m, **U-Drain:** 15 (fifteen) U-Drains at - Ch.1575m, Ch.1655m, Ch.1616m, Ch.1852m, Ch.2140m, Ch,2680m, Ch.2948m, Ch.3094m, Ch.3780m, Ch.3836m, Ch.4391m, Ch.4480m, Ch.4757m, Ch.5019m & Ch.5657m. **Pipe Culverts:** 1000mm ∅ 2 (two). Pipe Culverts at - Ch.1152m & Ch.1313m. **Slope Protection Works:** At 5 sections (for details **Table 10** may be referred).	**Road:** a. BFS Road with 2.7m -3.0m carriageway from Ch.1071-1711m, Ch.3280-3685m, Ch.3764-3950m & Ch.4860-5738m. b. BC Road with 3.0m – 3.5m carriageway from Ch.1711-2789m & Ch.3685-3764m, c. HBB Road with 3.0m carriageway from Ch.2789-3217m. d. Earthen Road of 3.0m – 3.6m width from Ch.3950-4860m. **Bridges:** 1 (one) 60m Foot Bridge at Ch.3230m, **Pipe Culverts:** 16 (sixteen) Pipe Culverts of ∅ 300mm ~ 600mm at – Ch.1152m, Ch.1313m,Ch.1575m, Ch.1616m, Ch.1655m, Ch.2140m, Ch,2680m, Ch.2948m, Ch.3094m, Ch.3780m, Ch.3836m, Ch.4391m, Ch.4480m, Ch.4757m, Ch.5019m & Ch.5657m **U-Drain:** 4 (four) U-Drains at - Ch.1852m, Ch.4048m, Ch.4345m & Ch.5390m.

The typical section for the roadway drainage design considerations with their cross-sections are exhibited in the **Figures 12 and 13.**

Figure 12: Typical cross section (Ch. 1+071-1+711, 2+789-3+150 and 1+711-2+789 km (Road ID 3024)





Typical Cross Section

Applicable Length: 1001m

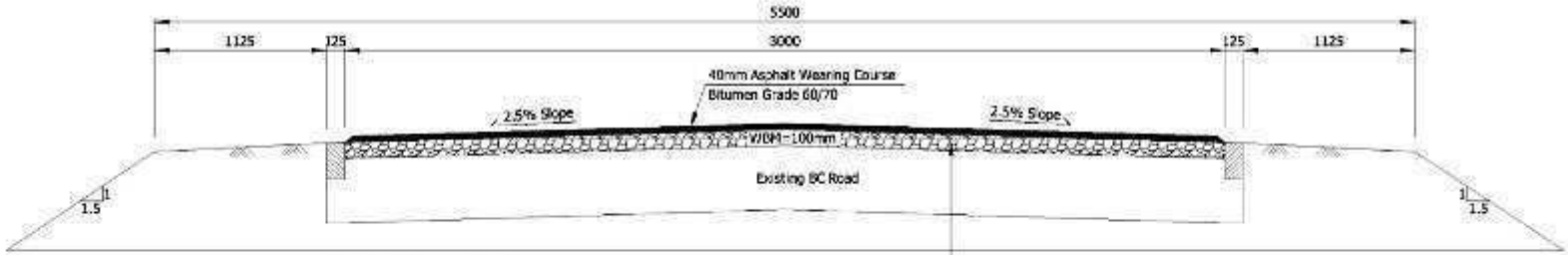
Ch.Km 1+071 to Km 1+711

Ch.Km 2+789 to Km 3+150

150mm AGGREGATE BASE COURSE, FOR BRICK AGGREGATE LOS ANGELES ABRASION VALUE (LAA) MAX. 40% OR TEN PERCENT FINES VALUE (TFV) MIN. 100 KN; FOR STONE AGGREGATE LOS ANGELES ABRASION VALUE (LAA) MAX. 35% OR AGGREGATE CRUSHING VALUE (ACV) <30%, COMPACTED IN TWO LAYERS, EACH LAYER SOAKED CBR min. 80%. COMPACTED TO 98% OF MDD MODIFIED.

200mm SUB BASE, LOS ANGELES ABRASION VALUE (LAA) MAX. 40% OR TEN PERCENT FINES VALUE (TFV) MIN. 100 KN; COMPACTED IN TWO LAYERS, EACH LAYER SOAKED CBR min. 30%, COMPACTED TO MIN. 98% OF MDD MODIFIED.

250mm COMPACTED SAND IMPROVED SUBGRADE, SAND FM MIN. 0.8, PI VALUE <6%, COMPACTED IN TWO LAYERS, EACH LAYER SOAKED CBR min. 8%, COMPACTED TO MIN. 98% OF MDD MODIFIED.



Typical Cross Section

Applicable Length: 1078m

Ch.Km 1+711 to Km 2+789

100mm AGGREGATE BASE COURSE, FOR BRICK AGGREGATE LOS ANGELES ABRASION VALUE (LAA) MAX. 40% OR TEN PERCENT FINES VALUE (TFV) MIN. 100 KN; FOR STONE AGGREGATE LOS ANGELES ABRASION VALUE (LAA) MAX. 35% OR AGGREGATE CRUSHING VALUE (ACV) <30%, COMPACTED IN ONE LAYERS, EACH LAYER SOAKED CBR min. 80%. COMPACTED TO 98% OF MDD MODIFIED.

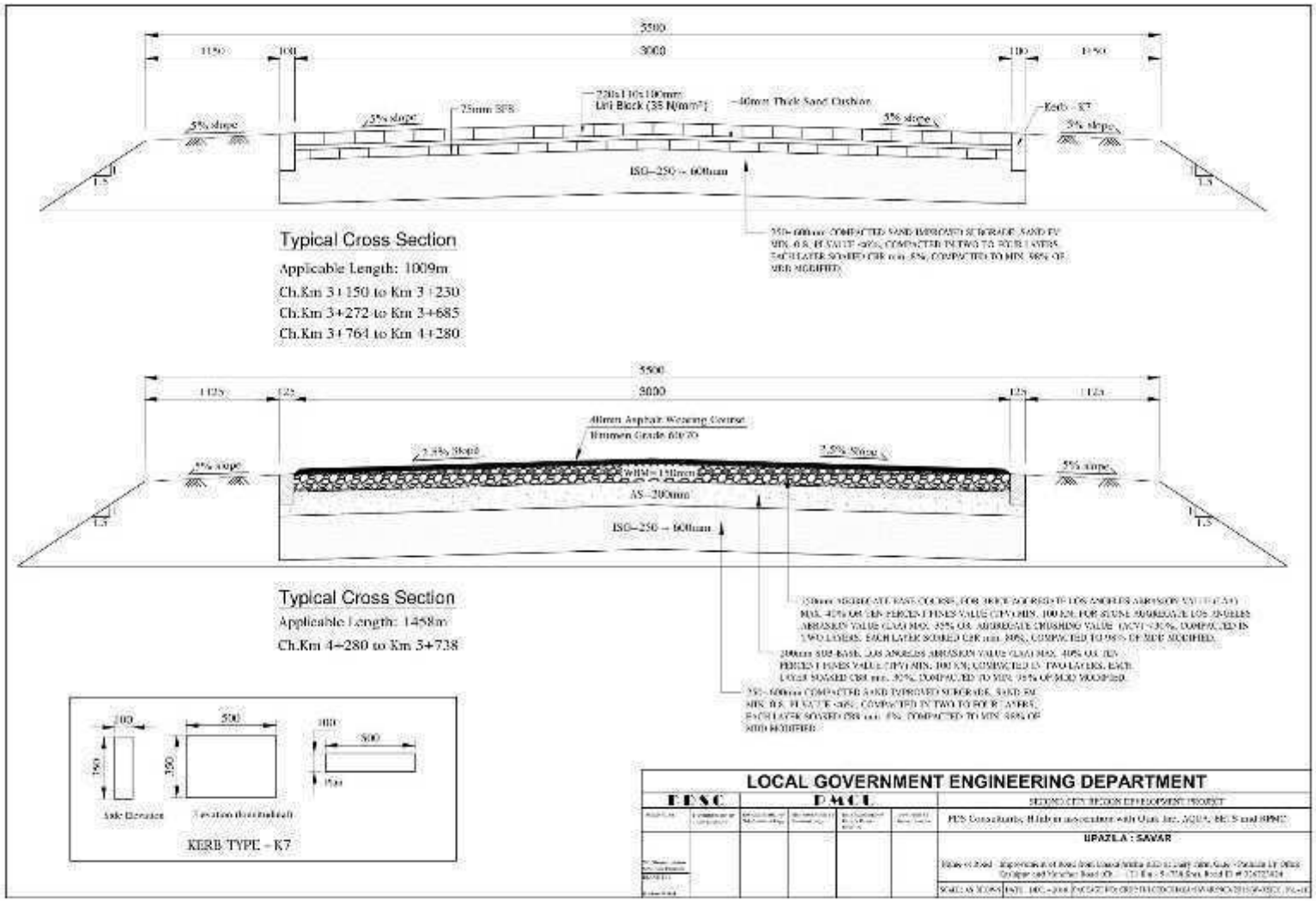
Note:

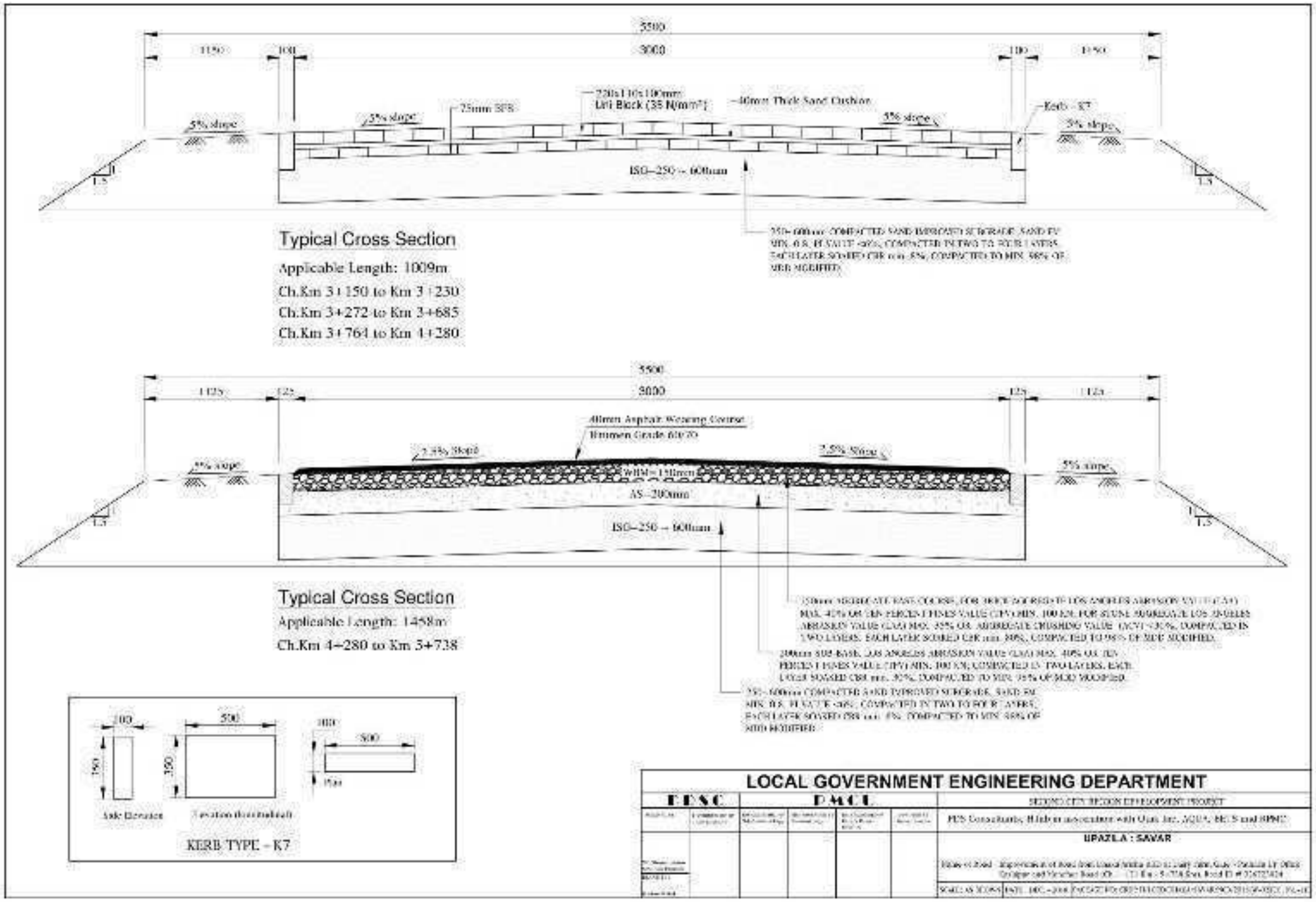
Considered Design Traffic 0-100 CVD and Subgrade CBR 4%-6%.
But Carriageway maintained as per existing width.

LOCAL GOVERNMENT ENGINEERING DEPARTMENT

PDSC	PMCU	CITY REGION DEVELOPMENT PROJECT-II (CRDP-II)
		PDS Consultants, Hifab in association with Otek Inc, AQUA, BETS and RPMC
		UPAZILA : SAVAR
		Name of Road : Improvement of Road from Dhaka Aricha RHD at Dairy Farm Gate - Pathalia UP Office Bridge and Mondalar Road (Ch : +871.8m - 5+738.90m), Road ID # 326725324
		SCALE: NO SCALE/MM DATE : APRIL - 2020 PACKAGE NO: CRDP/LG(E&C)/SAVAR/WBM-MDB-LOS/W-01 Rev. No : 01

Figure 13: Typical cross section (Ch. 3+150-3+230, 3+272-3+685, 3+764-4+280 and 4+280-5+738 (Road ID 3024)




5500
3000
5% slope
Kerb - K7
ISO-250 ~ 600mm
Typical Cross Section
Applicable Length: 1009m
Ch.Km 3+150 to Km 3+230
Ch.Km 3+272 to Km 3+685
Ch.Km 3+764 to Km 4+280
40mm Asphalt Wearing Course
Bitumen Grade 60/70
AS-200mm
Typical Cross Section
Applicable Length: 1458m
Ch.Km 4+280 to Km 5+738
KERB TYPE - K7
LOCAL GOVERNMENT ENGINEERING DEPARTMENT
UPAZILA : SAVAR

3. Road-3 (ID 3017): Improvement of the Road from Prantik bazar BLRI (RHD) – Ashulia UP Road (5.510 km)

73. Proposed interventions planned for the Existing Road (ID No. 3017): Improvement of the Road from Prantik bazar BLRI (RHD) – Ashulia UP Road are as follows

(i) Improvement of the existing road, including footpaths at both sides of the road within ROW;

(ii) Construction of BC carriageway of width 3.0 m as per design, and it will include hard shoulder/s or walkway/s and soft shoulders on either sides depending on the availability of vacant road width;

(iii) Construction of RCC Pipe Drain including drain pits and catch pits on the left side of the road alignment with outfall to the existing Pipe Drain in order to remove the roadside rainfall and run-off stagnant water:

- at Ch.0+00 - 0+500 km (1000 mm ∅ RCC pipe on Left side;

(iv) Proposed road improvement including construction of RCC Pipe Drain based on design that considers the road safety requirements per LGED published guidelines and standards.

(v) Pavement works comprising construction of sub-grade, sub-base, base binder course and wearing course;

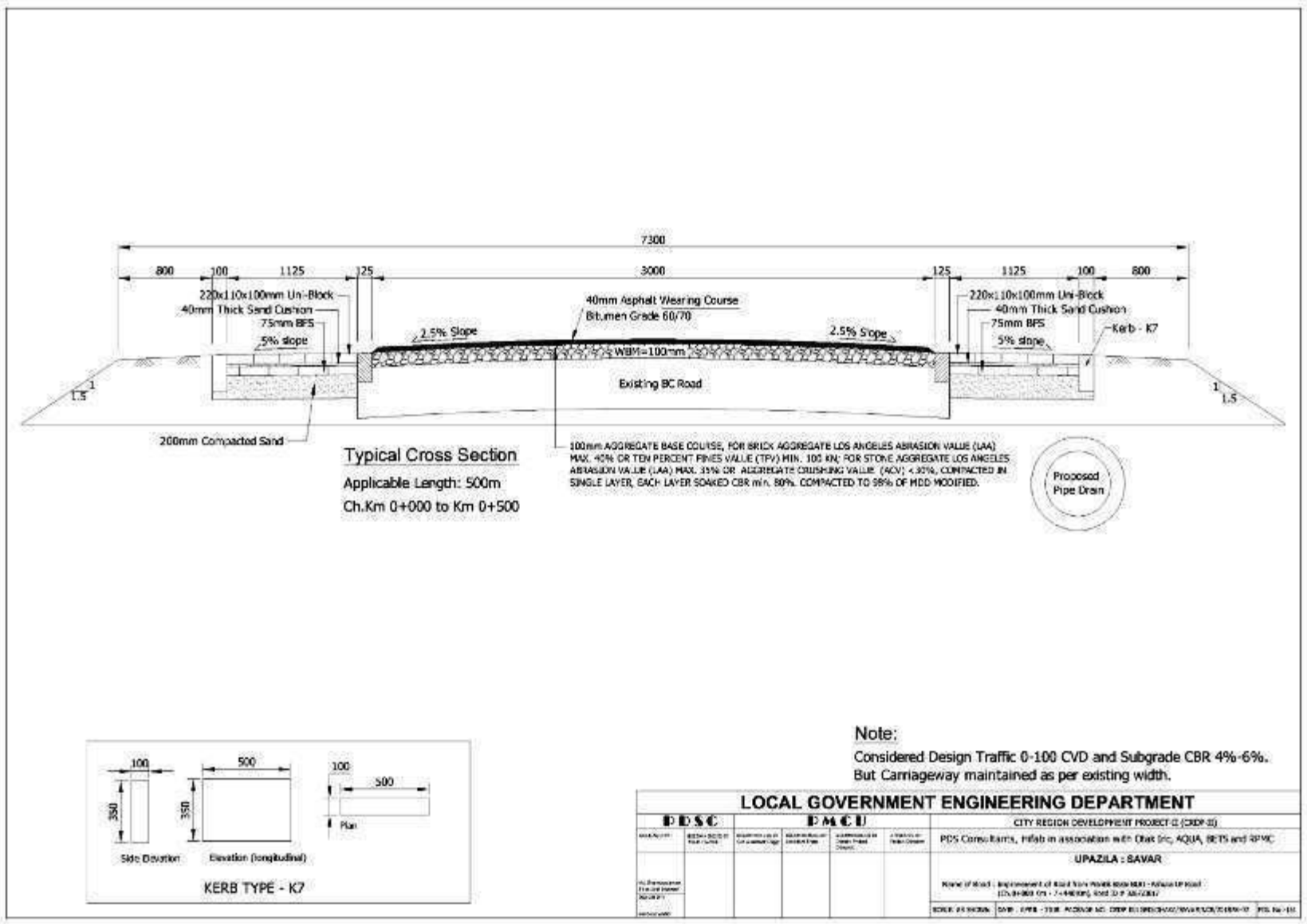
74. The existing status with proposed development interventions of this roadway drainage component is summarized in **Table 12.**.

Table 12: Summary of Proposed Improvement of the Road from Prantik bazar BLRI (RHD)-Ashulia UP Road (Road ID 3017)

Name of Subprojects	Length / Area	Subproject Components	Details of Proposed Works	Existing condition
Road-3 Improvement of the road from Prantik bazar BLRI (RHD) – Ashulia UP Road (ID 3017)	5.510 km	a. BC Pavement b. Drainage c. Hard Shoulder/Uni-Block pavement	**Road:** a. BC Road with 3.0m Carriageway from Ch.00-500m &Ch.3250m-5510m with Hard Shoulder and soft shoulder, Ch.500m-Ch.3250m only soft shoulder. **Drainage:** • at Ch.0+00-0+500 km (1000 mm ∅ RCC Pipe Drain on the Left side of the road alignment and Drain Pits and Catch Pits. .	**Road:** a. BFS Road with 3.0m carriageway from Ch.3250-3665m, Ch.3280-3685m, Ch.3764-3950m & Ch.4860-5738m. b. BC Road with 3.0m carriageway from Ch.000-3250m, Ch.3665-4225m & Ch.4335-5510m, c. HBB Road with 3.0m carriageway from Ch.4225-4335m. **Box Culverts:** 1 (one) Box Culvert (size: 4m X 4m) at Ch.3462m **U-Drain:** **1** (one) U-Drains at Ch.3462m.

The typical section for the roadway drainage design considerations with their cross-sections are exhibited in the **Figures 14 to 15.**

Figure 14: Typical cross section (Ch. 0+000 - 0+500) (Road ID 3024)



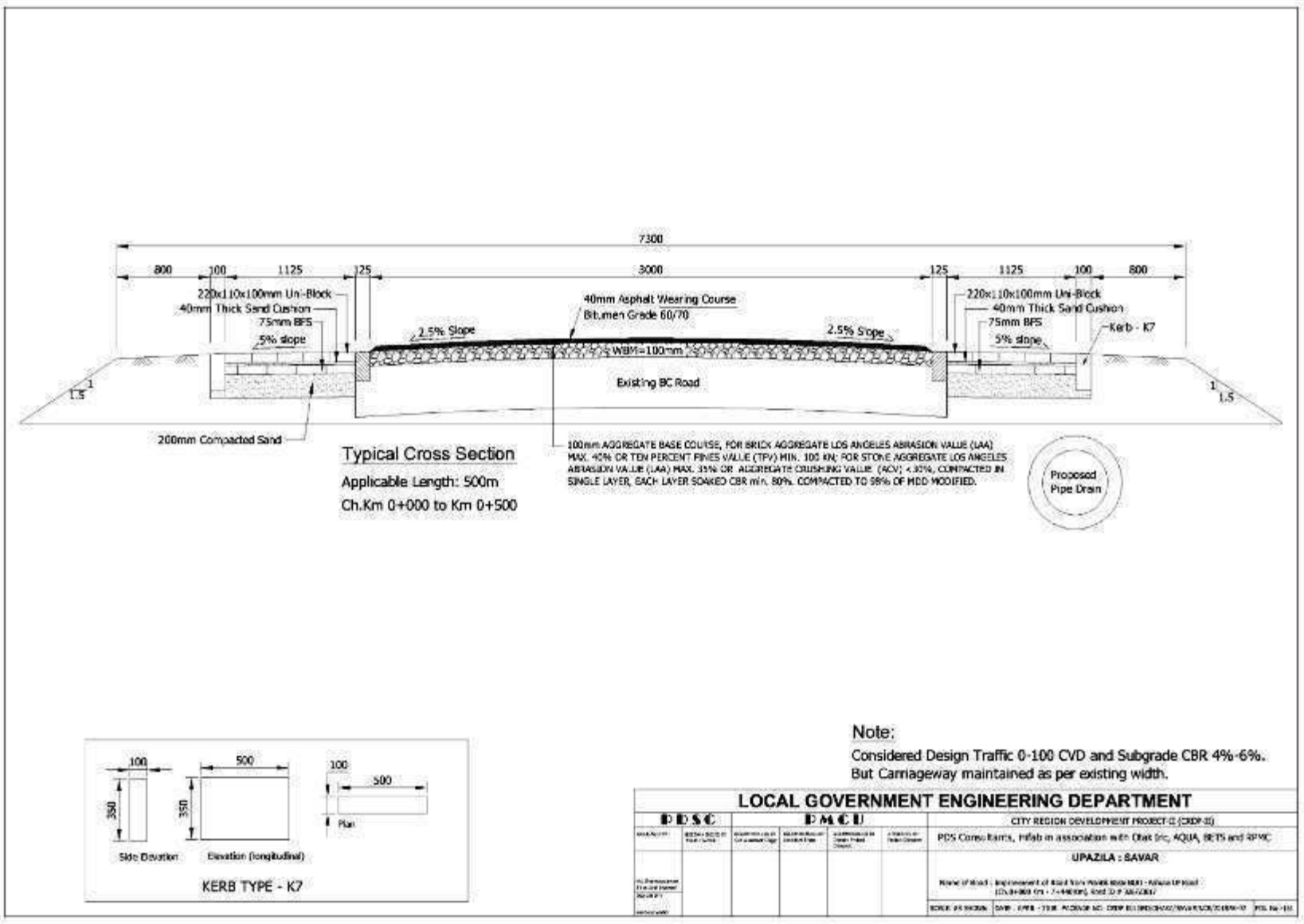
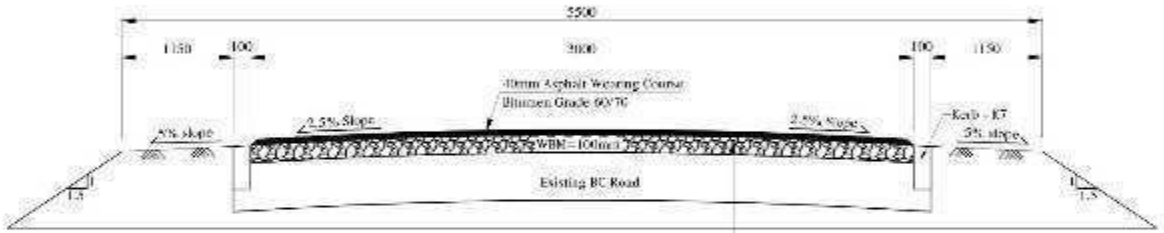


Figure 15: Typical cross section (Ch. 0+500-3+250, 3+665-4+225 and 4+335-5+510 (Road ID 3017)

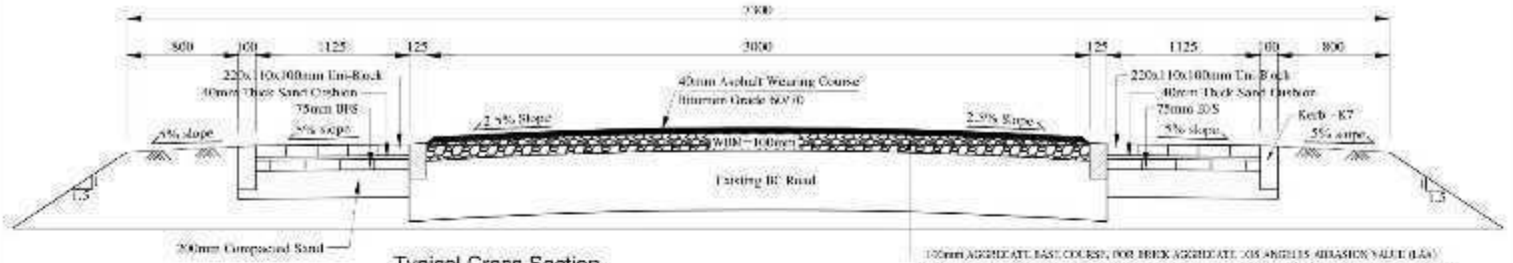


Typical Cross Section

Applicable Length: 2750m

Ch.Km 0+500 to Km 3+250

100mm AGGREGATE BASE COURSE, FOR BRICK AGGREGATE: LOS ANGELES ABRASION VALUE (LAA) MAX. 40% OR TEN PERCENT FINES VALUE (TFV) MIN. 100 KN; FOR STONE AGGREGATE: LOS ANGELES ABRASION VALUE (LAA) MAX. 35% OR AGGREGATE CRUSHING VALUE (ACV) <30%, COMPACTED IN SINGLE LAYER, EACH LAYER SOAKED CBR not. 80%, COMPACTED TO 98% OF MDD MODIFIED.



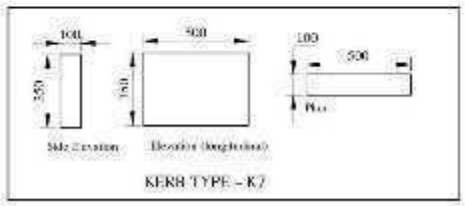
Typical Cross Section

Applicable Length: 1735m

Ch.Km 3+665 to Km 4+225

Ch.Km 4+335 to Km 5+510

100mm AGGREGATE BASE COURSE, FOR BRICK AGGREGATE: LOS ANGELES ABRASION VALUE (LAA) MAX. 40% OR TEN PERCENT FINES VALUE (TFV) MIN. 100 KN; FOR STONE AGGREGATE: LOS ANGELES ABRASION VALUE (LAA) MAX. 35% OR AGGREGATE CRUSHING VALUE (ACV) <30%, COMPACTED IN SINGLE LAYER, EACH LAYER SOAKED CBR not. 80%, COMPACTED TO 98% OF MDD MODIFIED.



KERB TYPE – K7

Note:

Considered Design Traffic 0-100 CVD and Subgrade CBR 4%-6%.
But Carriageway maintained as per existing width.

LOCAL GOVERNMENT ENGINEERING DEPARTMENT

DESC	PMCU	SECOND CITY REGION DEVELOPMENT PROJECT
		PDS Consultants, Ellipse in association with Oval Inc., AQUA, BETS and SPMC
		UPAZILA : SAVAR

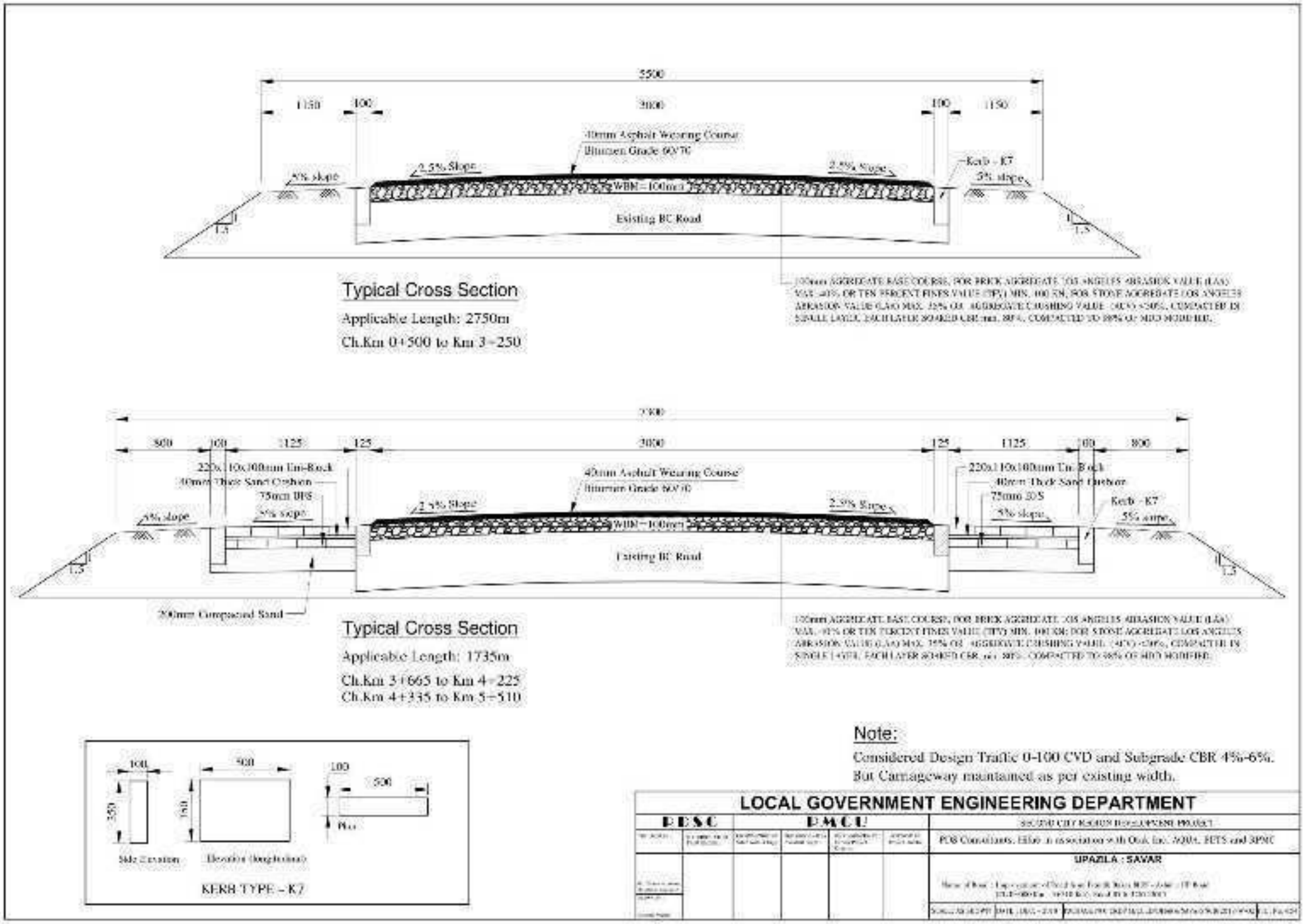
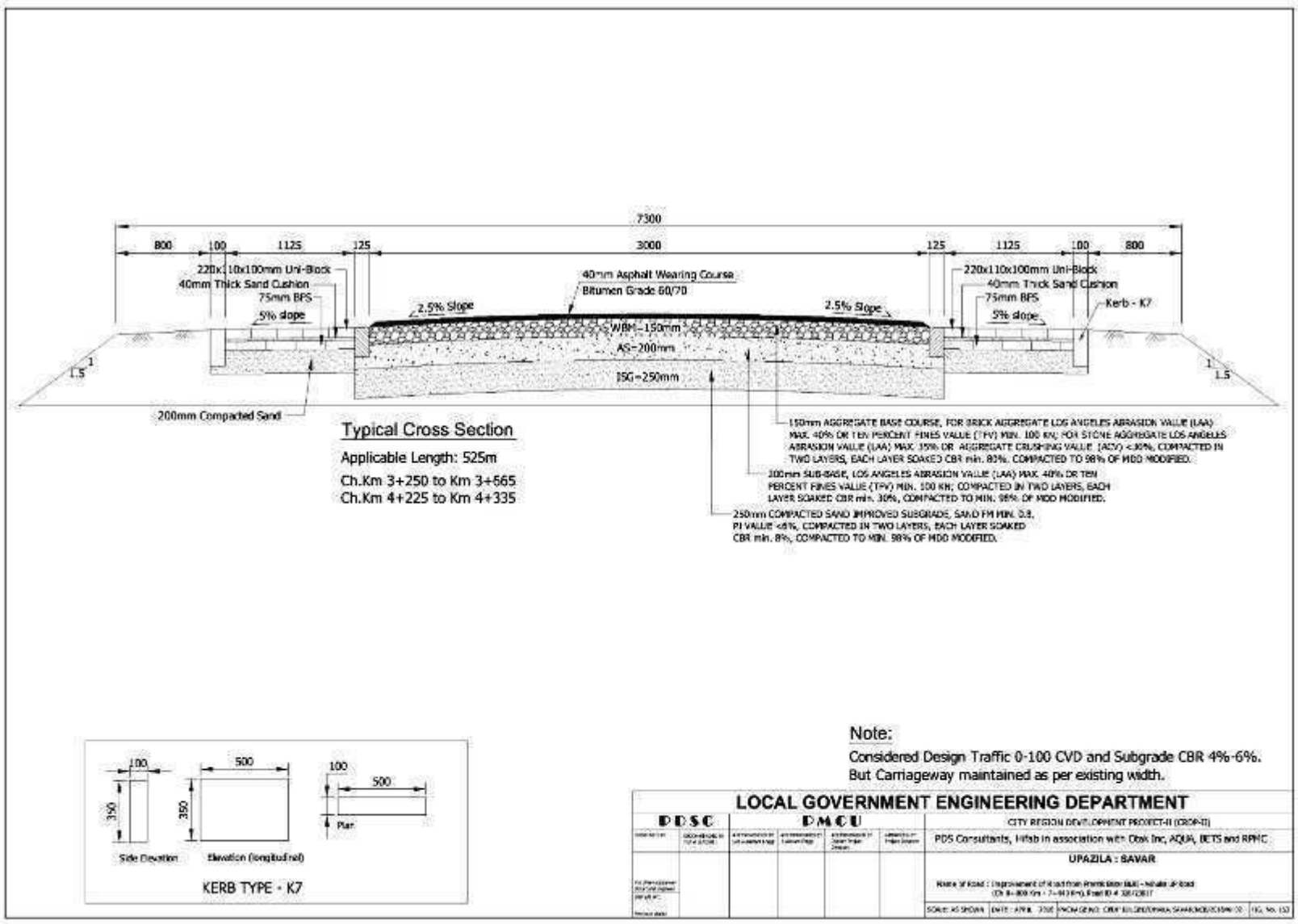
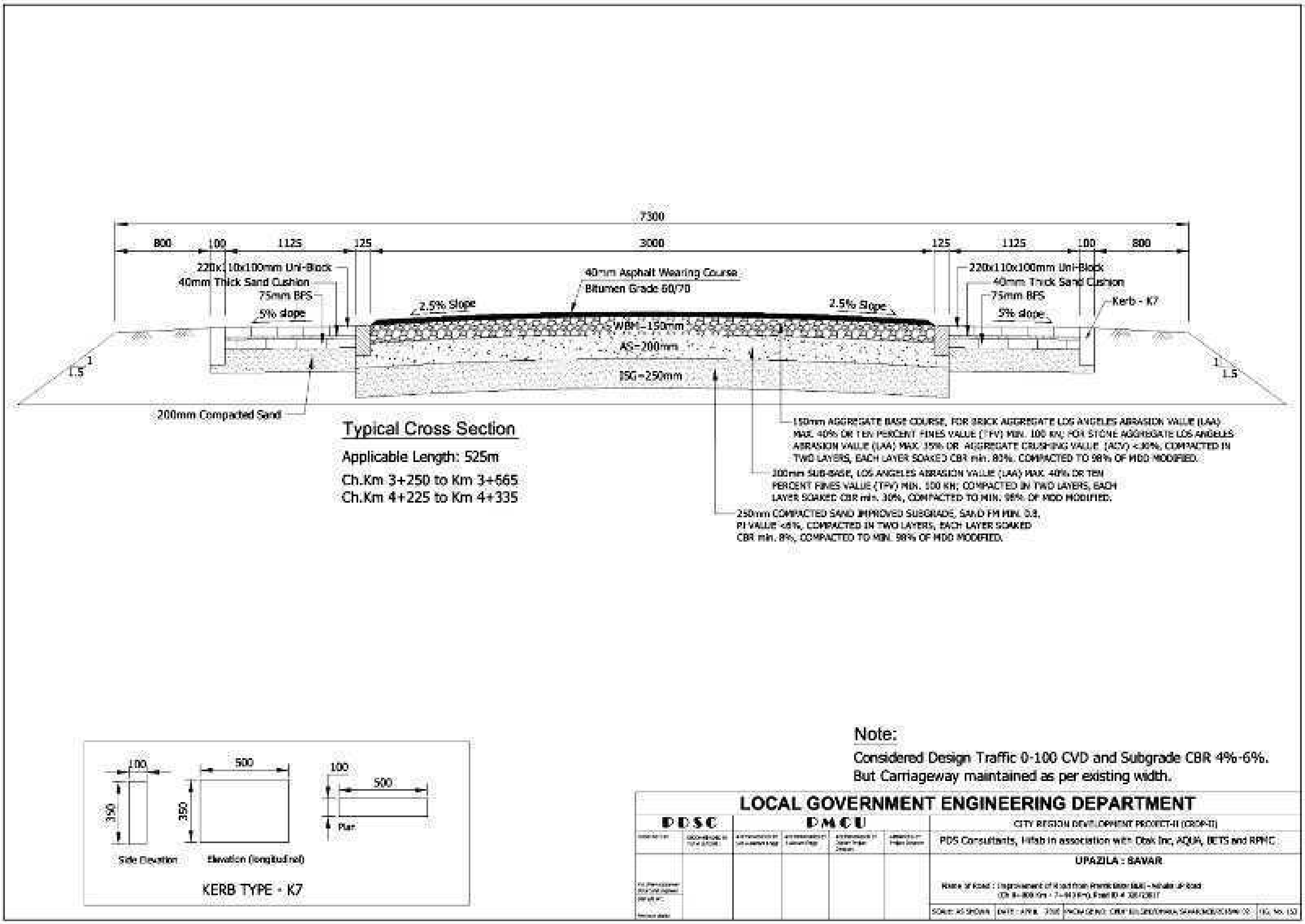

5500
1150
100
3000
100
1150
40mm Asphalt Wearing Course
Bitumen Grade 60/70
2.5% Slope
2.5% Slope
5% slope
5% slope
Kerb - K7
WBM=100mm
Existing BC Road
Typical Cross Section
Applicable Length: 2750m
Ch.Km 0+500 to Km 3+250
800
100
1125
125
3000
125
1125
100
800
220x110x100mm Uni-Block
40mm Thick Sand Cushion
75mm BFS
40mm Asphalt Wearing Course
Bitumen Grade 60/70
2.5% Slope
2.5% Slope
5% slope
Kerb - K7
WBM=100mm
Existing BC Road
200mm Compacted Sand
Typical Cross Section
Applicable Length: 1735m
Ch.Km 3+665 to Km 4+225
Ch.Km 4+335 to Km 5+510
Note:
Considered Design Traffic 0-100 CVD and Subgrade CBR 4%-6%.
But Carriageway maintained as per existing width.
KERB TYPE - K7
LOCAL GOVERNMENT ENGINEERING DEPARTMENT
UPAZILA : SAVAR

Figure 16: Typical cross section (Ch. 3+250-3+665 and 4+225-4+335 (Road ID 3017)




7300
800
100
1125
125
3000
220x110x100mm Uni-Block
40mm Thick Sand Cushion
75mm BFS
5% slope
2.5% Slope
40mm Asphalt Wearing Course
Bitumen Grade 60/70
WBM=150mm
AS=200mm
ISG=250mm
Kerb - K7
200mm Compacted Sand
Typical Cross Section
Applicable Length: 525m
Ch.Km 3+250 to Km 3+565
Ch.Km 4+225 to Km 4+335
150mm AGGREGATE BASE COURSE, FOR BRICK AGGREGATE LOS ANGELES ABRASION VALUE (LAA) MAX. 40% OR TEN PERCENT FINES VALUE (TFV) MIN. 100 KN; FOR STONE AGGREGATE LOS ANGELES ABRASION VALUE (LAA) MAX. 35% OR AGGREGATE CRUSHING VALUE (ACV) <30%, COMPACTED IN TWO LAYERS, EACH LAYER SOAKED CBR min. 80%. COMPACTED TO 98% OF MDD MODIFIED.
200mm SUB-BASE, LOS ANGELES ABRASION VALUE (LAA) MAX. 40% OR TEN PERCENT FINES VALUE (TFV) MIN. 100 KN; COMPACTED IN TWO LAYERS, EACH LAYER SOAKED CBR min. 30%, COMPACTED TO MIN. 98% OF MDD MODIFIED.
250mm COMPACTED SAND IMPROVED SUBGRADE, SAND FM MIN. 0.8, PI VALUE <6%, COMPACTED IN TWO LAYERS, EACH LAYER SOAKED CBR min. 8%, COMPACTED TO MIN. 98% OF MDD MODIFIED.
Side Elevation
Elevation (longitudinal)
Plan
KERB TYPE - K7
Note:
Considered Design Traffic 0-100 CVD and Subgrade CBR 4%-6%.
But Carriageway maintained as per existing width.
LOCAL GOVERNMENT ENGINEERING DEPARTMENT
PDSC
PMCU
CITY REGION DEVELOPMENT PROJECT-II (CRDP-II)
PDS Consultants, Hifab in association with Dtek Inc, AQUA, BETS and RPMC
UPAZILA : SAVAR

4. Road-4: Improvement of the road from Ashulia UP-Katgora Bazar via Boro Rangamatia Road (ID 3010)

75. Proposed interventions planned for the Existing Road (ID 3010) from Ashulia UP-Katgora Bazar via Boro Rangamatia Road are as follows:

    (i) Improvement of the existing road, including hard/soft shoulder on both sides which are within ROW;

    (ii) Construction of BC carriageway of width 3.0 m and RCC carriageway of width 3.0 ~ 5,5 m as per design, and it will include hard shoulder/s or walkway/s and soft shoulders on either sides depending on the availability of vacant road width;

    (iii) Pavement works comprising construction of sub-grade, sub-base, base binder course and wearing course;

    (iv) Road improvement based on design that considers the road safety requirements per LGED published guidelines and standards.

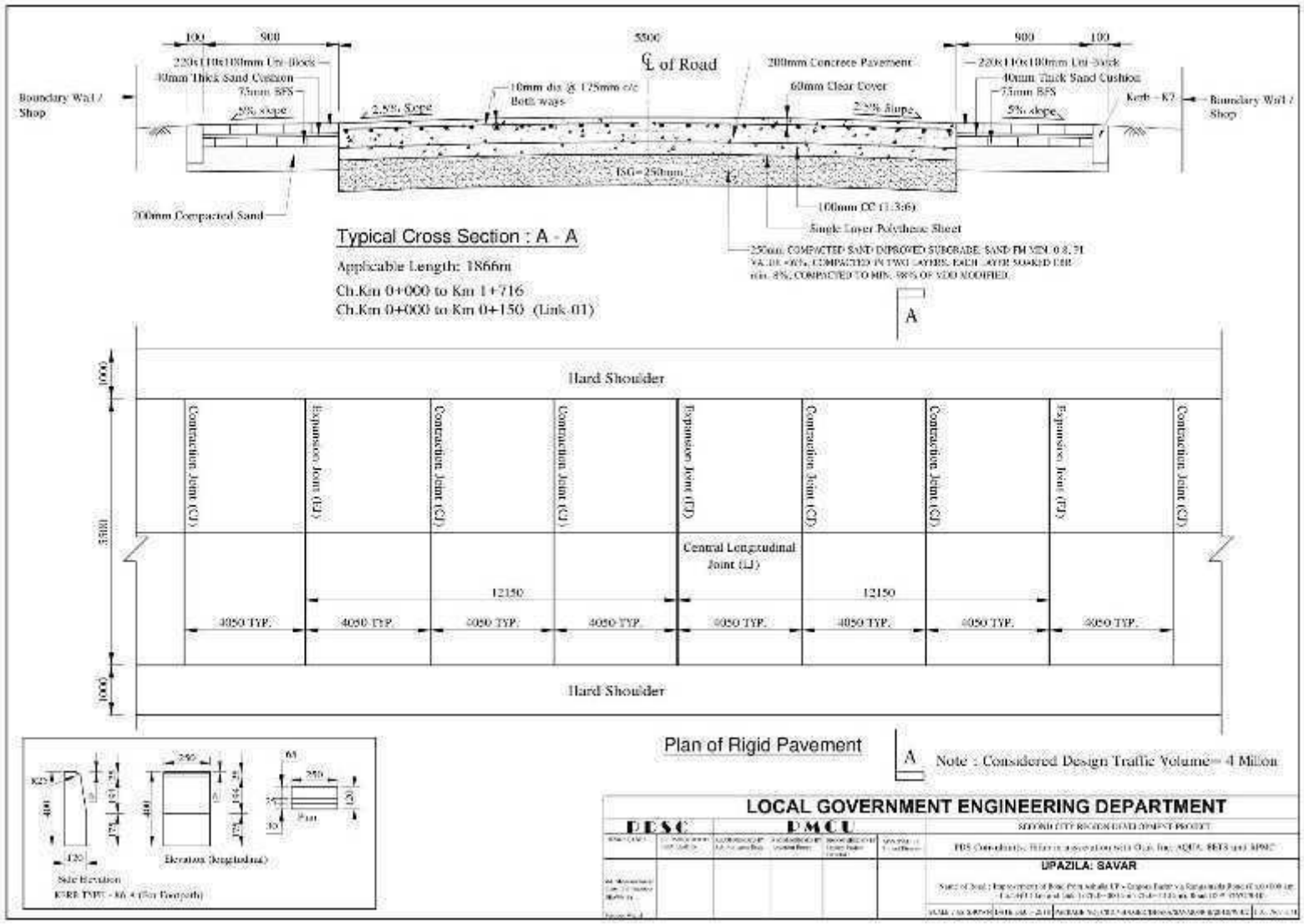
76. The existing status with proposed development interventions of this road component is summarized in **Table 13.**

Table 13: Summary of Proposed Improvement of the road from Ashulia UP-Katgora Bazar via Boro Rangamatia Road (Road ID 3010)

Name of Subprojects	Length / Area	Subproject Components	Details of Proposed Works	Existing condition
Road-4 Improvement of the road from Ashulia UP-Katgora Bazar via Boro Rangamatia Road (ID 3010)	4.761 km	a. BC and RCC Pavement b. Hard Shoulder/Uni-Block pavement	**Road:** a. BC Road with 3.0m Carriageway from Ch.2000-Ch.2900m with Hard Shoulder and soft shoulder, Ch.2900m-Ch.4000m only soft shoulder. b. RCC Road with 3.0m Carriageway from Ch.1716-2000m & Ch.4000-4611m with Hard Shoulder and soft shoulder. c. RCC Road with 5.5m Carriageway from Ch.00-1716m & Ch.00-150m (Link-1) with Hard and soft shoulder. .	**Road:** a. HBB Road with 3.0m - 4.5m carriageway from Ch.000-1716 & Ch.3037-3320m b. BC Road with 3.0m – 4m carriageway from Ch.1716-3037m & Ch.3320-4611m, . **Box Culverts:** 1 (one) Box Culvert of size 2 x 3.7m x 3.7m at Ch.1716m

The typical section for the roadway drainage design considerations with their cross-sections are exhibited in the **Figures 17 to 19.**

Figure 17: Typical cross section (Ch. 0+000-1+716 and 0+000-0+150 (Link-1)) (Road ID 3010)



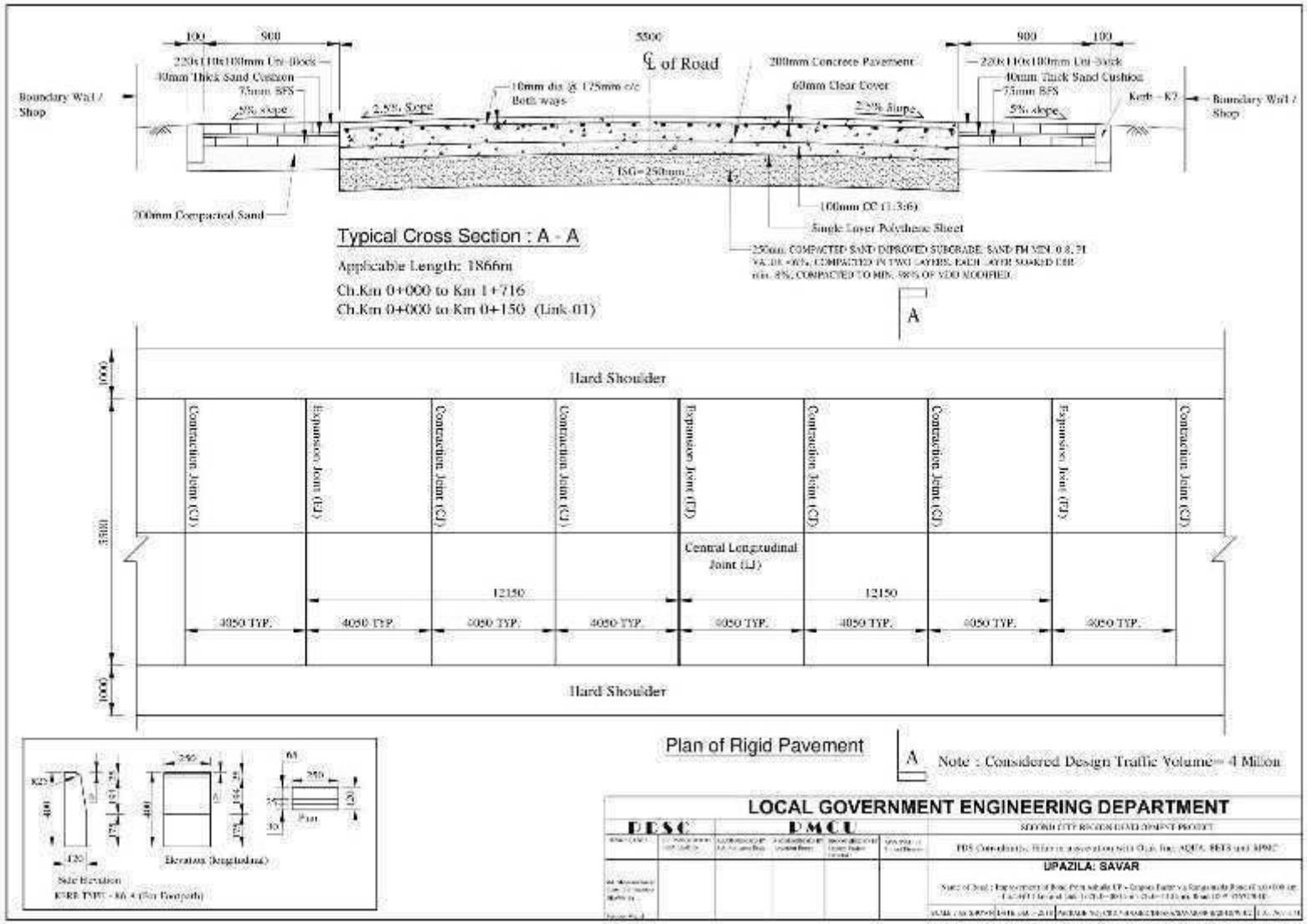


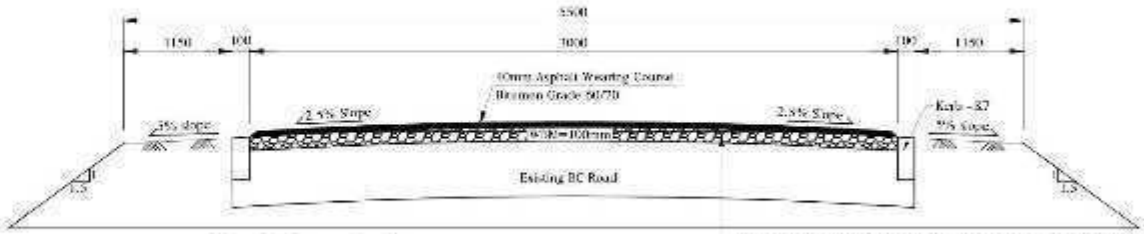
Figure 18: Typical cross section (Ch. 2+000-2+900, 2+900-3+037 and 3+320-4+000) (Road ID 3010)

Typical Cross Section

Applicable Length: 900m

Ch.Km 2+000 to Km 2+900

100mm AGGREGATE BASE COURSE, FOR BRICK AGGREGATE LOS ANGELES ABRASION VALUE (LAV) MAX. 40% OR TEN PERCENT FINES VALUE (TPV) MIN. 100 KN; FOR STONE AGGREGATE LOS ANGELES ABRASION VALUE (LAV) MAX. 35% OR AGGREGATE CRUSHING VALUE (ACV) <30%, COMPACTED IN SINGLE LAYERS, EACH LAYER SOAKED CBR ... 80%, COMPACTED TO 98% OF MDD MODIFIED.

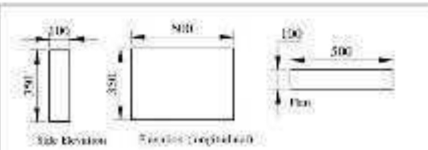


Typical Cross Section

Applicable Length: 817m

Ch.Km 2+900 to Km 3+037
Ch.Km 3+320 to Km 4+000

100mm AGGREGATE BASE COURSE, FOR BRICK AGGREGATE LOS ANGELES ABRASION VALUE (LAV) MAX. 40% OR TEN PERCENT FINES VALUE (TPV) MIN. 100 KN; FOR STONE AGGREGATE LOS ANGELES ABRASION VALUE (LAV) MAX. 35% OR AGGREGATE CRUSHING VALUE (ACV) <30%, COMPACTED IN SINGLE LAYERS, EACH LAYER SOAKED CBR ... 80%, COMPACTED TO 98% OF MDD MODIFIED.



KERB TYPE - K7

Note:

Considered Design Traffic 0-100 CVD and Subgrade CBR 4%-6%.
But Carriageway maintained as per existing width.

LOCAL GOVERNMENT ENGINEERING DEPARTMENT

DDSC	DMCL	SECOND CITY REGION DEVELOPMENT PROJECT
		PDS Consultants, Ltd. in association with Oriental..., AQUA, BETS and BPMC
		UPAZILA : SAVAR

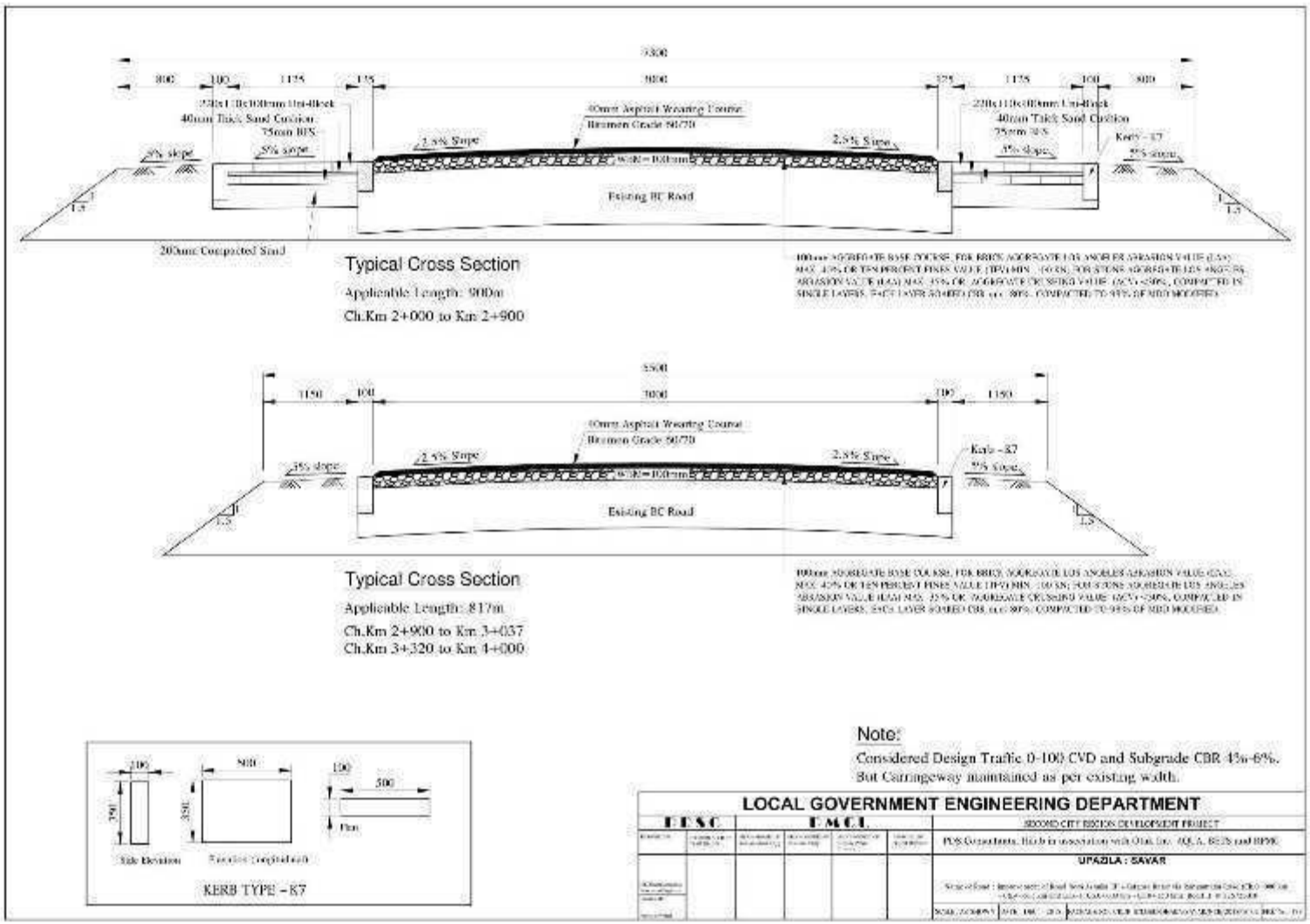
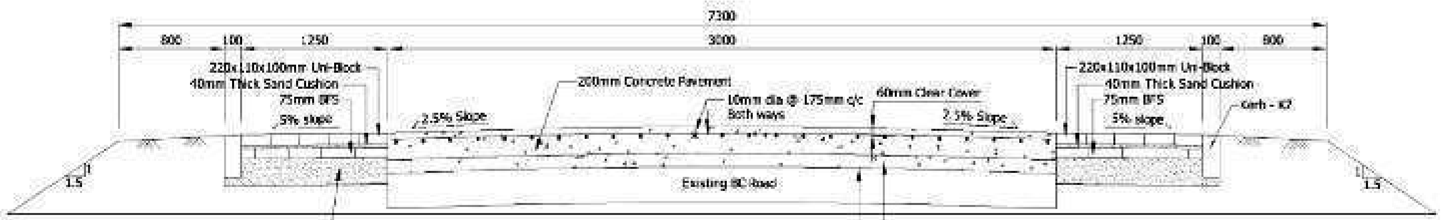


Figure 19: Typical cross section (Ch. 1+716-2+000 and 4+000-4+611) (Road ID 3010)

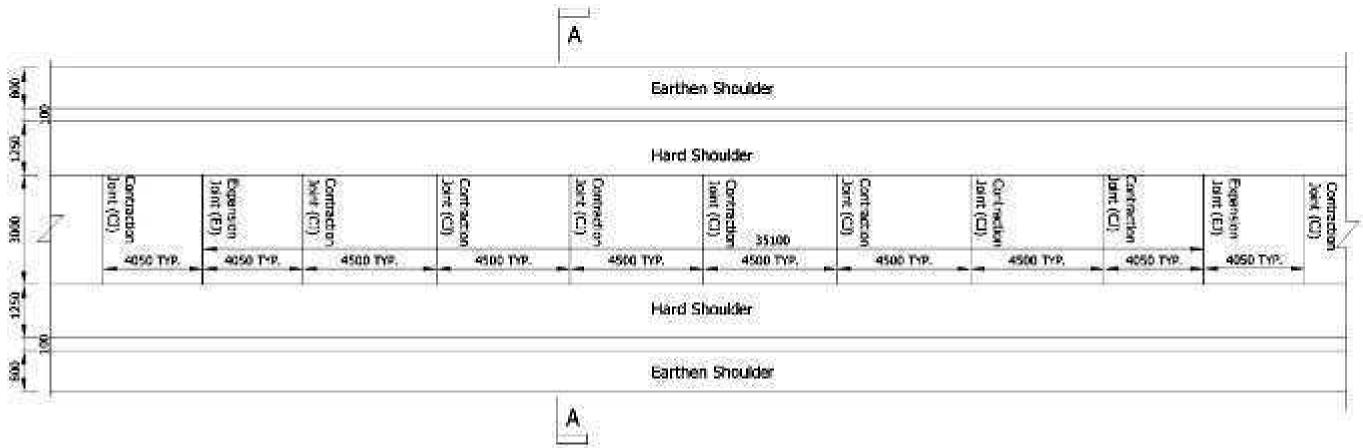


Typical Cross Section : A - A

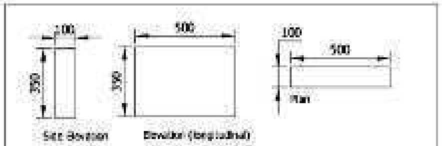
Applicable Length: 895m

Ch.Km 1+716 to Km 2+000

Ch.Km 4+000 to Km 4+611



Plan of Rigid Pavement

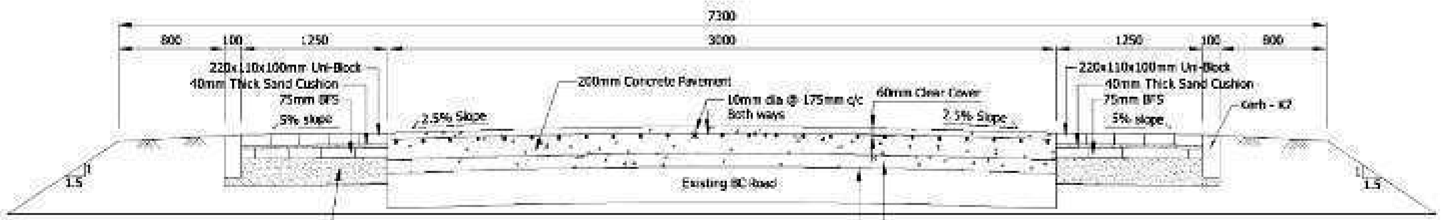


KERB TYPE - K7

Note : Considered Design Traffic Volume= 4 Millon

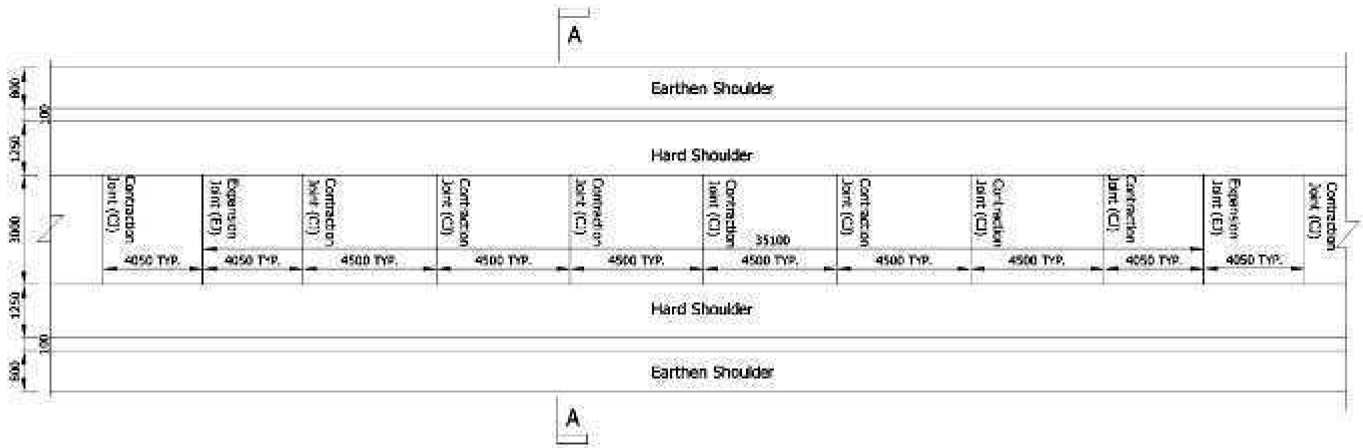
LOCAL GOVERNMENT ENGINEERING DEPARTMENT

PDSC	PMCU	CITY REGION DEVELOPMENT PROJECT-II (CRDP-II)
		PDS Consultants, Hifab in association with Otak Inc, AQUA, BETS and RPMC
		UPAZILA : SAVAR
		Name of Road : Improvement of Road from Ashulia UP - Kaiganj Bazar to Rangamatia Road
		SCALE: AS SHOWN | DATE : APRIL - 2018 | PACKAGE NO: CRDP II/LGED/DHAKA/SAVAR/

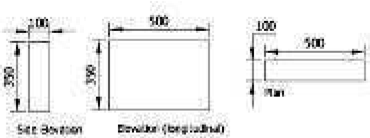


Typical Cross Section : A - A

Applicable Length: 895m
Ch.Km 1+716 to Km 2+000
Ch.Km 4+000 to Km 4+611



Plan of Rigid Pavement



KERB TYPE - K7

Note : Considered Design Traffic Volume= 4 Millon

LOCAL GOVERNMENT ENGINEERING DEPARTMENT

PDSC | PMCU | CITY REGION DEVELOPMENT PROJECT-II (CRDP-II)

PDS Consultants, Hifab in association with Ctak Inc, AQUA, SETS and RPMC

UPAZILA : SAVAR

Name of Road : [illegible]

SCALE: AS SHOWN | DATE : APRIL - 2018 | PACKAGE NO: [illegible]

5. Road-5: Improvement of the road from Katgora Bazar - Chitrashail Road via Kandail Road (ID 4198)

77. Proposed interventions planned for the Existing Road (ID 4198) from Katgora Bazar - Chitrashail Road via Kandail Road are as follows:

(i) Improvement of the existing road, including soft shoulder on both sides which are within ROW;

(ii) Construction of RCC carriageway of width 3m as per design, and this carriageway shall include hard shoulder/s or walkway/s and soft shoulders on either sides at Ch. 0+000 to 2+637 km & Ch.0+000 to 0+150 km (Link-01) depending on the availability of vacant road width;

(iii) Pavement works comprising construction of sub-grade, sub-base, base binder course and wearing course;

(iv) Road improvement based on design that considers the road safety requirements per LGED published guidelines and standards.

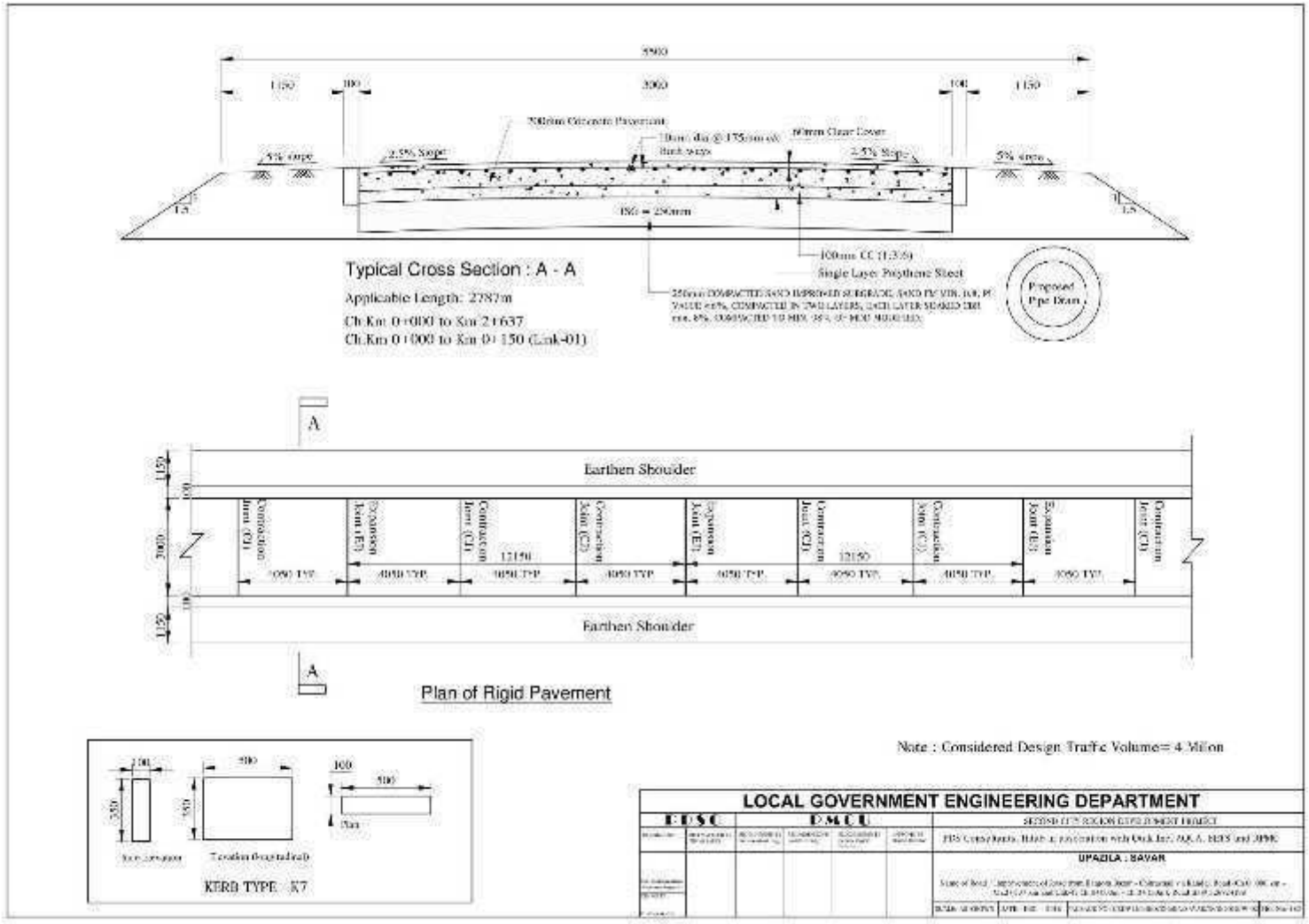
78. The existing status with proposed development interventions of this road component is summarized in **Table 14.**

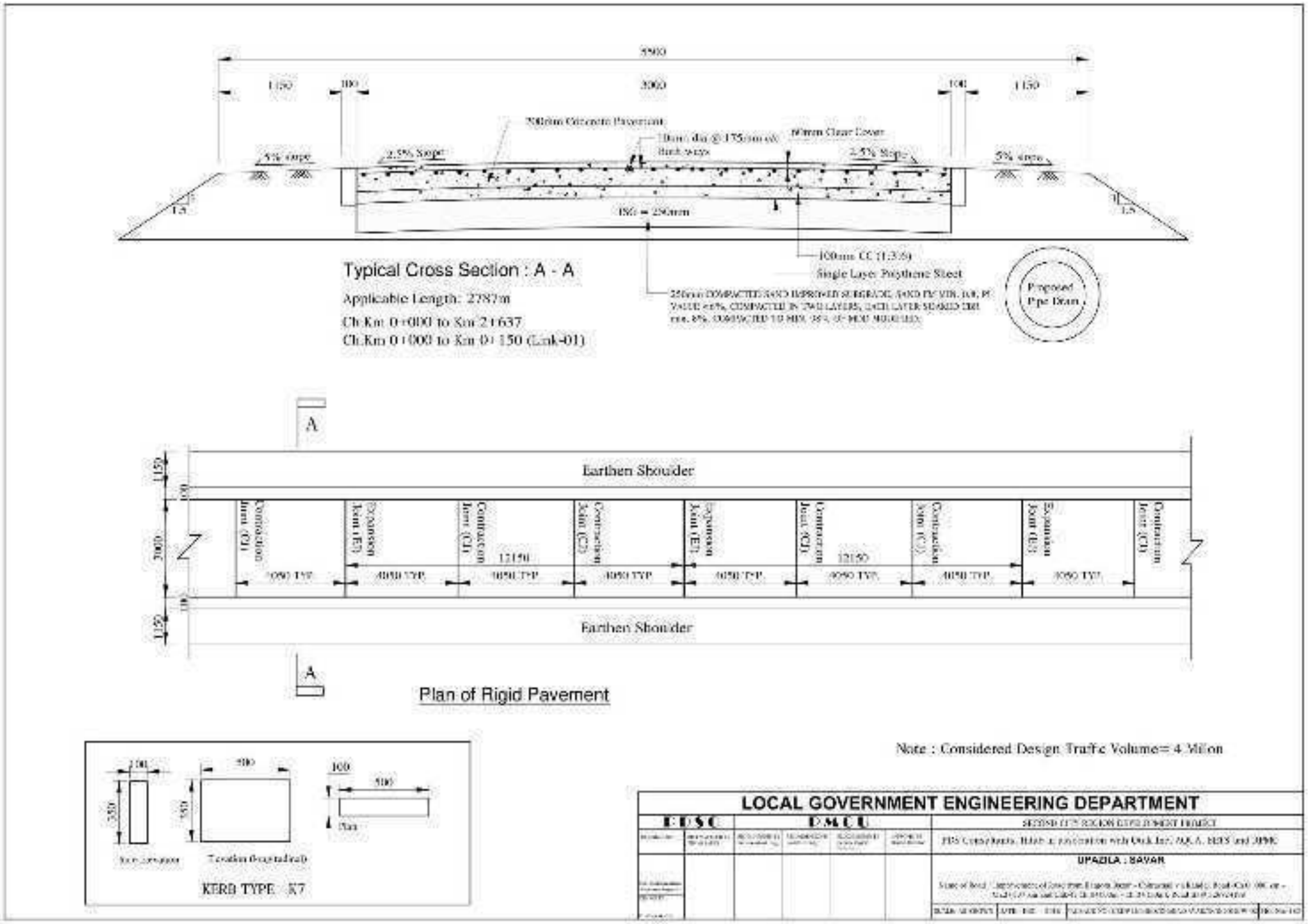
Table 14: Summary of Proposed Improvement of the road from Katgora Bazar - Chitrashail Road via Kandail Road (ID 4198)

Name of Subprojects	Length / Area	Subproject Components	Details of Proposed Works	Existing condition
Road-5 Improvement of the road from Katgora Bazar - Chitrashail Road via Kandail Road (ID 4198)	2.787 km	a. RCC Pavement b. Hard Shoulder/Uni-Block pavement	**Road:** a. RCC Road with 3.0m Carriageway from Ch.00-Ch.2637m & Ch.00-Ch.150m (Link-01) with soft shoulders. .	**Road:** a. HBB Road with 3m carriageway from Ch.00-1006m, Ch.1520-2416m & Ch.2500-2637m. b. BC Road with 3.0m carriageway from Ch.1006-1520m & Ch.2416-2500m. . **U-Drain:** **2** (two) U-Drains at Ch. 1006m and Ch.1900m.

The typical section for the roadway drainage design considerations with their cross-sections are exhibited in the **Figures 20.**

Figure 20: Typical cross section Ch. 0+000 - 2+637 km & Ch. 0+000 – 0+150 km (Link-01) (Road ID 4198)




5500
1150
100
3000
100
1150
200mm Concrete Pavement
10mm dia @ 175mm c/c Both ways
60mm Clear Cover
5% slope
2.5% Slope
2.5% Slope
5% slope
ISG = 250mm
100mm CC (1:3:6)
Single Layer Polythene Sheet
Typical Cross Section : A - A
Applicable Length: 2787m
Ch.Km 0+000 to Km 2+637
Ch.Km 0+000 to Km 0+150 (Link-01)
Proposed Pipe Drain
A
Earthen Shoulder
Contraction Joint (CJ)
Expansion Joint (EJ)
12150
4050 TYP.
Earthen Shoulder
A
Plan of Rigid Pavement
KERB TYPE - K7
Note : Considered Design Traffic Volume= 4 Millon
LOCAL GOVERNMENT ENGINEERING DEPARTMENT
UPAZILA : SAVAR

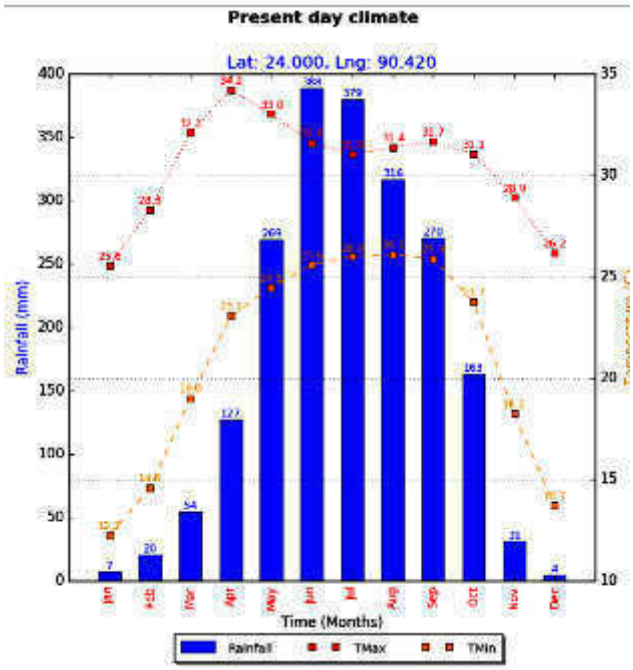
IV. DESCRIPTION OF THE ENVIRONMENT

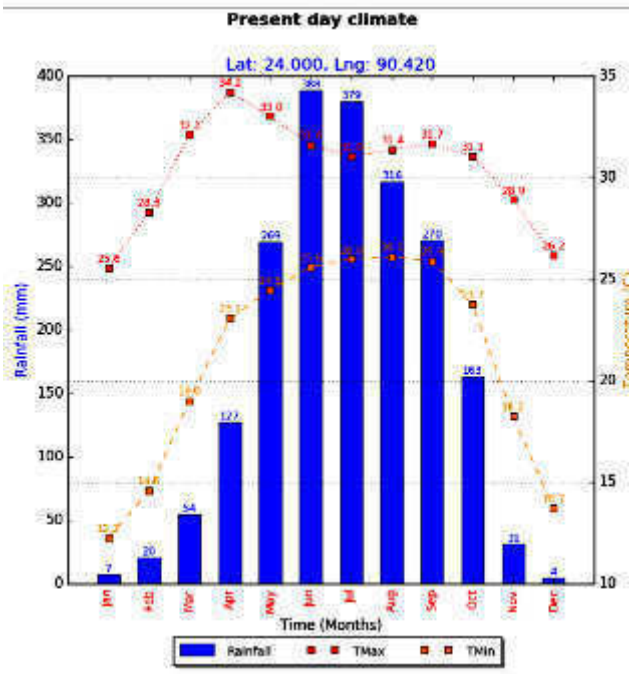
A. Physical Resources

91. **Location and Extent.** The proposed subproject is located in Savar Sadar Upazila of Savar District in the division of Dhaka, Bangladesh, and it is in between 23° 49' and 23° 52' north latitudes and in between 90° 14' and 92° 17' east longitudes. It is bounded by Ghoradia, Mallicker Tek, Teuti, Madpur, Dashkin Krishna Chalia and Deogaon on the north, Dharendra Mouza Bangaon Union on the east, Karnapara Khal on the south and Bangsi river on the west. The area of Savar Upazila is 280.13 sq. km of which the Savar Pourashava is 37.56 sq. km.

92. **Topography, Soil and Geology.** The area The area is generally flat and poorly drained and its elevation is about 7 meters above mean sea level and the area is nearly slope from west to east. Soils are somewhat porous allowing for some seepage of surface water into the soil, but in general the area is subject to seasonal flooding. Shitalakshya is the major drainage channel of the area, in which slowly draining streams will transport surface runoff to the river Shitalakshya

93. **Climate.** The temperature maximum (Tmax) at Savar Upazila ranges from 25.4^0 C (in January) to 34.3^0 C (in April), and temperature minimum (Tmin) ranges from 12.0^0 C (in January) to 26.0^0 C (in August).The monthly rainfall averages 374mm (in July) in monsoon and 6mm (in January) in winter.



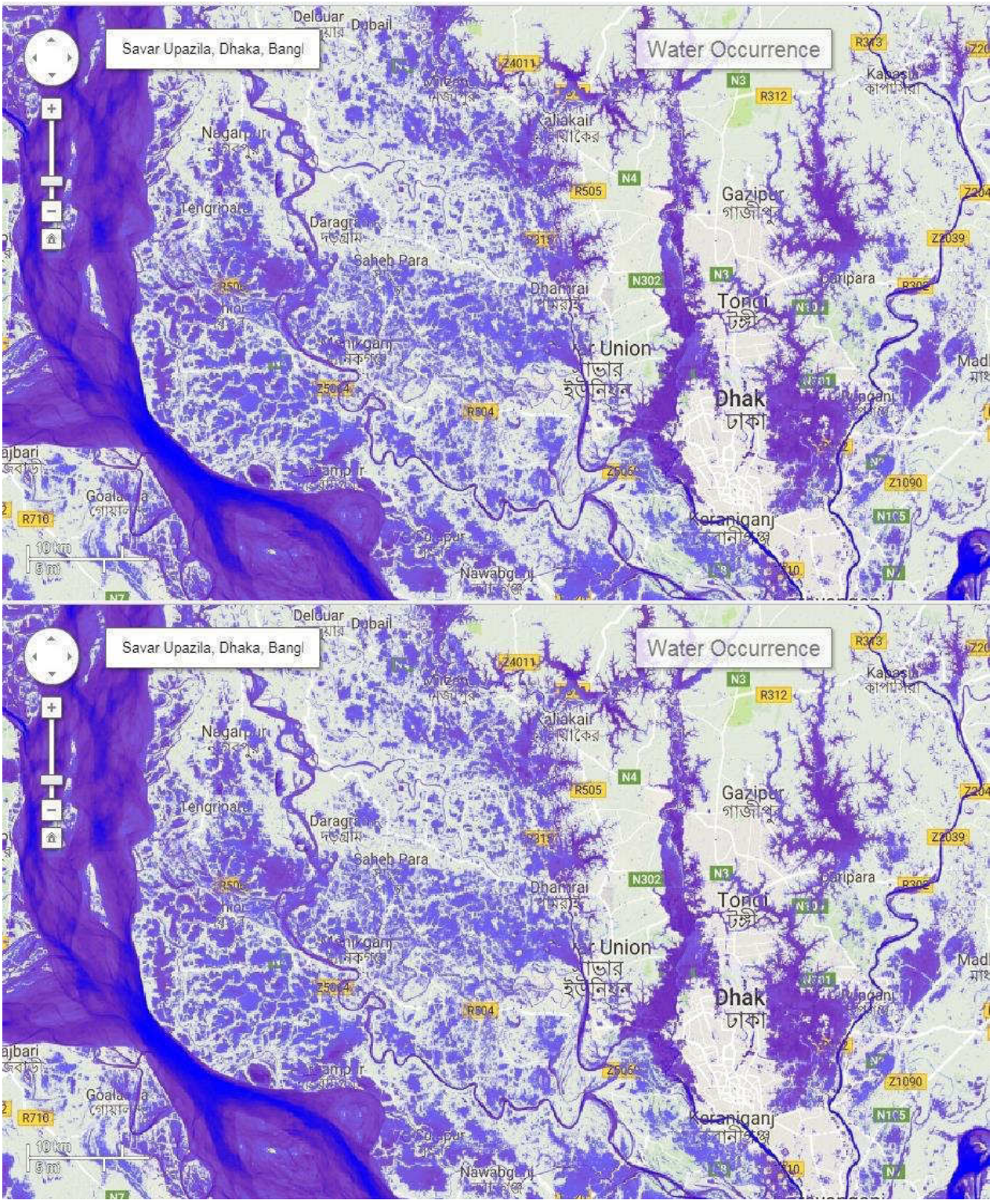


94. **Air Quality.** No information is available on local air quality. Population density within the subproject area of the Upazila is high and there are many motor vehicles operating onthe subproject roads and other roads within the upazila. It is expected that the subproject will not cause significant deterioration of air quality in the area. Close vegetation is observed in and around the project area. Prior to construction activities, subproject contractors will conduct air quality measurements as baseline. During construction, contractors will be required to conduct air quality measurements and ensure that the subproject does not cause deterioration of ambient air quality. This is included in the environmental management plan hereof.

35. **Noise Level.** No information is available on local noise level. Prior to construction activities, subproject contractors will conduct noise level measurements as baseline. During construction, contractors will be required to conduct noise level measurements and ensure that the subproject does not cause deterioration of noise level beyond the standards. This is included in the environmental management plan hereof.

95. **Surface Water**. Shitalakshya (located at a distance of about 13 km east of the subproject area) is the main river channel of the area flowing from north to south, which is the ultimate discharge point of other 2 (two) drainage channels namely, river Balu which is about 3 km east of subproject area and river Turag which is also about 3 km west of the subproject area. There is another drainage channel river Dhaleshwari which is about 10 km west of the subproject area, and its ultimate discharge takes place in the river Buriganga through the middle of subproject area. Further other small canals and streams flowing through the Upazila are directly connected either these two main rivers (Sitalakshya and Buriganga). **Figure 22** below shows the location of the subproject sites from these river systems.

Figure 21: Map showing location of subproject sites relative to Shitalakshya and Meghna rivers



96. **Groundwater.** Groundwater is abundant in Bangladesh. Water tables are generally shallow and aquifers are productive. The water table at Savar Upazilla is shallow; however the main aquifer, which is the source of water supply, is found at a depth of greater than 50 m. Arsenic contamination is generally not present in the project area. Arsenic contamination is generally not

present in the project area.

B. Ecological Resources

1. Terrestrial Ecosystem

97. **Terrestrial Flora.** The ecological setting is mostly settled countryside with typical homestead and roadside vegetation. The village homes are usually concealed by lush green foliage of wide variety of trees, thickets of bamboo and banana plants. A characteristic feature of the landscape is the presence of variety of plant and fruit trees. There are no extensive forested areas in the near vicinity, yet tree cover from cultivated species could be as high as 50% in some areas. There is no natural forest located alongside any of the subproject road of Savar Upazila. Only roadside trees are found which are largely maintained by the community or social forestry program. Main crops grown inside the subproject area include paddy, jute, peanut, onion, garlic, chilli and other vegetables.

98. **Terrestrial Fauna.**The diversified habitat and ecosystem in the proposed area support various types of local birds and animals. Magpie Robin, the national bird of Bangladesh which is commonly known as “Doyel” is frequently found in the subproject area. The wildlife like frogs, toad, snakes, lizards, tortoise, jackals, rats, shrew, squirrel and bats are common in Savar area. No rare and endangered species of flora and fauna have been reported in the subproject. No wild animals inhabit the area.

2. Aquatic Ecology

99. **Aquatic Flora.** In the shallow water of the floodplains, ponds and swamps of the subproject area, various hydrophytes and floating ferns grow in abundance. Tall grasses present a picturesque site near the bank of rivers and the marshes. Different types of aquatic flora species were recorded in the study areas. The most abundant hydrophytes in the project area are Kochuripana *(Eichhornia crassipes),* Topapana *(Pistia stratiotes),* Khudipana *(Lemna minor)* Pata Jhajii *(Vallisneria spiralis),* Shapla *(Nymphaea sp.),* Kolmi *(Ipomoea aquatica),* Helenchaa *(Enhydra fluctuant),* and Duckweed *(Spiredella* sp.). Numerous algae (e.g. *Spirogyra* and *Scytonema)* and amphibian plant, Dhol kolmi(Ipomoea *fistulosa)* are also found in the road side water bodies. There are no endangered aquatic flora species found in water bodies in the subproject areas.

100. **Aquatic Fauna.** The temporary aquatic habitat of the khals and beels have usual acquatic plants and weeds and the fauna include fishes and crustaceans. The common fish species includes carps (*rui, katla, mrigal, silver carp, grass carp, karpio etc.), barbs (putis), Chitol, Folai, catfish (Tengra, Singi, Magur, Boal, Pungus,* Snakehead (*Shol, Taki*), bele, etc. and varieties of prawn (*chingri*). The fisheries in the proposed project area comprises of ponds, beels, rivers, flood lands, borrow pits, and canals. There are no endangered aquatic fauna species found in water bodies in the subproject areas. These water bodies are normally full during monsoon seasons, while some dry up during summer or dry seasons.

3. Economic Development

101. **Land Use.** As per information collected from Savar Upazila, the total area of Savar Upazila is 280.12 sq.km of which 54.85% is residential, 4.56% is commercial, 2.08% industrial, 24.55% is agricultural, 2.93% is institutional, 0.67% road network and others is 10.36% e.g. open space and water bodies .

102. **Industry and Agriculture.** As per Savar Upazila statistics, **t**here are small industries (743), medium industries (350) and big industries (95) of different types (namely Ricemill, flourmill, Jutemill, cottonmill, papermill, hosieryindustry, bakery, bidifactory etc.) and cottage industries (Goldsmith, blacksmith, weaving, wood work, embroidery etc.) in operation in the Upazila area. As observed from field visit at proposed subproject site, no industries were found to encroach the ROW for the proposed development. Main crops grown in the area are paddy, wheat, potato, brinjal, patal, cauliflower, sugarcane and mula (radish).Extinct or nearly extinct crops are kaun and sesame.

103. **Infrastructure, Transport and Communications.** As per the information collected from Savar Upazila, existing infrastructure in Savar Upazila includes many roads that are poorly maintained, degraded in condition and often impassable except at very slow speeds. Itemized these include about 273 km paved and 114 km unpaved road and 760 km Earthen Road and drains 54 km. Regular bus services are available to travel other areas of Bangladesh. Internal movement is met by rickshaw, auto-rickshaw, easybike, maxi (laguna) and rickshaw van.

4. Social and Cultural Resources

104. **Demography.**[13]The population of Savar Upazila is 14,42,885 (male 53.3 % & female 46.7%) The population density is 4,948 persons per sq km. Information obtained from the Upazila suggests that the main occupations of general people are agriculture 17.86%%, non-agricultural labourer 2.58%, trade and commerce 19.76%, transport and communication 7.03%, service 32.22%, construction 3.97% and others 16.58%.

105. **Local Market and Bazar.** There are 26 Hats and Bazars and 14 fairs, most noted of which are Tongi Bazar, Pubail Bazar, Mirzapur Bazar, Kashimpur Bazar, Board Bazar, Salna Bazar, Joydebpur Bazar; Pubail Lakshmi Dashamir Mela, Tongi Shashan Ghat Mela, Dhirashram Shitala Debi Mela, Domer Para Chaitra Samkranti Mela, Koddar Baruni Mela and Joydebpur Rath Mela are notable. It is noteworthy to point out that none of the above Hats and Bazars fall within the proposed subproject road alignment (footnote 13).

106. **Health and Educational Facilities.** There are numerous health facilities, educational and religious institutions within the Upazila : Health centers include - Govt. Health Complex 1, Union Health Center, Community Clinic 8, Private Clinic 45, Private Medical College, missionary hospital 1, cancer hospital 1, eye hospital 2, private medical college 1, cardiology hospital 1. Educational institutions include - university 10, medical college 1, college 10, cadet college 1, technical college 17, technical school 10, secondary school 88, primary school 168, madrasa 36. Noted educational institutions: Bangabandhu Sheikh Mujibur Rahman Agricultural University (1993), Islamic University of Technology (1979), Dhaka University of Engineering and Technology (1980), National University (1992), Bangladesh Open University (1993), Rani Bilasmoni Government Boys' High School (1905) and Religious institutions include - Mosque 889, temple 74 and church 8. Average literacy rate within the Upazila area is 62.6% (male 67.3%, female 56.8%) (footnote 13).

107. **Water Supply and Sanitation.** There is piped water supply system in the Savar subproject area (inside city corporation area) which includes over-head tank 3, home connection 11895, production tubewell 55 and water pipeline 119 km. The source of drinking water supply also includes 1248 tube-wells. The sanitation facilities within the Upazila include - sanitary latrines 95%, community latrines and twin pit latrines coverage is 5% (footnote 13).

[13]Banglapedia. The National Encyclopedia of Bangladesh. .

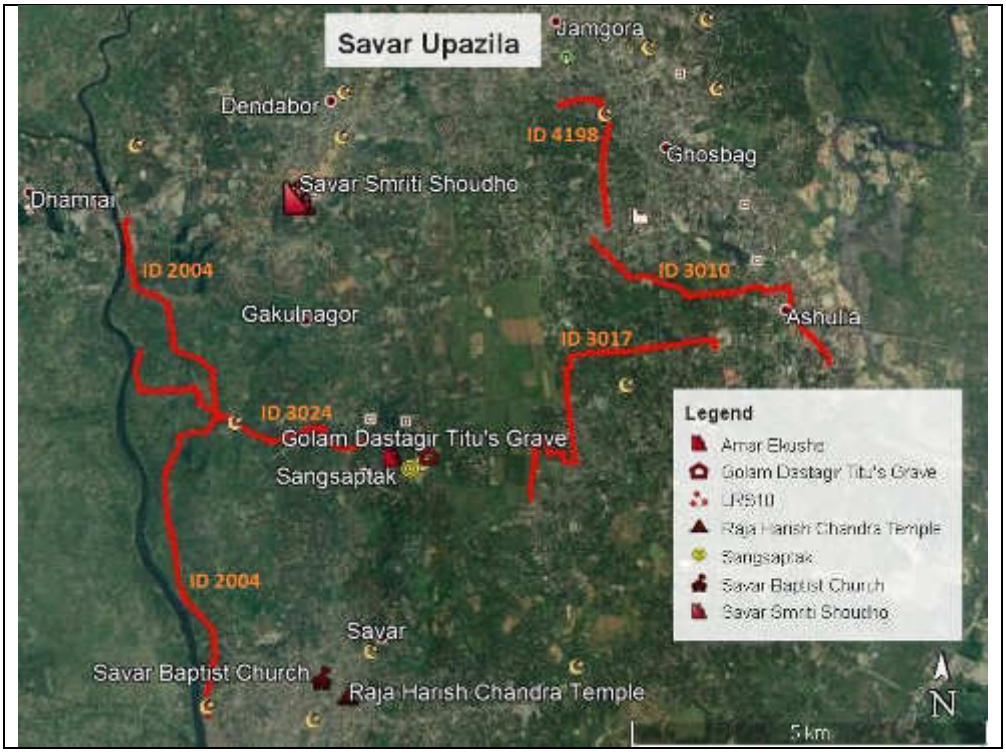
108. **Access to electricity.** All the unions of the Upazila are under rural electrification net-work. However 78.48% of the dwelling households have access to electricity.

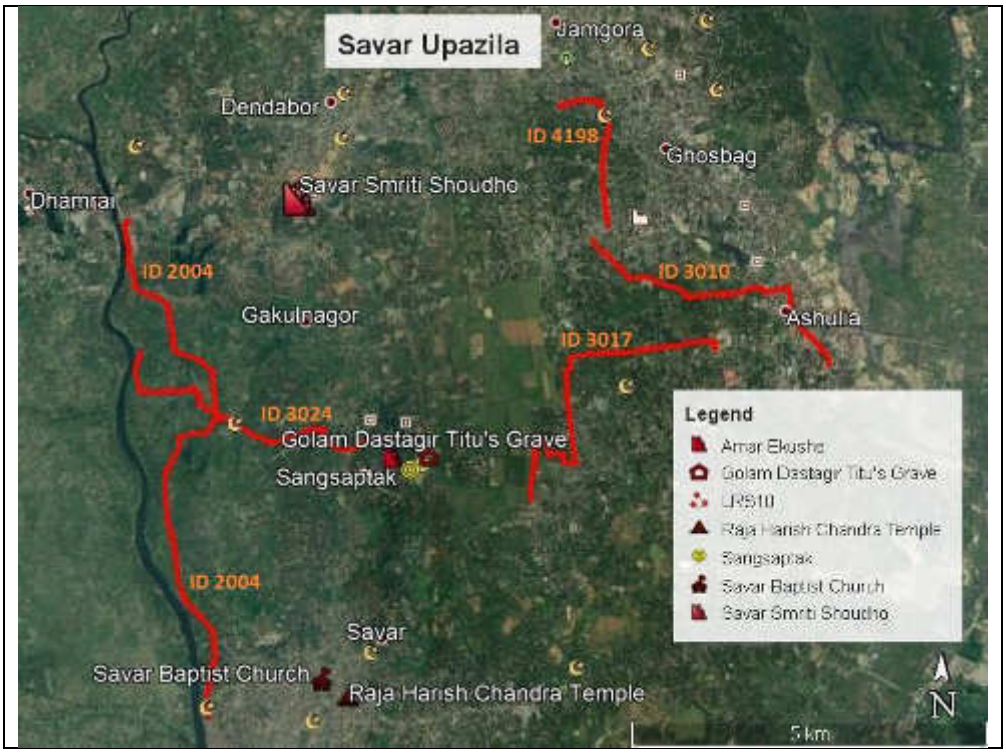
109. **Pollution and Road Safety.** People are concerned about increasing pollution in the subproject area as well as safety of people while crossing the roads. Industries within the subproject road were found discharging the untreated effluent to local drains, canals and water courses which may result in the contamination of the land area and water bodies. Accident is reported to take place now and then on the subproject road due to rough driving as well fast speed and non-availability of safe passage for crossing the road.

5. History, Culture andTourism

110. The Savar Poura area encompassing the subproject roads and drains is enriched with two noted religious sites namely, Savar Baptist Church and Raja Harish Chandra. These cultural sites are generally of local interest and tourist attraction only. None of these sites are in the list of UNESCO World Heritage Sites or protected by the Bangladesh Department of Archaeology. None of these are located near or along the alignments of the subproject and will not be affected by the proposed roadway improvements. The nearest cultural sites namely, Raja Harish Chandra Temple and Savar Baptist Church are already more than 250 m and 500 m respectively by straight line distance from the nearest subproject alignments, while the other cultural sites are already at a distance between about 1.2 to 2.8 km away from and within the subproject alignments. Based on actual field visits by PMCU in 2017 and 2018, no physical cultural resources are found in the corridor of impacts. **Figure 23** below shows the nearest physical cultural resources and are more than 300 m away from the road alignment

Figure 22: Aerial Map Showing the Locations of Cultural Heritage Sites Relative to the Subproject Alignments





6. Socio-economic benefits from the Road Improvement Schemes

111. Expected outcomes after implementation of the schemes will be:

- Increased property values and revenue income of the Upazila;
- Improved environmental conditions and reduced environmental pollution risk;
- Improved tourist potential, providing an enhanced business environment for local businesses and investment;
- Increased job opportunities in small industries due to expansion of trade and commerce;
- Increased economic and financial opportunities;
- Creation of short-term employment opportunities in construction work during the period of implementation;
- Improved traffic management, public transport and sustainable environmental conditions; and
- Generation of employment opportunities.

112. **Summary of Environmental Features around the Road Alignments.** To understand the effect of the proposed of the subproject to receptors, information on some important environmental key features for all the four subproject roads have been collected and analyzed. From analysis, these roads reveal more or less similar pattern of environmental features around them. **Table 15** summarizes these environmental features.

Table 15: Summary of environmental features around road alignments

Sl. No.	Environmental Features	Within 100 m from centerline of road	Within 7 km from centerline of road
1	Ecological		
a)	Presence of Wildlife Sanctuary/ National Park	No	No
b)	Reserved Forests	No	No

Sl. No.	Environmental Features	Within 100 m from centerline of road	Within 7 km from centerline of road
c)	Wetland/water bodies	Small ponds/ditches. None is protected	1 river (Meghna) /ponds and ditches, but none is protected
d)	Migratory route for wild animals	No	No
e)	Migratory routes for birds	No	No
f)	Migratory routes for fishes	Yes(during rainy season)	Yes (during rainy season)
g)	Presence of Dolphin	No	No
h)	Tree/vegetation cover	Yes. Moderate trees and vegetation. No threatened or endemic tree.	Yes. Moderate trees and vegetation. No threatened or endemic tree.
i)	Birds Nesting	Yes. On trees along the sides of road alignments and trees within the 100 meter distance, birds may also nest.	Yes. On trees along the sides of road alignments and trees within the 7 km distance, birds may also nest.
2.	Archaeological Monuments	No	No
3.	Groundwater	Available at low depth, drinking water at about 50 m below ground.	Available at low depth, drinking water at about 50 m below ground.
4.	Land Use	Agricultural, Rural Settlement, Urban Settlement, Commercial, Industrial	Agricultural, Rural Settlement, Urban Settlement, Commercial, Industrial, Some Rural Community Forests (not protected forests).
5.	Physical Cultural structures and social	Road in some areas passes through few religious structures and/ or graveyard located near the road alignments. However, none of these will be affected.	Road passes through rural-urban and peri-urban areas. Few religious structures and/ or graveyard located near the road alignments.

km = kilometer, m = meter.
Source: PMCU/LGED field surveys conducted in 2017 and 2018.

7. Baseline and Projected Climate

113. A climate change vulnerability and disaster risk assessment was conducted for the various subprojects under the project.[14] Results of this assessment have been used to design the various subprojects, including the Savar Uppazila roads subprojects. The baseline climate and future projection at 2050 Tmax and Rainfall for Savar for RCP 6.0 are shown in **Table 16** which demonstrate that the temperature is expected to increase in the future. Changes of both temperature and rainfall are shown in **Table 17**

Table 16: Baseline data and projection for 2050 of Tmax and Rainfall for Savar

Month	Baseline		Future	
	Max Temp (degree C)	Rainfall (mm)	Max Temp (degree C)	Rainfall (mm)
January	26.0	9	29.3	10
February	28.7	20	30.1	24
March	32.4	57	33.5	57
April	34.5	144	35.6	177
May	33.4	258	34.0	275

[14] LGED. 2017. Climate Change Vulnerability and Disaster Risk Assessment: Design Options for Dhaka City Region Roads Subprojects. CRDP-II.

June	31.9	381	32.6	407
July	31.1	379	32.0	431
August	31.4	325	32.3	330
September	31.7	257	33.3	205
October	31.3	157	33.5	158
November	29.1	35	31.1	39
December	26.6	5	29.6	0
Year	30.7	2027	32.2	2113

Table 17: Changes of Tmin and Tmax (0C) and Rainfall (mm) in Savar

Month	Tmin	Tmax	Mean	Rainfall	% Change in rainfall	Seasonal
Jan	2.2	3.3	2.75	1	11	0% (DJF)
Feb	1.6	1.4	1.5	4	20	
Mar	1.3	1.1	1.2	0	0	11% (MAM)
Apr	2.3	1.1	1.7	33	23	
May	1.6	0.6	1.1	17	7	
Jun	1.1	0.7	0.9	26	7	7 % (JJA)
Jul	1.6	0.9	1.25	52	14	
Aug	1.4	0.9	1.15	5	2	
Sep	1.5	1.6	1.55	-52	-20	-10%(SON)
Oct	2.5	2.2	2.35	1	1	
Nov	1.8	2	1.9	4	11	
Dec	1.1	3	2.05	-5	-100	

114. For roads, the critical climate parameter is precipitation in terms of volume and intensity, and their impact on occurrences of flooding depending on location. In combination with geology and geography, a related variable is soil moisture as it affects road foundation stability.

115. Hot days temperature is also an important road design consideration, particularly for asphalt roads, due to its effect on stiffness of the pavement. The stiffness modulus of asphalt is affected by temperature. Migration/bleeding of liquid asphalt is a concern at sustained air temperatures above 32°C.For concrete roads, the range of temperature variation determines the proper width of joints, including the composition of the joint sealants.

116. For bridges, the critical design parameter derived from precipitation and catchment characteristics is flood level which determines the required vertical clearance of the bridge deck.

V. ASSESSMENT OF ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

A. Compliance with subproject selection criteria

117. The subproject was selected based on the selection criteria in the environmental assessment and review framework (EARF) of the project. **Table 18** below is a summary of the assessment of compliance with the subproject selection criteria under the project.

Table 18: Compliance matrix with subproject selection criteria

Criteria	Remarks
1) Complies with all requirements of relevant national, state and local laws, rules and regulations.	Being complied on ongoing basis.
2) Complies with all requirements of ADB Safeguards Policy Statement (SPS) 2009, and follow procedures set down in the environmental assessment and review framework (EARF).	Being complied on ongoing basis.
3) Does not trigger environmental category A per ADB SPS. In particular, does not encroach any sensitive areas and/or critical habitats per definition of ADB SPS, and does not cause significant adverse environmental impacts that are irreversible, diverse, or unprecedented, which may affect an area larger than the sites or facilities subject to physical works.	Complied.
4) Does not include and/or involve any activities listed in ADB's Prohibited Investment Activities List (Appendix 5 of ADB SPS). These activities do not qualify for ADB's financing.	Complied.
5) Avoids any work in or near environmentally sensitive locations, including sites with national or international designation for nature conservation, cultural heritage, or any other reason.	Complied.
6) Does not result in destruction of or encroachment onto physical cultural resources such as archaeological monuments; heritage sites; and movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance.	Complied.
7) Alignments or project locations avoid or minimize, when avoidance is not possible, the cutting of trees. Include provisions for compensatory plantation at ten trees per every tree to be cut.	Complied. Included in the environmental management plan (EMP).
8) Reflects inputs from public consultation and disclosure for site selection.	Complied. Also, to be complied in future consultations. The initial environmental examination (IEE) provides for this criterion.
9) All the road works shall be designed to blend in with the environment.	Complied.
10) Does not lead to alteration of surface water hydrology of streams/waterways that may result in increased sediment load due to erosion from construction sites.	Complied. Included in the EMP.
11) Provides for appropriate protection/mitigation measures to address noise impacts on adjoining communities, especially sensitive receptors as schools/hospitals along the roads.	Complied. Included in the EMP.
12) Ensure requirements for drainage maintenance measures are incorporated into the operations and maintenance manual and suitable budget allowed for to ensure ongoing performance of measures.	Complied. Included in the EMP.

Criteria	Remarks
13) For subproject components that may affect natural streams or rivers, all comments and advice received from project management coordination unit (PMCU), project implementation unit (PIU), design engineers, and appropriate departments are incorporated into the planning, design and construction of the subprojects as far as practicable.	Being complied on ongoing basis.
14) Provides for appropriate protection/mitigation measures to address noise impacts on adjoining communities, especially sensitive receptors as schools/hospitals along the roads.	Complied. Included in the EMP.
15) Ensure requirements for drainage maintenance measures are incorporated into the operations and maintenance manual and suitable budget allowed for to ensure ongoing performance of measures.	Complied. Included in the EMP.
16) Ensures detailed designs and environmental safeguards conditions are included in the planning.	Complied. Included in the EMP.
17) Provides for (i) capacity building of PIU staff composting plant operation and maintenance, and (ii) market study on the users of compost to assess sustainability of the demand for such compost.	Complied. Included in the EMP.

B. Anticipated Impacts and Mitigation Measures - Planning, Location and Design Phase

118. **Impacts due to location.** These Impacts are associated with planning particularly on the site selection. They include impacts due to encroaching on sensitive areas and impacts on the people who might lose their homes or livelihoods due to the development of the proposed site. However, in the case of the road subproject, no significant impacts are anticipated since the road construction and/or rehabilitation works will be done on existing road alignments with ROW and located in built up areas. There will be no road widening works that will encroach any private property. The road shoulders or footpaths to be constructed and/or rehabilitated are also within existing ROW.

119. **Impacts due to Climate Change.** The impact of climate change is high for the road subproject. The design of the roads and other related infrastructures should consider future changes in climate patterns such as flooding due to extended monsoon seasons and increased level of precipitation, droughts, and increased global temperature, among others. More particularly for the subproject, the planning and design of the subprojects should consider the following:

(i) Likely changes in the climatic conditions with respect to temperature, flooding, salinity, and acidity, including drainage aspects; and

(ii) Likely impacts on road surfaces and runoff due to climate change-induced heavier and more erratic rainfall.

120. Mitigation Measures. The impacts of climate change will be mitigated upfront during the design and planning stage for the infrastructures. Among these measures are the following:

(i) Due to climate change, the river water level will rise and as a result, the bridge clearance will be lower. Therefore, consideration of increase bridge height is required;

(ii) The differences in water level between base and future time should be computed as it is needed to estimate the additional road embankment height required in making the roads safer against climate change-induced flooding;

(iii) The proposed road area might have to drain a significant additional discharge due to climate change-induced higher rainfall during extreme events. Therefore, adequate number of drainage facilities along with comparatively larger openings should be considered in structure for the proposed road; and

(iv) Maximum possible efforts have to be made for minimizing cutting of trees while designing widening option for the proposed road.

121. Apart from the above climate change considerations in the design of the subproject, the other impacts, issues, concerns and mitigation measures during the design phase are illustrated in **Table 19** below.

Table 19: Issues, Concerns and Mitigation Measures During Design Phase

Project Activity	Potential Environmental Impacts	Proposed Mitigation Measures	Responsibility
Detailed design			
Incorporation of sloped areas in subproject design	Soil erosion and slope instability	• Incorporate measures and sites for handling excessive spoil materials • Incorporate drainage plan in final design	Project management coordination unit (PMCU), preparation, design and supervision consultant (PDSC)
Incorporation of community health and safety measures in the design	Road accidents	• Ensure to include in the design the following: (i) road signages in critical areas or curves, (ii) speed limiters such as humps, (iii) barricades or similar structures in accident-prone areas, and (iv) pedestrian crossing lanes, among others.	PMCU, PDSC
Location trees, utilities and other infrastructures before construction.	Disruption of utility services; False claims from people; Water quality changes due to construction. Interference with other utilities and other infrastructures, including heritage areas, if any, during construction	• Avoid alignments that will run over trees and utilities such as electric poles, etc. • Innovate and design footpaths that will avoid cutting of trees. • Provide budget for restoration/replacement of damaged utilities • Provide budget for tree planting as replacement activity for cut trees, if any. • Avoid placing alignment near heritage buildings and religious structures. • Photograph all sites within heritage areas to enable before and after comparison (note: all roads are to be reinstated to original character especially in heritage areas) • Ensure compliance with any Department of Archaeology rules during design. • If deemed required, consult structural engineers to determine the impact of vibration to all kinds of infrastructures adjacent to the road alignments.	PMCU, PDSC

Project Activity	Potential Environmental Impacts	Proposed Mitigation Measures	Responsibility
Construction in the vicinity of residential areas	Nuisance to nearby receptors. Impacts to qualities of ambient air, surface water, groundwater, and land. Impacts to health and safety of community and workers.	• Ensure compliance with national or international standards on noise, ambient air and effluent, whichever are more stringent. • Ensure all bid and contract documents prepared and finalized have copy of the initial environmental examination (IEE) as attachment.	PMCU, PDSC
Operation and maintenance (O&M) Manual preparation	Impacts to health and safety of community.	• Prepare a comprehensive O&M manual to include periodic inspection and maintenance of roads, conduct of road repairs, etc.	PMCU, PDSC
Site selection of sources of construction materials such as sand and gravels.	Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion; Disturbance in natural drainage patterns, ponding and water logging, and water pollution.	• Procure construction materials such as sand, gravels, or aggregates from government-authorized dealers only. • If quarrying is to be the source, ensure to conduct at sites authorized by the government such as the Bangladesh Water Resources Development Board for sand quarrying.	PMCU, PDSC
Spoil management and disposal	Inappropriate disposal of spoils will cause nuisances to affected properties, including siltation of canals.	• Identify designated disposal sites approved by the upazila. • A spoil management plan will be developed.	PMCU, PDSC
Construction camps	Inappropriate location for construction camps will impact the general welfare and health and safety of the workers.	• Identify construction camp sites that are strategically located relative to the work sites. • Ensure these camp sites can be easily provided with the basic amenities for the workers.	PMCU, PDSC

C. Anticipated Impacts and Mitigation Measures – Construction Phase

122. In the case of this subproject, environmental impacts during construction phase will not be severe because: (i) most of the component works are relatively small and involve straightforward construction, so impacts will be mainly localized and not greatly significant; (ii) most of the predicted impacts are associated with the construction process, and are produced because of the invasive nature of excavation activities and earth movements; and (iii) being located in the built-up area of the rural and urban areas, will not cause direct impact on biodiversity values.

1. Construction Method.

123. The civil works for road construction and/or rehabilitation include earth work excavation. Earth work excavation will be undertaken using various heavy equipment such as bulldozers,

backhoes, dump trucks, compactors, etc. Excavation and construction activities will be done through segmentation or chainage-wise planning with around 100m - 200m per segment or stretch. This will ensure that impacts can be easily managed by the contractor.

124. **Non-Compliance with Environmental Legislation.** This issue will arise when there is a lack of awareness among subproject staff and management of environmental safeguard requirements, compliance with the requirements, conditions specified in the IEE report, approval status, and consent.

125. Mitigation measures include (i) capacity strengthening of the PMCU Environmental Officer and the counterpart PIU focal persons on environmental safeguards; and (ii) ensuring that necessary permits are obtained.

111. Impact on Physical Resources

126. **Topography, Soils and Geology**. Subproject activities are not large enough to affect these features; so there will be no impacts.

127. **Sources of Materials**. Significant amount of gravel, sand and aggregate, will be required for this subproject. The contractor will be required to:

(i) Prepare Aggregates Management Plan as part of the SEMP;
(ii) Source aggregates only from entities with environmental clearances and license;.
(iii) Use quarry sites and sources permitted by relevant government agencies only, such as the Bangladesh Water Resources Development Board for sand quarrying;
(iv) No new quarry sites shall be used for the subproject;
(v) Verify suitability of all material sources and obtain approval of implementing agency; and
(vi) Document all sources of materials and include in the monthly reporting to the PIU.

128. **Air Quality**. While most construction works will be conducted during the dry season, there is potential for creating dust from (i) excavation of dry soil and backfilling, (ii) transport, loading and unloading of natural aggregates; (iii) movement of construction-associated vehicles; (iv) on-site rock crushing and concrete mixing; (v) emissions from construction vehicles, equipment, and machinery used for excavation and construction, which may contain pollutants such as carbon monoxide, sulphur oxides, particulate matter, nitrous oxides, and hydrocarbons, and (vi) burning of firewood for cooking and heating in work and labor camps.

129. To mitigate the impacts, contractors will be required to:

(i) follow World Bank's Environmental Health and Safety (EHS) Guidelines on Construction and Decommissioning Activities;[15]
(ii) confine earthworks according to excavation segmentation plan that should be part of site-specific environmental management plan (SEMP);
(iii) prepare and implement a dust management plan that should be part of the SEMP;
(iv) consult with PIU on the designated areas for stockpiling of sand, gravel, and other construction materials (ideally about 500 m from residential areas);
(v) bring construction materials (aggregates, sand, etc.) to the construction site as and when required to avoid heavy stockpiling at the sites;

[15] IFC World Bank Group. 2007. *Environmental, Health, and Safety (EHS) Guidelines – General EHS Guidelines: Construction and Decommissioning*.

(vi) damp down with water dry exposed surfaces and stockpiles of aggregates at least twice daily, or as necessary;
(vii) if re-surfacing of disturbed roads cannot be done immediately, spread crushed gravel over backfilled surfaces;
(viii) during demolition, water exterior surfaces, unpaved ground in the immediate vicinity and demolition debris;
(ix) place signage at active work sites in populated areas;
(x) require trucks delivering aggregates and cement to have tarpaulin cover;
(xi) clean wheels and undercarriage of vehicles prior to leaving construction sites;
(xii) limit speed of construction vehicles on access roads and work sites to a maximum of 30 km/h;
(xiii) prohibit burning firewood in work and labor camps (promote liquified petroleum gas for cooking purposes and electric heater for heating purposes);
(xiv) use vehicles that have government-issued permits and registrations; and
(xv) prohibit open burning of solid waste.

130. **Noise Levels.** Noise-emitting construction activities include earthworks, concrete mixing, demolition works, movement and operation of construction vehicles and equipment, and loading and unloading of coarse aggregates. The significance of noise impact will be higher in areas where noise-sensitive institutions such as health care and educational facilities are situated. Noise levels should not exceed the national standards for noise or WHO noise level guidelines, whichever is more stringent, or result in increase in background noise level of 3 decibels at the nearest receptor location off-site.[16] The comparative illustration of national standards versus WHO guidelines is in of section .

(i) follow World Bank's EHS Guidelines on Construction and Decommissioning Activities (footnote);
(ii) if applicable to subproject alignment, prepare and implement a noise and vibration management plan that should be part of the SEMP;

131. To mitigate the impacts, contractors will be required to:
(iii) provide prior information to the local public, including institutions such as schools and hospitals, about the work schedule;
(iv) use equipment that emits the least noise, well-maintained and with efficient mufflers. Install silencers if necessary and practical;
(v) restrict noisy activities to day time;
(vi) avoid use of noisy equipment or doing noisy works at night time;
(vii) limit engine idling to a maximum of one minute;
(viii) spread out the schedule of material, spoil and waste transport;
(ix) minimize drop heights when loading and unloading coarse aggregates; and
(x) not use horns unless it is necessary to warn other road users or animals of a vehicle's approach.

132. **Surface Water Quality.** Some sections of the road alignments are located along or cross water bodies, exposing these water bodies to risks of pollution caused by: (i) poorly managed construction sediments, and waste materials; (ii) poor sanitation practices of construction workers; and (iii) improper storage of petroleum products or chemicals used during construction such as

[16] IFC World Bank Group. 2007. .

fuel, oil and lubricants. Although construction works will be scheduled during dry season, any unavoidable excavation or construction works during monsoon season will wash down these pollutants to the water bodies.

133. To mitigate these impacts, the contractor will be required to:

(i) follow World Bank's EHS Guidelines on Construction and Decommissioning Activities (footnote);
(ii) dispose excess spoils per the Spoil Management Plan attached in **Appendix 8**;
(iii) locate temporary storage areas on flat grounds and away from main surface drainage routes (ideally at least 100 m from surface water);
(iv) shield temporary storage areas with sandbags;
(v) provide adequate water supply and sanitation facilities at work sites;
(vi) provide impervious bunded areas with 110% volume for storage of petroleum products used during construction, such as fuel, oils, and lubricants;
(vii) provide orientation and training to assigned workers on the correct handling of petroleum-based products, clean -up of equipment, and response measures in case spills or emergencies using a well prepared emergency response plan; and
(viii) ensure no refueling within 100 m from surface water.

134. For management and final disposal of solid wastes following mitigation, contractors will be required to apply the follow-up measures such as:

(i) follow World Bank's EHS Guidelines on Construction and Decommissioning Activities (footnote);
(ii) collection of recyclable solid wastes and supply to scrap vendors;
(iii) ensure all the camp wastes and construction wastes are placed in the designated waste collection pits (lined to ensure no seepage of leachate) away from receiving water;
(iv) establishment of separate bunded and lined areas with 110% volume for the storage of all the toxic material wastes, including batteries, oil filters, mobil, burnt oils, etc. at the construction site; and
(v) consultation with PIU on the proper disposal of all residual wastes.

135. **Groundwater**. Subproject activities do not interfere with groundwater regime. No groundwater abstraction is proposed and all activities are limited on land surface activities. Groundwater quality will not be impacted by the subproject.

36. However, as a precautionary measure, the mitigation measures for avoiding seepage of pollutants to the groundwater will be in place. Contractors will be required to :

(i) follow World Bank's EHS Guidelines on Construction and Decommissioning Activities (footnote);

136. provide impervious bunded areas with 110% volume for storage of petroleum products used during construction, such as fuel, oils, and lubricants. This will ensure these chemicals will not seep into the ground and eventually affecting groundwater quality.

137. **Landscape and Aesthetics**. The construction work is likely to generate considerable quantities of waste soil. Indiscriminate disposal of the soil and waste, excess construction material, concrete, packing materials, containers, lubricants and oils may affect the landscape

and aesthetics of local environment.

138. These impacts are negative but short-term and reversible by mitigation measures. As mitigation measures, contractors will be required to:

(i) dispose excess spoils per the Spoil Management Plan attached in **Appendix 8**;
(ii) avoid stockpiling of excess excavated soils as far as possible;
(iii) avoid disposal of any debris and waste soils in or near water bodies/rivers;
(iv) coordinate with PIU for beneficial uses of excess excavated soils or immediately dispose to designated areas;
(v) recover used oil and lubricants and reuse or remove from the sites;
(vi) manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas; and
(vii) remove all wreckage, rubbish, or temporary structures which are no longer required;

139. **Impact on Ecological Resources.** Subproject sites are located within the town area. There is no biodiversity or natural habitat in these sites. As such, no impacts on ecological resources is envisaged.

140. **Impacts on Terrestrial Ecology.** Haphazard site clearing, parking, and movement of construction vehicles and equipment stockpiling, will result in disturbance to the land in the subproject area. However, the subproject area does not include any forest, so the impacts to flora and fauna will be minimal. For trees found along the alignments that will be used for footpaths or drains, the design will ensure that these trees will not be cut.

141. To mitigate these impacts, contractors will be required to:

(i) avoid, or minimize when avoidance is not possible, tree cutting;
(ii) for any tree cut, conduct replacement planting at a ratio of 1:10 consistent with the approved EARF for the project and social forestry program of LGED (see **Appendix 9** for LGED Tree Plantation Program);
(iii) protect giant trees and locally-important trees (for religious reasons), if any, during implementation;
(iv) prevent workers or any other person from removing and damaging any flora and fauna found in the subproject sites; and
(v) prohibit employees and workers from poaching animals and cutting of trees for firewood at the subproject sites or their vicinities.

142. **Impacts on Aquatic Ecology.** Some of the subproject sites are near or adjacent to ponds of khals (canals) that have been formed as water bodies and serve as catchment of rainwater during monsoon season. Through the years, these ponds and khals are utilized as fish ponds of the local communities. All aquatic animals in these ponds are not protected species and are grown for livelihood and income purposes by the local communities. Nevertheless, the construction of the subproject may affect these ponds due to siltation and therefore may impact the quality of the water and eventually the productivity and harvest of these aquatic resources.

143. To mitigate this impact, contractors will be required to:

(i) provide temporary protection at sections adjacent or near ponds or khals to avoid sliding of soils;
(ii) store spoils away from these ponds to avoid being washed down the ponds or khals (ideally at least 100 m from the surface water);; and
(iii) not undertake construction works near these sites during the spawning and breeding period between June and September.

144. **Impacts to traffic flow.** During construction, few disturbances will occur. Mitigation measures include the preparation and implementation of a traffic management plan in coordination with local authorities and PIU. The traffic management plan shall include the following: (i) installation of clear signages; (ii) barricades; (iii) lightings at night; and (iv) markers to direct traffic movement in sites, among others.

145. **Impacts on physical cultural resources.** The subproject will not encroach into or run over any physical cultural resources. Strip maps showing alignments with physical cultural resources, specifically religious establishment, are shown in **Appendix 10**. As well, the subproject area is not a potential archaeological area and therefore no impact is envisaged.However, as a precautionary approach, the contractor will be required to:

(i) strictly follow the protocol by coordinating immediately with PIU and Bangladesh Department of Archaeology for any suspicion of chance finds during excavation works;
(ii) stop work immediately to allow further investigation if any finds are suspected; and
(iii) request authorized person from the Bangladesh Department of Archaeology to observe when excavation resumes for the identification of the potential chance find, and comply with further instructions.

146. **Impacts on the socioeconomic, environment and resources.** The impacts will result from excavation works, stockpiling, the operation of construction vehicles and equipment, and

accidental damage to utilities (e.g., power supply poles, open drains, and water taps or hoses). The potential impacts include disturbance to economic activities, particularly to the businesses operating along the alignments of construction works.

147. To mitigate these impacts, the contractor will be required to:

(i) prepare a traffic management plan in collaboration with local authorities;
(ii) where traffic congestion will likely occur, place traffic flagmen during working hours;
(iii) avoid full road closures by applying section-wise and/or chainage-wise approach during excavation, concreting and/or curing periods;
(iv) if full road closure is not possible especially on very narrow roads, ensure that alternate routes are identified and that affected residents and establishments are informed prior to conducting the construction activities;
(v) provide appropriate compensation to qualified affected people or businesses per approved resettlement plan for the subproject;
(vi) manage stockpile;
(vii) manage pumped water from excavations either to drains or drums for later use;
(viii) relocate the affected power supply poles, and
(ix) advise the concerned authority during accidental damage to utilities.

148. **Community health and safety hazards**. Communities will be moderately exposed to threats due to impacts on air and water quality, ambient noise level; mobility of people such as the children and elderly, goods, and services; accesses to properties, economic activities, and social services; service disruptions, etc. Construction workers may potentially bring communicable diseases in the community.

149. To mitigate these impacts, the contractor will be required to implement its approved SEMP, which should include a community health and safety plan following international best practices on community health and safety such as those in Section 4.3 of World Bank EHS Guidelines on Construction and Decommissioning Activities.[17] As a minimum and whichever is applicable, the community health and safety plan shall ensure the following:

(i) implement risk management strategies to protect the community from physical, chemical, or other hazards associated with sites under construction and decommissioning;
(ii) restricting access to the site, through a combination of institutional and administrative controls, with a focus on high risk structures or areas depending on site-specific situations, including fencing, signage, and communication of risks to the local community;
(iii) removing hazardous conditions on construction sites that cannot be controlled affectively with site access restrictions, such as covering openings to small confined spaces, ensuring means of escape for larger openings such as trenches or excavations, or locked storage of hazardous materials; and
(iv) implement measure to prevent proliferation of vectors of diseases at work sites;
(v) adequate space and lighting, temporary fences, shining barriers and signage at active work sites;
(vi) contractor's preparedness in emergency response;

(vii) adequate dissemination of GRM and contractor's observance and implementation of GRM; and

(viii) upon availability, local people should be given an opportunity for work in the subproject activities.

150. **Occupational health and safety hazards.** Workers will be exposed to the crosscutting threats of the impacts above during construction. Inadequate supply of safe and potable water and inadequate sanitation facilities; poor sanitation practices on site; poor housing conditions; the handling and operation of construction equipment; handling of hazardous substances; exposure to extreme weather and non-observance of health and safety measures pose additional threats to the health and safety of construction workers. Construction workers may be potentially exposed to communicable and transmittable diseases in the community and the workforce.

151. To mitigate these impacts, contractors will be required to implement its approved SEMP, which should include an occupational health and safety plan following international best practices on occupational health and safety such as those in Section 4.2 of World Bank EHS Guidelines on Construction and Decommissioning Activities (footnote xx). As minimum and whichever are applicable, the occupational health and safety plan shall ensure the following:

(i) Communication and Training

a) Training of all workers on occupational health and safety prior to construction works;
b) Conduct of orientation to visitors on health and safety procedures at work sites;
c) Signages strategically installed to identify all areas at work sites, including hazard or danger areas;
d) Proper labeling of equipment and containers at construction and storage sites; and
e) Suitable arrangements to cater for emergencies, including: first aid equipment; personnel trained to administer first aid; communication with, and transport to, the nearest hospital with an accident / emergency department; monitoring equipment; rescue equipment; firefighting equipment; and communication with nearest fire brigade station;

(ii) Physical Hazards

a) Use of personal protective equipment by all workers such as earplugs, safety shoes, hard hats, masks, goggles, etc. as applicable, and ensure these are used properly;
b) Avoidance of slips and falls through good house-keeping practices, such as the sorting and placing loose construction materials or demolition debris in established areas away from foot paths, cleaning up excessive waste debris and liquid spills regularly, locating electrical cords and ropes in common areas and marked corridors, and use of slip retardant footwear;
c) Use of bracing or trench shoring on deep excavation works;
d) Adequate lighting in dark working areas and areas with night works;
e) Rotating and moving equipment inspected and tested prior to use during construction works. These shall be parked at designated areas and operated by qualified and trained operators only;

f) Specific site traffic rules and routes in place and known to all personnel, workers, drivers, and equipment operators; and
g) Use of air pollution source equipment and vehicles that are well maintained and with valid permits;

(iii) General Facility Design and Operation

a) Regular checking of integrity of workplace structures to avoid collapse or failure;
b) Ensuring workplace can withstand severe weather conditions;
c) Enough work spaces available for workers, including exit routes during emergencies;
d) Fire precautions and firefighting equipment installed;
e) First aid stations and kits are available. Trained personnel should be available at all times who can provide first aid measures to victims of accidents;
f) Secured storage areas for chemicals and other hazardous and flammable substances are installed and ensure access is limited to authorized personnel only;
g) Good working environment temperature maintained;
h) Worker camps and work sites provided with housekeeping facilities, such as separate toilets for male and female workers, drinking water supply, wash and bathing water, rest areas, and other lavatory and worker welfare facilities; and
i) Maintain records and make reports concerning health, safety and welfare of persons, and damage to property. Take remedial action to prevent a recurrence of any accidents that may occur.

D. Anticipated Impacts and Mitigation Measures – Operation and Maintenance Phase

152. **Impacts to community health and safety.** Once in operation, the improved roads may result to elevated noise level and air emissions from increased vehicular traffic. Increase in carbon monoxide, sulphur oxides, particulate matter, nitrous oxides, and hydrocarbons in the air is expected. The construction and rehabilitation of the roads will give way to much faster vehicle speeds which could endanger people, especially the children and elderly persons, and households along the road alignments. Damage to the roads, may also cause accidents to passing vehicles and may inflict harm to the local people.

153. To mitigate these impacts, the PIU will be required to:

(i) Conduct regular inspection of the roads to check for damages, and undertake rehabilitation measures for any damages found;
(ii) Inspect and maintain the integrity of road barriers, especially at critical curves or locations that are prone to vehicular accidents;
(iii) Inspect and maintain speed limiters such as humps installed on road sections near residential areas, schools, and religious establishments;
(iv) Inspect and maintain all road signages, including appropriate warning signages at silent zones, and ensure that these are reflectorized and visible even during night time; and
(v) Ensure pedestrian crossings and other safety measures to protect children and elderly persons, are maintained.

VI. CONSULTATION, INFORMATION DISCLOSURE, AND GRIEVANCE REDRESS MECHANISM

A. Consultation

154. Stakeholder consultation and participation was an essential process during subproject preparation. The process of engaging stakeholders and affected people involved key informant interviews, on-site discussions and random field interviews of stakeholders.

155. **Preliminary Consultation.** Public consultations were conducted in January 2018 and March 2018 which were attended by various stakeholders. The summary of consultation meeting is attached as **Appendix 11**. The following are some of the concerns discussed:

(i) Local people will support the project activities;
(ii) The main issue arising from the consultation is that the people of this area suffer huge traffic congestion due to movement of heavy container truck. They cannot easily move to the school, hospital, and working places from their residences due to congestion. Hence, the people will benefit from the subproject, especially those who are residing alongside the roads;
(iii) The area is dominated by businesses and is about70%. The people in this area depends largely on these businesses, while the rest on services and agricultural cultivations;
(iv) During the construction period short term, the consultees believe that community activities will be affected. However, the PIU explained that the project will ensure measures shall be put in place to avoid any negative impact to the community;
(v) It was emphasized that no resettlement and land acquisition will be required for the project. However, compensations will be provided to affected persons who will be temporarily disrupted of their businesses during construction;
(vi) It was confirmed with the local stakeholders that there is no protected areas in and around the project areas;
(vii) The project will never impact on natural water body and not contaminate the soil resources. It was explained that he project will implement appropriate mitigation measures to ensure the natural water bodies in the area will not be negatively impacted; and
(viii) The participants assured that they welcome the project, and will support/cooperate in all stages of the project works.

156. **Future consultations during final detailed design stage**. The stakeholder consultations during the final detailed design stage will continue to discuss about the subproject, including the implementation of the EMP and SEMP developed for the subproject. PMCU, PIU and PDSC will ensure that consultations will be conducted as meaningful per definition of ADB SPS (footnote 17). Savar PIU will ensure that these consultations include participation of the representatives of institutional establishments along the subproject road alignments such as schools, hospitals, and religious establishments and mosques. These religious establishments or mosques are identified in **Appendix 10**.

B. Information Disclosure

157. Information shall be disclosed through public consultation and more formally by making documents and other materials available in a form and at a location in which they can be easily accessed by stakeholders. This normally involves making draft reports available for the public in the subproject locations and providing a mechanism for the receipt of comments, and making documents available more widely by lodging them on ADB and LGED websites. LGED through

the PMCU will submit to ADB the following documents for disclosure on ADB's website:[18]

(i) the final IEE report;
(ii) new or updated IEE reports and corrective action plan prepared during project implementation, if any; and
(iii) semi-annual environmental monitoring reports.

158. PMCU will provide relevant environmental information, including information from the relevant documents in a timely manner, in an accessible place and in a form and language(s) understandable to affected people and other stakeholders. For illiterate people, other suitable communication methods will be used.

159. For the benefit of the community, the summary of the IEE will be translated in Bangla and made available at: (i) office of PMCU; and (ii) offices of the Savar PIU. Hard copies of the IEE will be available in the PMCU and Savar PIU, and accessible to citizens as a means of disclosing 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 offices of the PMCU or Savar 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 LGED after approval of the documents by Government and clearance from ADB. PMCU will issue notification on the disclosure mechanism in local newspapers, ahead of the initiation of implementation of the project, providing information on the project, as well as the start dates, etc. The notice will be issued by the PMCU and Savar PIU in local newspapers one month ahead of the implementation works. This will create awareness of the project implementation among the public. PMCU and Savar PIU will consider other additional means of information disclosure depending on practicability, such as the distribution of posters to libraries within the locality to mass campaign the basic tenets of the IEE.

C. Grievance Redress Mechanism

37. The project will adopt the grievance redress mechanism (GRM) outline of the first CRDP. The GRM shall be set up to register grievances of the people regarding technical, social and environmental aspects. Also, the GRM welcomes all kinds of technical and safeguards-related queries, comments, suggestions and complaints from anyone. The process will be designed to be transparent, gender responsive, culturally appropriate and commensurate to the risks and adverse impacts of the project, as well as readily accessible to all segments of the affected people. The project GRM will not supersede any legal government grievance procedures.

160. Affected people are to be informed about the mechanism through information caravan and orientation in the community to be conducted by the project officers and staff, printing of pamphlets and brochures, media and public outlets. To ensure wider coverage, complaints or grievances can be reported through but not limited to: letters, e-mails, text messages, verbal narration from walk-in complainants, phone calls, fax, online grievance registration form (in local dialects) through the project website, installation of Grievance Intake Box at the project area and other mode of filing that the affected people have access to. For those affected people who cannot read and write, a community leader/volunteer will be identified in every project area. The community leader/volunteer will serve as the focal person who will assist the affected people in filing the complaints. This participatory process shall ensure that all views of the

[18]Per ADB SPS, 2009, prior to disclosure on ADB website, ADB reviews the "borrower's/client's social and environmental assessment and plans to ensure that safeguard measures are in place to avoid, wherever possible, and minimize, mitigate, and compensate for adverse social and environmental impacts in compliance with ADB's safeguard policy principles and Safeguard Requirements 1-4."

people are adequately reviewed and suitably incorporated in the design and implementation process. The GRM will be implemented in three levels. See **Figure 24** for the outline.

161. **First Level**. The first level and most accessible and immediate venue for the fastest resolve of grievances is the PIU, chiefly through the Environment and/or Social Safeguard Officers and Project Manager (or equivalent), with assistance from the Environmental and Social Safeguard Specialists of the preparation, design and supervision consultant (PDSC). The contact phone number will be posted in the project areas and at PMU and PIU websites and notice boards. Grievances will be resolved through continuous interactions with affected persons and the PIU will answer queries and resolve grievances regarding various issues including EMP implementation, land acquisition, structures acquisition, livelihood impacts, entitlements, and assistance. Corrective measures will be undertaken at the field-level itself within five days and feedback provided to the complainant on actions taken for resolution. All grievances will be documented with full information of the person and issue. A sample grievance form that may be used is in **Appendix 12**. The suggested format for record-keeping of grievance is in **Appendix 13**.

162. **Second Level**. Should the grievance remain unresolved, the PIU Project Manager (or equivalent), will activate the second level of the GRM by referring the issue (with written documentation) to the local Grievance Redress Committee (GRC) of the Upazila, who will, based on review of the grievances, address them in consultation with the Safeguards Officers 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 PIU Project Manager will be responsible for processing and placing all papers before the GRC, recording decisions, issuing minutes of the meetings, providing feedback to complainants and taking follow up actions so that formal orders are issued and decisions are carried out. The local GRC will consist of the following persons: (i) Chief Executive Officer or Secretary of the Upazila Parishad (GRC Chair); (ii) representative of the Chairman of the Upazila; (iii) representative of the affected persons; (iv) official of the land registry department; (v) official of the DOE divisional office; (vi) town planner of the Upazila Parishad; and (vii) environmental and/or social safeguards officers of the PIU. The local GRC shall meet weekly, unless the Head of the PIU 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.

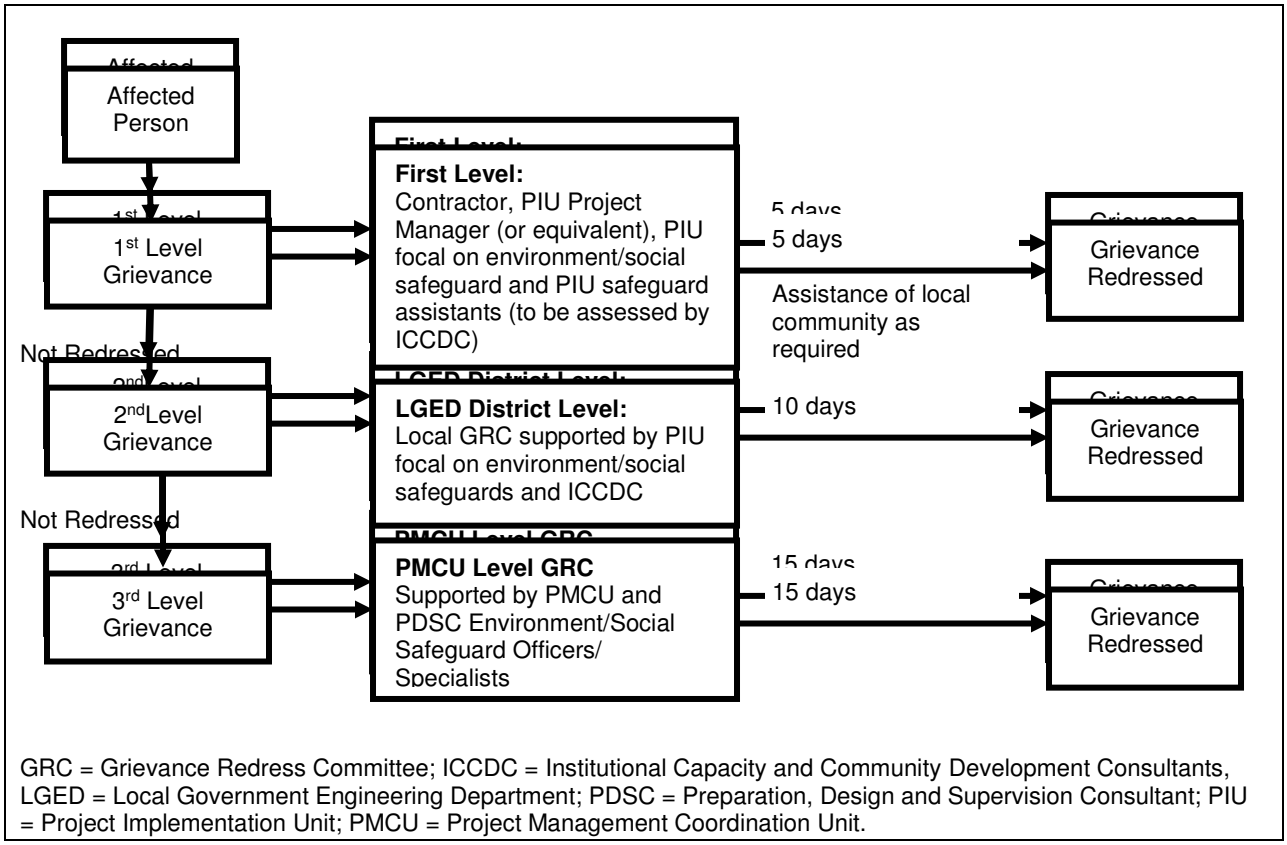
163. The functions of the local GRC are as follows: (i) provide support to affected persons on problems arising from land acquisition (temporary or permanent), asset acquisition and eligibility for entitlements, compensation and assistance, and other environmental or social safeguard issues unresolved at the first level of GRM; (ii) record grievances of affected persons, categorize and prioritize them and provide solutions within 10 days from receipt of grievance from the first level; and (iii) report to the aggrieved parties about developments regarding their grievances and decisions of the GRC.

164. **Third Level**. Should the grievance remain unresolved, the PIU Head 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 local GRC Chair, activate the PMCU level GRC. This committee shall comprise the following representatives: (i) Project Director, PMCU, (ii) Deputy Project Director, PMCU; (iii) Environmental/Resettlement Safeguards Officer of the PMCU; (iv) representative from Land Ministry, (v) representative from DOE; (vi) representative of the affected

persons; and (vii) Environmental and/or Social Safeguards officers of the PIU. The Project Director will sign off on all grievances received by the PMCU.

165. The GRC at the PMCU level shall meet based on the receipt of grievances, and the meeting shall be convened and grievance redressed within 15 days of receipt of the grievance by the PMCU. The Environmental and/or Social 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, and final decision conveyed to the complainant.

Figure 23: Project Grievance Redress Mechanism19



GRC = Grievance Redress Committee; ICCDC = Institutional Capacity and Community Development Consultants, LGED = Local Government Engineering Department; PDSC = Preparation, Design and Supervision Consultant; PIU = Project Implementation Unit; PMCU = Project Management Coordination Unit.

166. The GRM notwithstanding, an aggrieved person shall have access to the country's legal system at any stage. This can run parallel to accessing the GRM and is not dependent on the negative outcome of the GRM.

167. If the established GRM is not in a position to resolve the issue, the affected persons can also use the ADB Accountability Mechanism through directly contacting (in writing) the Complaint Receiving Officer at ADB headquarters. The complaint can be submitted in any of the official languages of ADB's Developing Member Countries. The ADB Accountability Mechanism information will be included in the Project Information Document to be distributed to the affected communities, as part of the project GRM.

VII. ENVIRONMENTAL MANAGEMENT PLAN

A. Institutional Arrangements

168. **Project Management Coordination Unit**. LGED will be the executing agency responsible for overall guidance of the project and implementation of urban roads and solid waste management subprojects. The PMCU, headed by a Project Director will be responsible[20] for planning, management, coordination, supervision and progress monitoring of the project in the two city regions. The PMCU has the responsibility of fulfilling environmental requirements of the government and conducting required level of environmental assessment as per ADB SPS, 2009. To ensure effective implementation of the environmental aspects, one full-time environmental safeguards officer who is a permanent employee of LGED will be assigned at PMCU. The environmental safeguards officer will primarily be responsible for the compliance to the statutory and legal requirements, including overall supervision of the implementation of the environmental management provisions in the IEEs/EMPs for the subprojects. The PDSC will assist the PMCU in this regard.

169. **Project Implementation Unit**. The Savar PIU will be responsible for the day-to-day activities of project implementation in the field and will have direct supervision to all contractors at subproject sites. Savar PIU will appoint at least one environment staff responsible for day-to-day monitoring of the project progress and implementation of the environmental provisions in the EMP. and the environment staff will ensure compliance with government and ADB requirements on environmental safeguards. The Savar PIU will prepare quarterly progress reports on all aspects concerning environmental assessment, management, monitoring, and report to the PMCU.

170. **Preparation, Design and Supervision Consultants**. The Preparation, Design and Supervision Consultants (PDSC) team shall include the following environmental safeguards expertise to effectively implement the EARF and relevant provisions of the IEE reports of the subprojects: (i) an international environmental safeguards specialist (to be hired only on "as needed" basis); and (ii) national environmental specialists (for duration of implementation). These personnel will provide technical support to the PMCU and Savar PIU including implementation of the environmental requirements, according to ADB SPS, and assist in monitoring impacts and mitigation measures associated with subprojects. The PDSC safeguards specialists will support environmental management functions including updating subproject IEEs with respect to environmental management plans, assisting in preparing IEEs, and assist in monitoring impacts and mitigation measures associated with subprojects. The consultants will also provide needed training and capacity building support to the PMCU and Savar PIU. The Terms of Reference for project environmental personnel is provided in **Appendix 14**.

171. **Contractors**. The contractors will have specific roles in the implementation of the EMPs. Each contractor shall have at least one full time environmental health and safety supervisor (or equivalent) responsible for implementing applicable measures in the EMP. All these specific roles and responsibilities are discussed in this IEE report which shall form part of the contract documents. Savar PIU will monitor contractors' environmental performance.
Table 20 summarizes the overall roles and responsibilities of PMCU, Savar PIU, and ADB.

[20]PMCU responsibilities shall include management of (i) Local Government Grant facility, (ii) Investment components under the project, and (iii) Institutional Strengthening and Capacity building of the local governments. The project PMCU will be advised by a Technical Advisory and Selection Committee and an Urban Management Support unit.

Table 20: Institutional Roles and Responsibilities

Project Management Coordination Unit	Project Implementation Unit	ADB
Pre-construction stage		
Environmental Officer of the PMCU, with assistance from the Environmental Specialist(s) of the PDSC to conduct Rapid Environmental Assessment (REA) for each subproject using checklists available on ADB's website. Based on the REA, categorize the project based on ADB's SPS. Submit all categorization forms to ADB.	PDSC will assist the PIU and conduct IEE (or update existing IEE) for all Category B subprojects, which will include an EMP. PIU with assistance from the Environmental Officer of the PMCU and the Environmental Specialist of the PDSC to carry out public consultation during IEE process and incorporate consultation findings into project designs and IEE.	ADB to review the REA checklists and reconfirm the categorization.
PMCU based on review, will approve the IEE and send to ADB for review and clearance before contract award. The IEE also made available on request. Ensure IEE with the corresponding EMP is part of contract documents for category B subprojects and/or components. If the subproject and/or component is of category 'C', the PMCU to provide generic mitigation measures, if any, to be implemented. For Category C subprojects, no IEE/EIA is required, only a review of the environmental implications.	After the approval of IEE by PMCU and clearance by ADB, PIU with the assistance of PDSC to disclose the IEE and EMP to public information as required by ADB's SPS. PDSC, on behalf of the PIU, to incorporate mitigation measures in project design, specified in IEE and incorporate environmental mitigation and monitoring measures that need to be incorporated into contract document.	ADB will review and grant clearance of IEE/EMPs for subprojects before award of contracts. ADB will disclose cleared and government-endorsed IEEs on its website.
Environmental Officer of PMCU to provide guidance to the PIU to ensure conformance of all subprojects to the regulatory compliance, with regard to environment. This shall include guidance in preparation of the documents as required for the issuance of ECC under the ECR and other necessary clearances such as for example tree cutting permits from the Ministry of Environment and Forests, submission of application forms, and liaising with agencies towards obtaining ECC, tree-cutting permits, and other clearances from relevant government agencies. Environmental Officer of PMCU shall notify the ADB on obtaining of these clearances, including the conditions specified if any in the clearances, and integration of these into the contracts/EMP.	ECR stipulates that for (i) green, (ii) orange-A, (iii) orange–B, and (iv) red category projects, obtaining of environmental clearance certificate from DOE is a prerequisite. The Environmental Support staff of the PIU with assistance from PDSC Environmental Specialists shall compile the necessary information required for submission of application forms for clearances, obtaining NOC from local authorities, etc. Until the obtaining of clearance certificate from DOE, the Environmental Support Staff will interact with the DOE on a regular basis and provide necessary documentation/clarifications as required.	ADB to ensure that the clearance requirements are included in the contract provisions/EMP.
Environmental Officer of PMCU to ensure that the IEE containing the EMP of each subproject is included in the bid and contract documents. At the same time, the Environmental Officer of PMCU to ensure that the total budget for	The environmental support staff of PIU to ensure that: (i) each contractor prepares its SEMP based on the EMP in the subproject IEE, and (ii) budget is included in the SEMP.	

Project Management Coordination Unit	Project Implementation Unit	ADB
implementing the EMP is included in the bid and contract documents.		
Construction stage		
PMCU to review the PIU monthly monitoring reports to ensure that all mitigation measures are implemented. PMCU to consolidate the monthly reports and submit semi-annual reports to ADB for review. Corrective actions to be undertaken if needed.	Contractors to conduct environmental monitoring and implement EMPs. PIU with support of the Environmental Specialist(s) of PDSC to (i) review and approve the contractors' implementation plan for the environmental provisions in the EMP, and (ii) monitor the implementation of mitigation measures by contractor. The PDSC with PIU to prepare monthly progress reports including a section on implementation of the mitigation measures and submit to PMCU for review. PMCU to submit semi-annual monitoring report to ADB.	ADB to review the reports and provide necessary advice/guidance needed to the PMCU.
Operation Stage		
LGED and Savar PIU to conduct monitoring, as specified in the environmental monitoring plan of EMP. The DOE to monitor the performance, if required and as specified in monitoring plan of EMP.		ADB to review semi-annual environmental monitoring report and disclose on its website. ADB to prepare Project Completion Report
PMCU to continue submission of semi-annual environmental monitoring report to ADB until ADB issues a Project Completion Report.		

ADB = Asian Development Bank, DOE = Department of Environment, ECC = Environmental Compliance Certificate, ECR = Environmental Conservation Rules, EIA = Environmental Impact Assessment, EMP = Environmental Management Plan, IEE = initial environmental examination, PDSC = preparation, Design, and Supervision Consultant, NOC = no objection certificate, PIU = Project Implementation Unit, PMCU = Project Management Coordination Unit, REA = Rapid Environmental Assessment, SPS = Safeguards Policy Statement.

B. Environmental Management Plan

172. An environmental management plan (EMP) has been developed to provide mitigation measures to reduce all negative impacts to acceptable levels (**Table 21**).

173. The EMP will guide the environmentally-sound construction of the subproject and ensure efficient lines of communication between PMCU, Savar PIU, consultants and contractors. The EMP will (i) ensure that the activities are undertaken in a responsible non-detrimental manner; (ii) provide a pro-active, feasible and practical working tool to enable the measurement and monitoring of environmental performance on site; (iii) guide and control the implementation of findings and recommendations of the environmental assessment conducted for the subproject; (iv) detail specific actions deemed necessary to assist in mitigating the environmental impact of the subproject; and (v) ensure that safety recommendations are complied with. The EMP includes a monitoring program to measure the environmental condition and effectiveness of implementation of the mitigation measures. It will include observations on- and off-site, document checks, and interviews with workers and beneficiaries.

174. The contractor will be required to (i) carry out all of the mitigation and monitoring measures set forth in the approved EMP; and (ii) implement any corrective or preventive actions set out in safeguards monitoring reports that PMCU will prepare from time to time to monitor implementation of this IEE, EMP and site-specific EMP (SEMP). The contractor shall allocate budget for compliance with these IEE, EMP and SEMP measures, requirements and actions. The contractor will be required to submit to PIU, for review and approval, SEMP including (i) proposed sites/locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid wastes and excavation spoils; (ii) specific mitigation measures following the approved EMP; and (iii) monitoring program per EMP. No works can commence prior to approval of SEMP.

Table 21: Environmental Management Plan Matrix

Field	Impacts	Mitigations Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
1. Before Construction Activities					
Consents, permits, clearances, etc.	Failure to obtain necessary consents, permits, and other appropriate regulatory clearances can result to design revisions and work stoppage	- Obtain all of the necessary consents, permits, and clearances before the start of civil works. - Include in detailed design drawings and documents all conditions and provisions if necessary	Project management coordination unit (PMCU), Araihazar project implementation unit (PIU), preparation, design and supervision consultant (PDSC)	Incorporated in final design and communicated to contractors	Before award of contract
Existing utilities	Disruption of services	- Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction - Require construction contractors to prepare a contingency and spoil management plan	PMCU, Savar PIU, PDSC	List of affected utilities and operators; Bid document to include a requirement for a contingency plan for service interruptions, e.g. provision of water if disruption is more than 24 hours, spoil management plan	During detailed design phase Review of spoils management plan: Twice (once after first draft and once before final approval)
Construction work camps, stockpile areas,	Disruption to traffic flow and sensitive receptors	- Determine locations before award of construction contracts	PMCU, Savar PIU, PDSC	List of selected sites for construction work camps,	During detailed design phase

Field	Impacts	Mitigations Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
storage areas, and disposal areas				hot mix plants, stockpile areas, storage areas, and disposal areas. Written consent of landowner/s (not lessee/s) for reuse of excess spoils to agricultural land	
Waste generation	Generation of solid waste, wastewater from labor camp and other construction waste may cause pollution	- Follow the principle of "Reduce, Reuse, Recycle, and Recover" - Prohibition of unwanted littering and discharge of waste. - Solid waste is either managed in a pit or disposed in municipal collection system.	Contractor	Contractor records. Visual inspection	Visual inspection by and PDSC on monthly basis
Sources of materials	Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, resulting water logging, and water pollution	- Prepare list of approved quarry sites and sources of materials	PMCU, Savar PIU, PDSC	List of approved quarry sites and sources of materials; (ii) Bid document to include requirement for verification of quarry sites	During detailed design phase, as necessary with a discussion with detailed design engineers and Savar PIU suitability of sources and permit for additional quarry sites if necessary.
Environmental management plan	Without training, the EMP may not be implemente	- Project manager and contractors should be trained on EMP implementation, spoils	PMCU, Savar PIU, PDSC, Contrac	Record of completion (Safeguards Compliance Orientation)	During the detailed design phase before the

Field	Impacts	Mitigations Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
(EMP) Implementation Training	d efficiently. Hence, will have impact to the environment, workers, and community	management, standard operating procedures (SOP), health and safety (H&S), applicable regulatory compliance.	tor's Environmental Supervisor	Contractor records for EMP implementation at worksites	mobilization of workers to site
2. During Construction Activities					
A. Physical Characteristics					
Topography landforms, geology, and soils and river morphology and hydrology	Sand, gravel or crushed stone will be required for this town project. Extraction of natural aggregate materials may cause localized changes in topography and landforms (if on land) or river morphology and hydrology (if on the river).	- Utilize readily available sources with environmental clearance and license - Borrow areas and quarries comply with environmental requirements. - Coordinate with local authorities such as the Bangladesh Water Resources Development Board for quarrying from rivers. Alternative sources should be identified.	Contractor	Records of sources of materials	Monthly by Savar PIU
Water quality	Trenching and excavation, run-off from stockpiled materials and chemical contamination from fuels and lubricants may result to silt-laden runoff during rainfall, which may cause	- Follow WB EHS Guidelines on Construction and Decommissioning Activities; - DisposeSpoils management plan. - Reuse excess spoils and materials - Disposal site in designated areas. - Earthworks during dry season - Stockyards at least 300m away from watercourses. - Fuel and other petroleum products stored at storage	Contractor	Areas for stockpile storage of fuels and lubricants and waste materials; Number of silt traps installed along trenches leading to water bodies; No visible degradation to nearby drainage, water bodies	Visual inspection by Savar PIU and/or PDSC on weekly basis Frequency and sampling sites to be finalized during detailed design.

Field	Impacts	Mitigations Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
	siltation and reduction in the quality of adjacent bodies of water.	areas away from water drainage and protected by impermeable lining and bunded areas with 110% volume for storage of petroleum products used during construction, such as fuel, oils, and lubricants; - Provide orientation and training to assigned workers on the correct handling of petroleum-based products, clean-up of equipment, and response measures in case spills or emergencies using a well prepared emergency response plan; - Ensure no refueling within 100 m from surface water. - Take precautions to minimize the overuse of water; - Prevent wastewater into water sources; - Ensure safe water diversion; and - No obstruction in flowing water.		due to construction activities	
Air quality	Work at the dry season and transporting construction materials may increase dust, carbon, monoxide, sulfur oxides, particulate matter, nitrous	- Follow World Bank's Environmental Health and Safety (EHS) Guidelines on Construction and Decommissioning Activities; - Confine earthworks according to excavation segmentation plan that should be part of site-specific environmental management plan (SEMP); - Prepare and implement a dust management plan	Construction Contractor	Location of stockpiles; Number of complaints from sensitive receptors; Heavy equipment and machinery with air pollution control devices; A certification that vehicles	Visual inspection by Savar PIU and/or PDSC on monthly basis Ambient air quality testing will be conducted consistent with the monitoring plan, or increase frequency as

Field	Impacts	Mitigations Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
	oxides, and hydrocarbons in air environment	that should be part of the SEMP; - Consult with PIU on the designated areas for stockpiling of sand, gravel, and other construction materials (ideally about 500 m from residential areas); - Bring construction materials (aggregates, sand, etc.) to the construction site as and when required to avoid heavy stockpiling at the sites; - Damp down with water dry exposed surfaces and stockpiles of aggregates at least twice daily, or as necessary; - If re-surfacing of disturbed roads cannot be done immediately, spread crushed gravel over backfilled surfaces; - During demolition, water exterior surfaces, unpaved ground in the immediate vicinity and demolition debris; - Place signage at active work sites in populated areas; - Require trucks delivering aggregates and cement to have tarpaulin cover; - Clean wheels and undercarriage of vehicles prior to leaving construction sites; - Limit speed of construction vehicles on access roads and work sites to a maximum of 30 km/h; - Prohibit burning firewood in work and labor camps (promote liquified petroleum gas for		are compliant with Bangladesh vehicle emission standards. Ambient air quality tests.	may be needed.

Field	Impacts	Mitigations Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
		cooking purposes and electric heater for heating purposes); - Use vehicles that have government-issued permits and registrations, complying with Bangladesh vehicle emission standards; and - Prohibit open burning of solid waste. -			
Acoustic environment	Temporary increase in noise level and vibrations by excavation equipment, and the transportation of materials, equipment and people.	- Follow WB EHS Guidelines on Construction and Decommissioning Activities. - If applicable to subproject alignment, prepare and implement a noise and vibration management plan that should be part of the SEMP; - Provide prior information to the local public, including institutions such as schools and hospitals, about the work schedule; - Use equipment that emits the least noise, well-maintained and with efficient mufflers. Install silencers if necessary and practical; - Restrict noisy activities to day time; - Avoid use of noisy equipment or doing noisy works at night time; - Limit engine idling to a maximum of one minute; - Spread out the schedule of material, spoil and waste transport; - Minimize drop heights when loading and	Contractor	Number of complaints from sensitive receptors; Use of silencers in noise-producing equipment Use of sound barriers or enclosures for generators, if any; Noise level measured at day time and night time	Visual inspection by Savar PIU and/or PDSC on monthly basis

Field	Impacts	Mitigations Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
		unloading coarse aggregates; - Not use horns unless it is necessary to warn other road users or animals of a vehicle's approach; - Warning signs in noise hazard areas. Require workers to wear ear plugs while in these areas; and - Identify vibration risk to nearby structures. Take caution working in such areas.			
Aesthetics	Interference with the enjoyment of the area and creation of unsightly or offensive conditions	- Prepare a debris disposal plan. - Minimize stockpile size - Clear wastes regularly - Avoid stockpiling of excess spoils. - Cover delivery trucks during transportation. - Clean roads. - Use screening enclosure shade cloth, temporary walls - Clean site regularly. - Follow the principle of "Reduce, Reuse, Recycle, and Recover"	Contractor	Number of complaints from sensitive receptors; Worksite clear of all types of wastes Worksite clear of any wastes unutilized materials, and debris Transport route and worksite cleared of dirt	Visual inspection by Savar PIU and/or PDSC on monthly basis
B. Biological Characteristics					
Biodiversity	Potential cutting of trees along road alignments Threat to animals due to poaching or leisure catching by workers in the	- Tree cutting will be avoided, or minimized if total avoidance is not possible, for this subproject. - In case of unavoidable tree cutting, replacement of ten trees per tree cut and follow the Local Government Engineering Division (LGED) tree plantation program to implement this measure	Contractor	Number of trees cut and planted if any (during detailed design stage) Some complaints from sensitive receptors on disturbance of vegetation,	Visual inspection by Savar PIU and/or PDSC on monthly basis

Field	Impacts	Mitigations Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
	subproject areas	(see **Appendix 9** for the LGED Manual). Further, any tree cutting activities shall be undertaken only outside the bird breeding season. - Any encounter with nomadic animal species will ensure these creatures are not hurt or killed. Any unintentional catch of any species should be reported and surrendered to authorized authorities for proper handling.		poaching fishing, etc.	
C. Socioeconomic Characteristics					
Existing provisions for pedestrians and other forms of transport	Potential road closures due to construction activities. Hauling of construction materials and operation of equipment on-site can cause traffic problems.	- Implement the Traffic Management Plan - Prepare suitable alternate transportation routes - Safe passage for vehicles and pedestrians - Avoid full road closures where possible by implementing section-wise or chainage wise approach during excavation, concreting and/or curing periods - Where full road closure is necessary especially in very narrow roads, inform affected residents or establishment prior to any construction activity and provide them with alternate routes. Ensure to complete construction activities in the fastest way possible. Provide appropriate compensation to qualified affected persons or businesses - Schedule material deliveries on low traffic hours.	Contractor	Traffic route during construction works, including number of permanent signs, barricades, and flagmen on worksite; Number of complaints from sensitive receptors; Some signage placed at the subproject location. Number of walkways, signage, and metal sheets placed at subproject location	Visual inspection by Savar PIU and/or PDSC on monthly basis

Field	Impacts	Mitigations Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
		- Erect and maintain barricades if required - Inform through display board about nature, duration of construction and contact for complaints - Complete the work quickly in nearby institution, place of worship, business, hospitals, and schools. - Consult with business and institutions for work schedules. - Restore damaged properties and utilities			
Socioeconomic status	Staffing will be required during construction. This can result in an increase in local revenue.	- Engage the local workforce. However, child and forced labor shall be strictly prohibited. - Secure construction materials from local market.	Contractor	Employment records; Records of sources of materials Records of compliance with Bangladesh Labor Act 2006.	Visual inspection by Savar PIU and/or PDSC on monthly basis
Other amenities for community welfare	Civil works may result in an impact to the sensitive receptors such as residents, businesses, and the communities. Excavation may also damage infrastructure located alongside the roads.	- Identify location and nature of existing infrastructure before excavation - Minimize repeated disturbance to locals by integrating other forms of infrastructures. - Inform local about nature, duration and possible impacts of the construction and integrate their concerns - Promptly relocate infrastructure materials - Take prior permission from local authority for water use - Restore damaged properties and utilities to pre-work conditions.	Contractor	Number of complaints from sensitive receptors	Visual inspection by Savar PIU and/or PDSC on monthly basis

Field	Impacts	Mitigations Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
		-			
Community health and safety	Construction works will impede the access of residents and business in limited cases. Construction works will raise danger to community people.	- Restrict work force in designated areas. - Identify stockyard areas in consultation with local administration - Work on private land requires written permission of landowners. - Prefer small mechanical excavator for trenching - Prohibit alcohol and drugs on site - Prevent excessive noise; - Code of conduct for workers includes restricting workers in designated areas, no open defecation, no littering, no firewood collection, no fire except designated places, no trespassing, no residence at construction sites, and no obligation to potentially dangerous work - Follow international best practices on community health and safety such as those in Section 4.3 of World Bank Environmental Health and Safety (EHS) Guidelines on Construction and Decommissioning Activities - Maintain a complaint logbook in workers camp and take action promptly of complaints	Contractor	The number of permanent signs, barricades, and flagmen on worksites per Traffic Management Plan (see **Appendix 15** for sample which can be modified according to applicability); Number of complaints from sensitive receptors; Number of walkways, signs, and metal sheets placed at the subproject location Agreement between landowner and contractors in case of using private land as work camps storage areas etc.	Visual inspection by Savar PIU and/or PDSC on weekly basis
Workers Health and Safety	There is invariably a safety risk when construction works such	- Comply with Bangladesh Labor Act 2006. - Follow international best practices on occupational health and safety such as those in Section 4.2 of	Contractor	Site-specific health and safety plan Equipped first-aid stations	Visual inspection by Savar PIU and/or PDSCon a weekly basis.

Field	Impacts	Mitigations Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
	as excavation and earthmoving are conducted in urban areas. Workers need to be mindful of the occupational hazards, which can arise from working at height and excavation works.	World Bank EHS Guidelines on Construction and Decommissioning Activities. - Train all site personnel on environmental health and safety - Exclude public from worksites - Provide personal protective equipment to workers and ensure their effective usage - Document procedures to be followed for site activities. - Maintain accident reports and records. - Make first aid kits readily available. - Maintain hygienic accommodation in work camps. - Ensure uncontaminated water for drinking, cooking and washing. - Ensure clean eating areas. - Ensure sanitation facilities are readily available. - Provide medical insurance coverage for workers. - Provide orientation for guest visitors. - Ensure that visitors do not enter hazard areas unescorted. - Require workers to wear high visibility clothes. - Ensure moving equipment is outfitted with audible backup alarms. - Chemical and material storage areas need to be marked clearly.		Medical insurance coverage for workers Number of accidents Records of supply of uncontaminated water Condition of eating areas of workers Record of orientation training Availability of personal protective equipment at construction site Percentage of moving equipment outfitted with audible back-up alarms Signage for storage and disposal areas Condition of sanitation facilities for workers	

Field	Impacts	Mitigations Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
		- Hearing protection equipment enforced in noisy environment.			
D. Historical, Cultural, and Archaeological Characteristics					
Physical and cultural heritage	There are no archaeological, paleontological, or architectural sites of significance listed by Bangladesh Department of Archaeology and United Nations Educational, Scientific and Cultural Organization (UNESCO).	- Stop work immediately to allow further investigation if any findings are suspected.	Contractor	Records of chance finds	Visual inspection by Savar PIU and/or PDSC Monthly basis.
E. Others					
Submission of EMP implementation Report	Unsatisfactory compliance to EMP	- Appointment of full time EHS supervisor (or equivalent) - Timely monitoring reports with field photographs	Contractor	Availability and competency of appointed supervisor Daily monitoring sheets by Contractor EHS supervisor Monthly monitoring reports by Contractor to Savar PIU.	Monthly monitoring report to be submitted by contractors to Savar PIU and Savar PIU submit quarterly reports to PMCU. PMCU to submit semi-annual monitoring report to ADB
3. During Post Construction Activities and Operation and Maintenance					
Post construction site clearing activities	Damage due to debris, spoils, excess	- Remove spoils wreckage, rubbish, or temporary structures no longer required;	Contractor	PMCU and/or Savar PIU report in writing that (i) worksite is	Before turnover of completed works to Savar PIU

Field	Impacts	Mitigations Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring
	construction materials	- All disrupted utilities should be restored - All affected structures rehabilitated /compensated - The construction camp needs to clear of spills e.g. oil, paint, etc. and other pollutants after dismantling - All hardened surfaces shall be ripped; all imported materials shall be removed, and all temporary services shall be cancelled - Fully reinstate pathways, other local infrastructure, and agricultural land to at least their pre-project condition as recorded by the Contractor - Request PMCU or PIUs in writing that worksites and camps are already vacated and restored to at least pre-project conditions		restored or reinstated to at least original conditions; (ii) camp has been vacated and restored to pre-project conditions; (iii) all construction related structures not relevant to operation and maintenance are removed, and (iv) worksite clean-up is satisfactory.	

C. Environmental Monitoring Program

175. Monitoring of mitigation measures during construction is the responsibility of the PIU supported by the PMCU Environment Officer and PDSC Environmental Specialist. **Table 22** shows the proposed Environmental Monitoring Plan for this subproject, which specifies the various monitoring activities, indicating location, frequency of monitoring and responsibility.

Table 22: Environmental Monitoring Program

Activities or Items to Monitor	Location	Responsible for Activities	Monitoring Method	Monitoring Frequency	Monitoring Responsibility
PRE-CONSTRUCTION					
Secure Environmental Compliance Certificate from Department of Environment	PMCU office	PMCU, PDSC	Copy of approved ECC	Before construction activities	PMCU, PDSC
IEEs and EMPs are included in bid and contract documents	PMCU office	PMCU, PDSC	Copies of bid and contract documents	Before approval tender document	PMCU, PDSC
Site-specific EMP (SEMP) submitted by Contractor for approval by PIU	PIU office	Contractor, PIU	Copy of approved SEMP	Before construction activities commence	PMCU, PDSC
Spoil Management Plan (SMP) submitted by Contractor for approval by PIU	PIU office	Contractor, PIU	Copy of approved SMP	Before construction activities commence	PMCU, PDSC
Traffic Management Plan (TMP) submitted by Contractor for approval by PIU	PIU office	Contractor	Copy of approved TMP	Before construction activities commence	PMCU, PDSC
Baseline environmental data gathering	All subproject sites	Contractor	Ambient air quality sampling Noise level measurements	Once before construction activities commence	PMCU, PDSC
Secure all other necessary permits and licenses from relevant government agencies		Contractor	Copies of permits and licenses	Before construction activities commence	PMCU, PIU, PDSC
CONSTRUCTION					
Implementation of SEMP; including implementation of community and occupational health and safety measures.	Subproject sites	Contractor	Site visits, Contractor records,	Weekly or as needed	PIU, PDSC
Implementation of SMP	Subproject sites	Contractor	Site visits, Contractor records	Weekly or as needed	PIU, PDSC
Implementation of TMP	Subproject sites	Contractor	Site visits, Contractor records	Weekly or as needed	PIU, PDSC
Conduct of ambient air quality sampling and noise level measurements	Subproject sites	Contractor	Contractor records, Results of laboratory analyses	At least semi-annual or as needed	PMCU, PIU, PDSC
Develop and apply archaeological protocol to protect chance finds	All subproject sites	Contractor, PMCU, Savar PIU, PDSC	Contractor records	Once until protocol is approved	PMCU,PIU, PDSC
Provide EHS training for all personnel	All subproject sites	Contractor	Contractor records; Interviews to workers	Monthly	PIU, PDSC
Keep accident reports and records	All subproject	Contractor	Contractor records; Interviews to workers	Monthly	PIU, PDSC

Activities or Items to Monitor	Location	Responsible for Activities	Monitoring Method	Monitoring Frequency	Monitoring Responsibility
	sites		and community people		
Employ workforce from communities near sites	All subproject sites	Contractor	Contractor records	Monthly	PIU, PDSC
Implementation of EHS measures at construction camps	Construction camp sites	Contractor	Site visits; Interviews to workers at camps	Monthly	PIU, PDSC
OPERATION AND MAINTENANCE					
Maintain safe passage for vehicles and pedestrians during maintenance activities	Subproject road sites	PIU	Site observations	Monthly	LGED
Maintain all road signages at critical points particularly the accident-prone areas and areas near institutional establishments such as schools, places of worship, hospitals.	Subproject road sites	PIU	Site observations	Monthly	LGED
Provide signboards informing nature and duration of maintenance activities	Subproject road sites	PIU	Site observations	Monthly	LGED
Prevent run-off/deposit of foreign materials (oil, grease, solid waste, plastics) into water courses, and clean drain periodically; dispose of materials removed from drains	Subproject road sites	PIU	Site observations	Monthly	LGED
Dispose of material from blocked drain in location away from roadway and drain	Subproject road sites	PIU	Site observations	Monthly	LGED

D. Capacity Development Training

176. The PMCU safeguards experts (environmental and social) with support from PDSC Environment Specialist and Social Safeguard Specialist will be responsible for training the Savar PIU' safeguards officers (environmental and social). Training modules will need to cover safeguards awareness and management in accordance with both ADB and government requirements as specified below:

(i) Environmental Safeguards
- (a) sensitization on ADB's safeguard policy on environment;
- (b) introduction to environment and environmental considerations in roads, drainage and solid waste management projects;
- (c) review of IEEs and integration into the project detailed design;
- (d) community and occupational health and safety considerations;
- (e) consultation and participation requirements;
- (f) project GRM and ADB's Accountability Mechanism;
- (g) improved coordination within nodal departments; and
- (h) monitoring and reporting system. The contractors will be required to conduct environmental awareness and orientation of workers prior to deployment to work sites.

(ii) Social Safeguards
- (a) sensitization on ADB's policies on Involuntary Resettlement and Indigenous People;
- (b) introduction to social safeguards assessment and document requirements;
- (c) Consultation and participations requirements;
- (d) Project GRM and ADB's Accountability Mechanism; and
- (e) monitoring and reporting system.

177. The proposed training project along with the frequency of sessions is presented in **Table 23**.

Table 23: Training Program for Environmental Management

Items	Pre-construction	Construction	
Training Title	Orientation workshop	Orientation program/ workshop for contractors and supervisory staff	Experiences and best practices sharing
Purpose	To make the participants aware of the environmental safeguard requirements of ADB and Government of Bangladesh and how the project will meet these requirements	To build the capacity of the staff for effective implementation of the designed EMPs aimed at meeting the environmental safeguard compliance of ADB and Government of Bangladesh	To share the experiences and best practices aimed at learning lessons and improving implementation of EMP
Contents	Module 1: Orientation ADB Safeguards Policy Statement Government of Bangladesh Environmental Laws and Regulations	Roles and responsibilities of officials/contractors/consultants towards protection of the environment Environmental issues during construction	Experiences on EMP implementation – issues and challenges

Items	Pre-construction	Construction	
	Module 2: Environmental Assessment Process ADB environmental process, identification of impacts and mitigation measures, formulation of an environmental management plan (EMP), implementation, and monitoring requirements Review of environmental assessment report to comply with ADB requirements Incorporation of EMP into the project design and contracts	Implementation of EMP Monitoring of EMP implementation Reporting requirements	Best practices followed
Duration	1 day	1 day	1 day on a regular period to be determined by PMCU and PDSC
Participants	PMCU and PIU staff (technical and environmental) involved in the project implementation	PMCU, PIU, Contractors	PMCU, PIU, Contractors

E. Environmental Management and Monitoring Plan Implementation Cost (Indicative)

178. Most of the costs associated with environmental mitigation and enhancement measures are included in the EMP budget. In consideration to the environmental impacts and their mitigation measures for this subproject, some items need to be incorporated in the Bill of Quantities (BOQ) of this subproject. A substantial part of environmental costs shall cover under Civil Works Contract. However, environmental costs under Civil Works Contract are not included here. Costs of these items will be dealt elsewhere in the respective project component document. The environmental costs presented in **Table 24** are tentative provisions based on experience of undertaking similar works under different LGED projects. For the details of environmental costs under civil works contract, individual contract package bid document may be consulted. It is assumed that the environmental cost under civil works contract for each contract package will be more or less same.

Table 24: Tentative EMP Budget for BOQ

(The following items need to be incorporated in the BOQ of this sub-project):

Item #	Description of Items	Unit	Quantity	Unit Rate, Taka	Item Total, Taka
1	Environmental Monitoring a) Air Quality, b) Noise level, c) Water quality, d) Sediment at work site to the entire satisfaction of the engineer-in-charge.	Lumpsum		20000	20,000.00
2	Dust suppression measures (excluding watering for compaction) to the entire satisfaction of the engineer-in-charge.	m	9970	2.00	19,940.00
3	Prevention of spillage, leakages of polluting materials to the entire satisfaction of the engineer-in-charge.	Lumpsum		5000	5,000.00
4	Providing and maintaining adequate potable water supply facilities (Shallow Tube well) at camp site and work site to the entire satisfaction of engineer-in-charge. Two Water Supply Tube wells	Nos.	1	10000	10,000.00
5	Providing and maintaining adequate sanitation facilities at camp site and work site to the entire satisfaction of engineer-in-charge. Two Sanitation Toilets (one for women and one for men)	Nos.	2	5000	10,000.00
6	Rehabilitation of ancillary sites including stockpile sites, brick crushing sites, borrow areas, workforce camp, to the entire satisfaction of the engineer-in-charge.	m	5000	2	10,000.00
7	Proper disposal of camp site wastes to the entire satisfaction of the engineer-in-charge.	Lump sum		10000	10,000.00
8	Maintain First aid box at camp site to the entire satisfaction of the engineer-in-charge.	Lump sum		5000	5,000.00
Estimated cost for additional environmental items					89,940.00

VIII. MONITORING AND REPORTING

179. PMCU will monitor the progress of EMP implementation in the different subproject jurisdictions. The PMCU and PIU will undertake site inspections and document review to verify compliance with the EMP and progress toward the final outcome. The contractor will conduct day to day implementation of the SEMP.

180. The contractor will submit monthly reports to the PIU with jurisdiction over the subproject sites. The monthly reports will include compilation of copies of monitoring sheets accomplished and duly signed by the contractor's EHS supervisor (or equivalent) on a daily basis. A sample daily monitoring sheet which can be used by the contractors is in **Appendix 16**. This monitoring sheet is indicative which can be further enhanced depending on the actual situations at subproject construction sites.

181. The PIU will submit quarterly environmental monitoring reports to PMCU, which will include summary of daily monitoring activities of contractor and results of any independent monitoring or inspection activities of the PIU. In the conduct of these independent inspection activities, PIU will be supported by PDSC in this regard. A sample inspection checklist is in **Appendix 17**. This checklist is indicative which can be further enhanced depending on the actual situations at subproject construction sites.

182. PMCU shall consolidate quarterly reports from the PIUs including Savar PIU and results of its independent monitoring or inspection activities. PMCU shall accomplish semi-annual environmental monitoring report (SEMRs), which shall be submitted to ADB for review and disclosure on ADB website. Submission of SEMR will continue until ADB issues a Project Completion Report. The template for the SEMR is attached as **Appendix 18**.

ADB will carry out the following monitoring actions to supervise the project implementation:

(i) On a need basis, conduct site visits for subproject with potential adverse environmental or social impact;
(ii) Conduct supervision missions with detailed review by ADB's environment/social safeguard specialists and/or officers and/or consultants for subprojects with adverse environmental and social impacts;
(iii) Review the SEMRs submitted by PMCU to ensure that adverse impacts and risks are mitigated as planned in the EMP;
(iv) Work with LGED to rectify to the extent possible any failures to comply with its environmental safeguard commitments, as covenanted in the loan agreement and elaborated in all environmental safeguard documents; and formulate and implement a corrective action plan to re-establish compliance as appropriate; and
(v) Prepare a project completion report that assesses whether the objective and desired outcomes of the safeguard plans have been achieved, taking into account the baseline conditions and the results of monitoring.

38. ADB's monitoring and supervision activities are carried out on an on-going basis until a project completion report is issued. ADB issues a PCR within 1-2 years after the project is physically completed and in operation.

IX. CONCLUSION AND RECOMMENDATIONS

183. The proposed subproject is not an environmentally critical undertaking. IEE indicates that the proposed subproject, and its components, is not located within or adjacent to environmentally sensitive areas.

184. The extent of adverse impacts is expected to be local, confined within the projects' main areas of influence, waste disposal sites, and the routes to and from these sites. With mitigation measures in place and ensuring that the bulk of earthworks are completed before the onset of the rainy season, the potential adverse impacts during construction would be site-specific.

185. The few adverse impacts of moderate magnitude during construction will be temporary and short-term (i.e., most likely to occur only during peak construction activities). These will not be sufficient to threaten or weaken the surrounding resources. Mitigation measures, integral to socially and environmentally responsible construction practices, are commonly used at construction sites and are well known to contractors. Hence, mitigation measures would not be difficult to implement.

186. Based on the above findings, the classification of the subproject under Package No. CRDP-II/LGED/Dhaka/Savar/ NCB/2018/W-02 as Category B per ADB SPS, 2009 is confirmed, and no further special study or detailed EIA needs to be undertaken.

Appendix 1: Rapid Environmental Assessment (REA) Checklist

Country/Project Title: Bangladesh / City Regions Development Project - II

Subproject / Package No.: Second CRDP/LGED/Dhaka/Savar Pour/ NCB/2018/W-01

Screening Questions	Yes	No	Remarks
A. Project Siting Is the project area adjacent to or within any of the following environmentally sensitive areas?			
▪ Cultural heritage site		√	
▪ Protected Area		√	
▪ Wetland		√	
▪ Mangrove		√	
▪ Estuarine		√	
▪ Buffer zone of protected area		√	
▪ Special area for protecting biodiversity		√	
B. Potential Environmental Impacts Will the Project cause…			
▪ encroachment on historical/cultural areas; disfiguration of landscape by road embankments, cuts, fills, and quarries?		√	
▪ encroachment on precious ecology (e.g. sensitive or protected areas)?		√	
▪ alteration of surface water hydrology of waterways crossed by roads, resulting in increased sediment in streams affected by increased soil erosion at construction site?	√		Construction and rehabilitation of roads and drainage will potentially increase siltation of surface waters near or along the alignments. However, this impact will be mitigated through implementation of measures in the EMP.
▪ deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?	√		Construction and rehabilitation of roads and drainage will potentially increase siltation of surface waters near or along the alignments. However, this impact will be mitigated through implementation of measures in the EMP.

Screening Questions	Yes	No	Remarks
▪ increased local air pollution due to rock crushing, cutting and filling works, and chemicals from asphalt processing?		√	Rock crushing and asphalt processing will not be undertaken under the subproject.
▪ risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation during project construction and operation?	√		Construction activities will pose risks to workers. However, this can be mitigated through the implementation of the EMP particularly occupational health and safety measures both at work sites and construction camp sites.
▪ noise and vibration due to blasting and other civil works?	√		Construction activities will elevate noise levels and vibration. However, this can be mitigated through the implementation of the EMP.
▪ dislocation or involuntary resettlement of people?		√	Not anticipated. All works will be confirmed on existing road alignments.
▪ dislocation and compulsory resettlement of people living in right-of-way?		√	Not anticipated. All identified road alignments are free of settlements. No widening works is included.
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		√	
▪ other social concerns relating to inconveniences in living conditions in the project areas that may trigger cases of upper respiratory problems and stress?	√		Construction activities will potentially increase pollutant concentration in ambient air. However, this can be mitigated through the implementation of the EMP, particularly on implementing both the community and occupational EHS measures.
▪ hazardous driving conditions where construction interferes with pre-existing roads?	√		Construction activities may pose hazardous driving conditions at the sites. However, the implementation of the Traffic Management Plan will mitigate this impact.
▪ poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases (such as STI's and HIV/AIDS) from workers to local populations?	√		Construction activities may result to poor sanitation and improper solid waste handling and disposal. However, the implementation of the EMP will mitigate this impact.
▪ creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents?	√		The EMP provides measures to avoid proliferation of disease vectors.
▪ accident risks associated with increased vehicular traffic, leading to accidental spills of toxic materials?		√	Not anticipated.

Screening Questions	Yes	No	Remarks
▪ increased noise and air pollution resulting from traffic volume?	√		Construction activities will elevate noise levels and worsen air pollution due to traffic. However, the TMP will provide measures to avoid traffic congestion at subproject sites.
▪ increased risk of water pollution from oil, grease and fuel spills, and other materials from vehicles using the road?		√	Not anticipated.
▪ social conflicts if workers from other regions or countries are hired?		√	Labor requirements will be sourced locally.
▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		√	Labor requirements will be sourced locally.
▪ risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?	√		Construction activities will pose risks to community health and safety. However, the EMP provides measures to mitigate this impact, including adoption of the WB EHS guidelines on construction and decommissioning relating to community health and safety.
▪ community and occupational safety risks due to both accidental and natural causes, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning.	√		Construction activities will pose risks to community health and safety. However, the EMP provides measures to mitigate this impact, including adoption of the WB EHS guidelines on construction and decommissioning relating to community and occupational health and safety.

A Checklist for Preliminary Climate Risk Screening

Country/Project Title: Bangladesh / City Regions Development Project - II

Subproject / Package No. :

Screening Questions		Score	Remarks[21]
Location and Design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather related events such as floods, droughts, storms, landslides?	1	
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc)?	1	
Materials and Maintenance	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g. construction material)?	1	
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s) ?	1	
Performance of project outputs	Would weather/climate conditions, and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design life time?	1	

Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1
Very Likely	2

Responses when added that provide a score of 0 will be considered low risk project. If adding all responses will result to a score of 1-4 and that no score of 2 was given to any single response, the project will be assigned a medium risk category. A total score of 5 or more (which include providing a score of 1 in all responses) or a 2 in any single response, will be categorized as high risk project.

Result of Initial Screening (Low, Medium, High): Medium

Other Comments:_____

_____

Prepared by: _____

Appendix 2: Template for Application for Environmental Clearance Certificate from Bangladesh Department of Environment

Application for Environmental Clearance Certificate

[See Rule 7(5) of ECR]

Director/Deputy Director
Department of Environment
Dhaka Division/Chittagong Division/Khulna Division/Rajshahi Division (Bogra),

Sir,

I do hereby apply for Environmental Clearance Certificate for my proposed industrial unit or project, or for the existing industrial unit or project, and enclose papers and furnish information as follows:

1.	(a) Name of the industrial unit or project	:
	Address of location of the industrial unit of Project	:
	(b) Address of the present office	:
2.	(a) Proposed industrial unit or project	
	Expected date of starting construction	:
	Expected date for completion of construction	:
	Expected date of trial production, in case of industrial unit, in other cases, date of starting operation of the project	:
	(b) Existing industrial unit or project	
	Date of starting trial production in case of industrial unit, in other cases, date of starting operation of the project	:
3.	Name of product and quantity to produced (daily/monthly/yearly)	:
4.	(a) Name of raw material and quantity (daily/monthly/yearly)	:
	(b) Source of raw material	:
5.	(a) Quantity of water to be used daily	:
	(b) Source of water	:
6.	(a) Name of fuel and quantity (daily/monthly/yearly)	:
	(b) Source of fuel	:
7.	(a) Probable quantity of daily liquid waste	:
	(b) Location of waste discharge	:
	(c) Probable quantity of daily emission of gaseous substance	:
	(d) Mode of emission of gaseous substance	:
8.	Mouza (village) map indicating “Daag” (plot) and “Khatiyan” (land tax account) number	:
9.	Approval of Rajdhani Unnayan Katripakkhya / Chittagong Development Authority / Khulna Development Authority / Local Authority (if applicable)	:
10.	(a) Design and time schedule of proposed Effluent Treatment Plant	:

	(b) Fund allocated	:
	(c) Area	:
11.	Process Flow Diagram	:
12.	(a) Location map of industrial unit or project	:
	(b) Layout plan (with location of Effluent Treatment Plant)	:
13.	(a) IEE / EIA report * (if applicable)	:
	(b) Environmental Management Plan*(if applicable)	:
14.	Feasibility Report (if applicable)	:

Seal

Signature of the entrepreneur:
Name:
Address:
Phone:
Date:

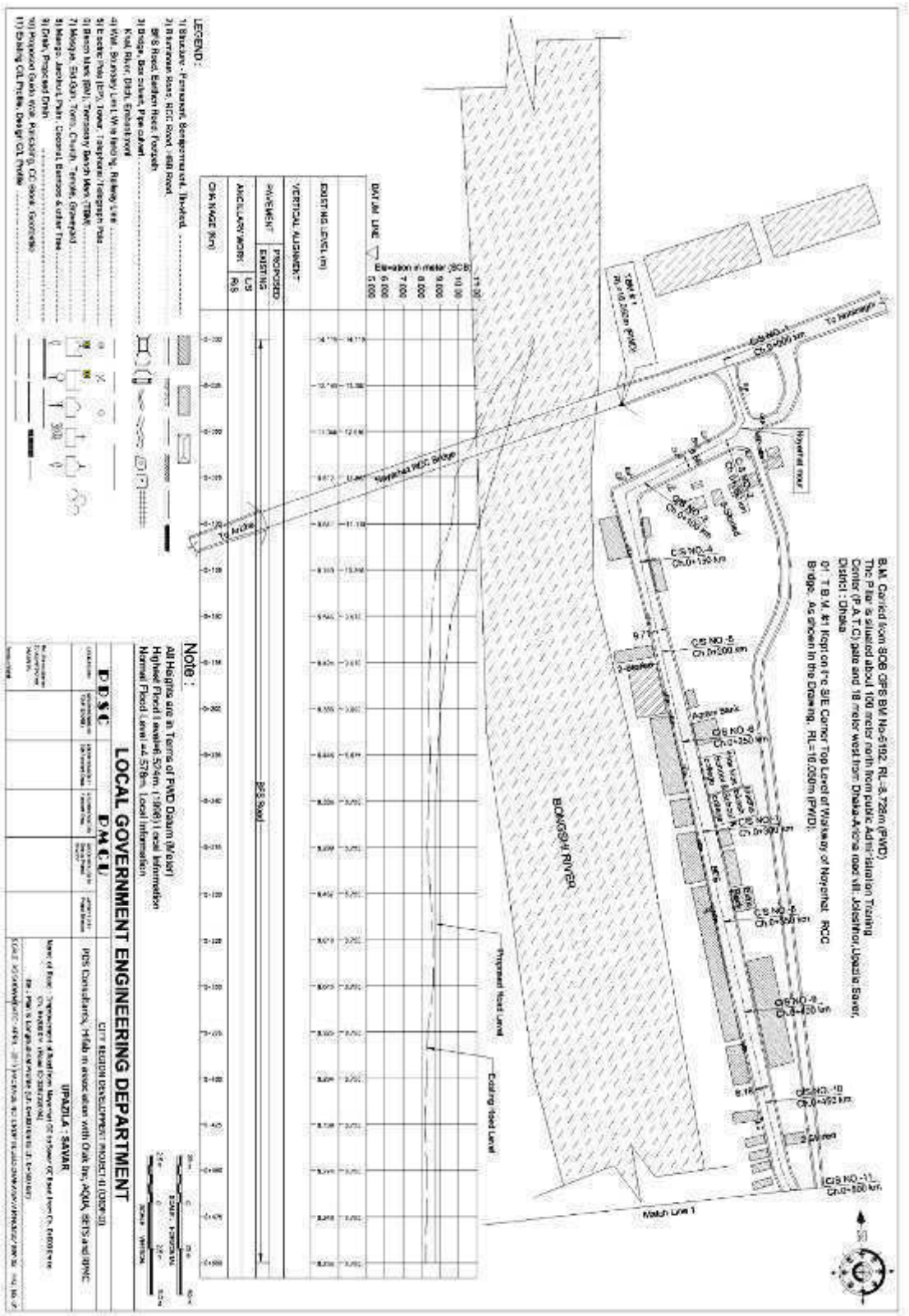
Declaration

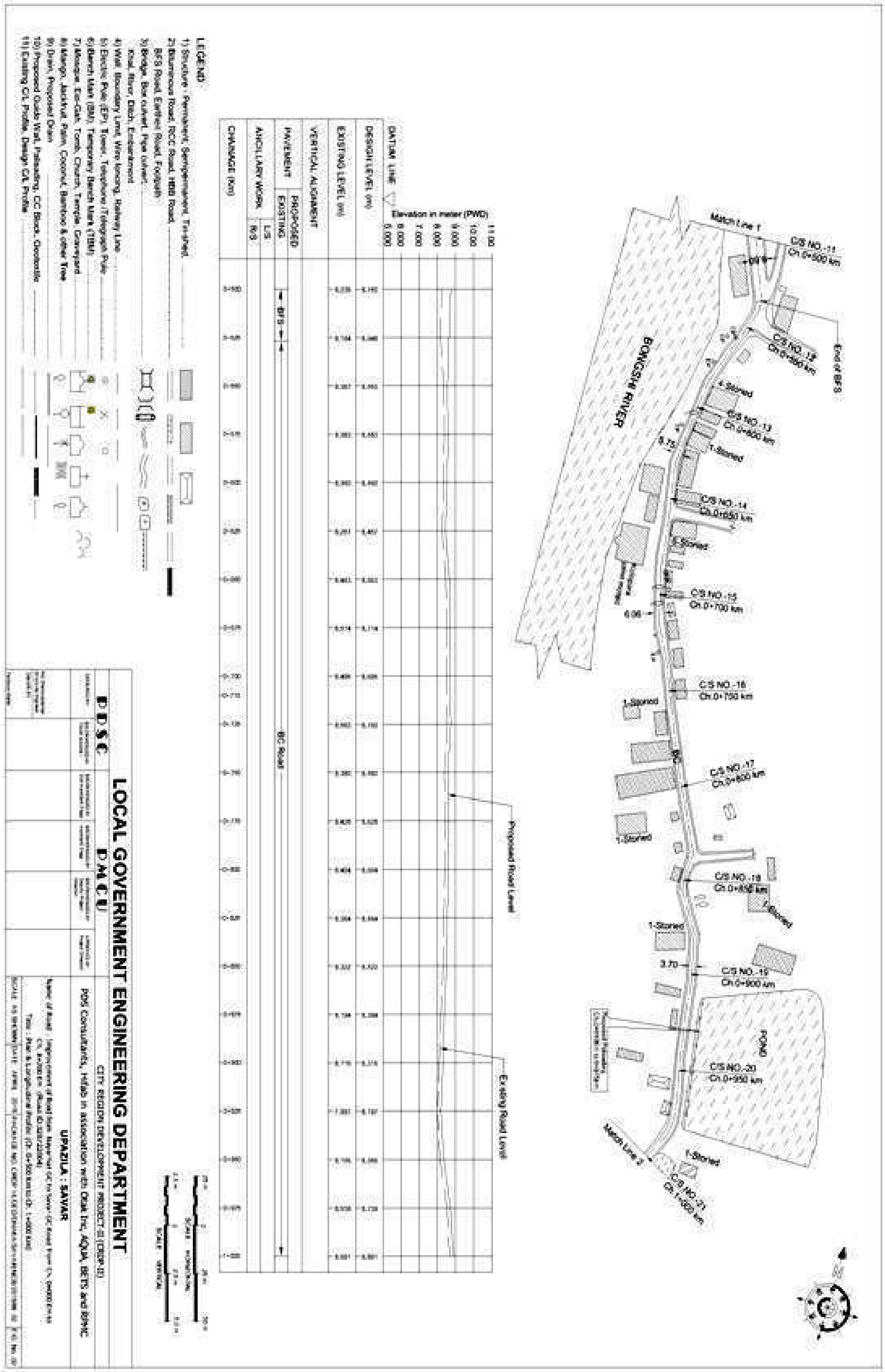
I do hereby declare that all information provided by me in this application are true to the best of my knowledge and no information has been concealed or distorted.

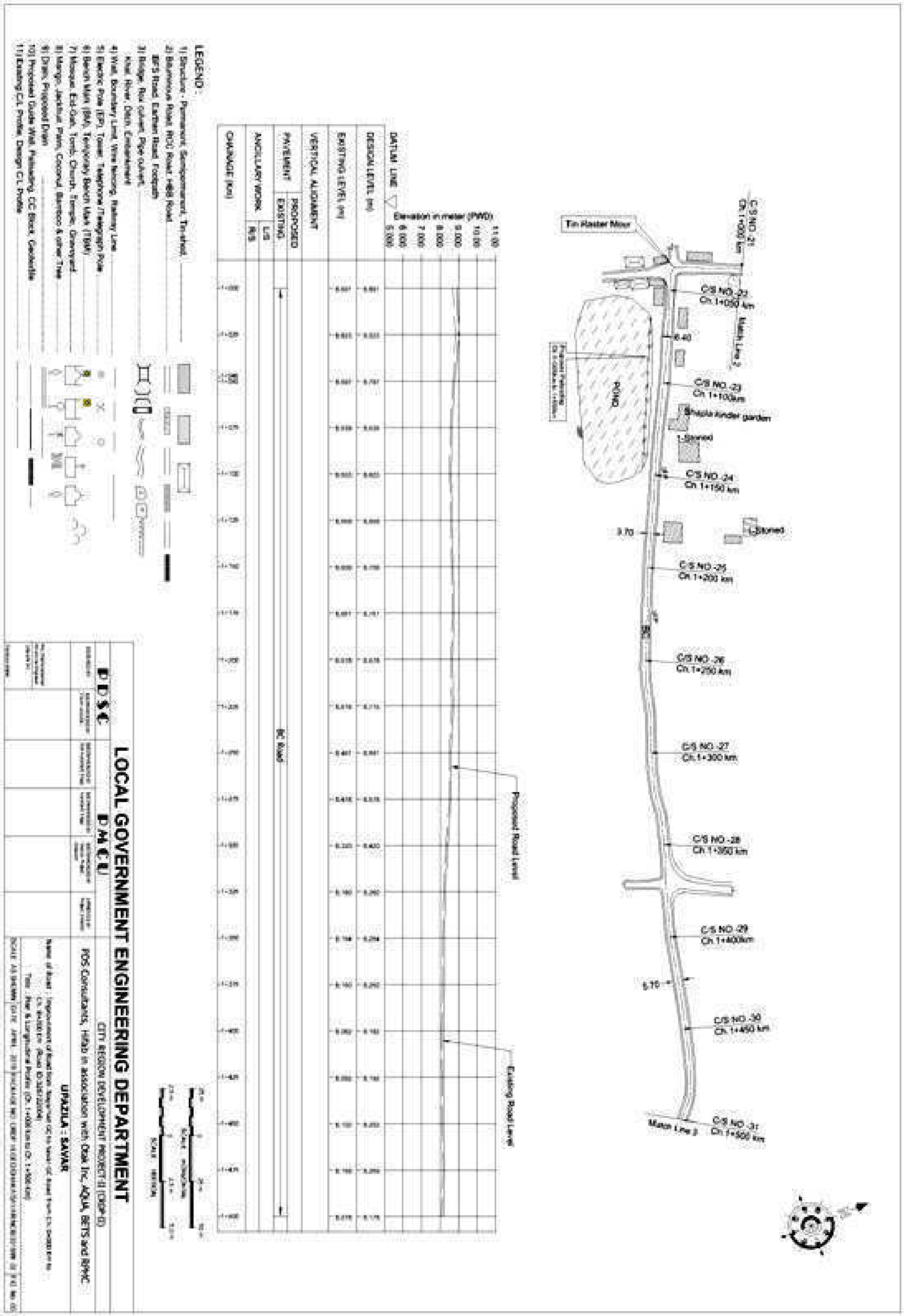
Name and Signature of Entrepreneur

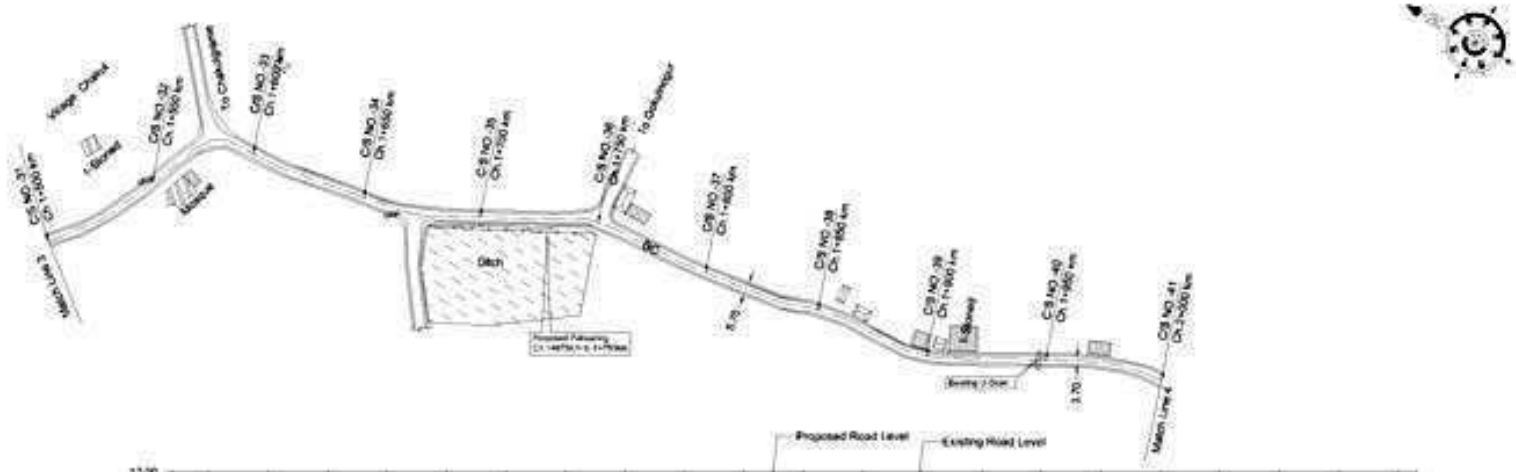
* Each page must be countersigned by the person who fills out this application form and by the entrepreneur.

Appendix 3: Strip Maps of Subproject Alignment - Road 1: Nayarhat GC to Savar GC Road, (Road ID: 2004)




LOCAL GOVERNMENT ENGINEERING DEPARTMENT
CITY REGION DEVELOPMENT PROJECT
UPAZILA : SAVAR
LEGEND
BONGSHI RIVER
POND
Match Line 1
Match Line 2
End of BFS
C/S NO.-11
Ch.0+500 km
C/S NO.-12
Ch.0+550 km
C/S NO.-13
Ch.0+600 km
C/S NO.-14
Ch.0+650 km
C/S NO.-15
Ch.0+700 km
C/S NO.-16
Ch.0+750 km
C/S NO.-17
Ch.0+800 km
C/S NO.-18
Ch.0+850 km
C/S NO.-19
Ch.0+900 km
C/S NO.-20
Ch.0+950 km
C/S NO.-21
Ch.1+000 km
1-Storied
4-Storied
Proposed Road Level
Existing Road Level
DATUM LINE
Elevation in meter (PWD)
DESIGN LEVEL (m)
EXISTING LEVEL (m)
VERTICAL ALIGNMENT
PAVEMENT
PROPOSED
EXISTING
ANCILLARY WORK
L/S
R/S
CHAINAGE (Km)
BFS
BC Road


LOCAL GOVERNMENT ENGINEERING DEPARTMENT
UPAZILA : SAVAR
LEGEND
POND
Proposed Road Level
Existing Road Level
Tin Raster Mour
Shapla kinder garden
DATUM LINE
DESIGN LEVEL (m)
EXISTING LEVEL (m)
VERTICAL ALIGMENT
PAVEMENT
ANCILLARY WORK
CHAINAGE (Km)
BC Road



LEGEND :

1) Structure - Permanent, Semipermanent, Tin-shed.....
2) Bituminous Road, RCC Road, HBB Road, BFS Road, Earthen Road, Footpath.....
3) Bridge, Box culvert, Pipe culvert, Khal, River, Ditch, Embankment.....
4) Wall, Boundary Limit, Wire fencing, Railway Line.....
5) Electric Pole (EP), Tower, Telephone /Telegraph Pole.....
6) Bench Mark (BM), Temporary Bench Mark (TBM).....
7) Mosque, Eid-Gah, Tomb, Church, Temple, Graveyard.....
8) Mango, Jackfruit, Palm, Coconut, Bamboo & other Tree.....
9) Drain, Proposed Drain.....
10) Proposed Guide Wall, Pitreading, CC Block, Geotextile.....
11) Existing C/L Profile, Design C/L Profile.....

LOCAL GOVERNMENT ENGINEERING DEPARTMENT

PDSC | PMCU | CITY REGION DEVELOPMENT PROJECT-II (CRDP-II)

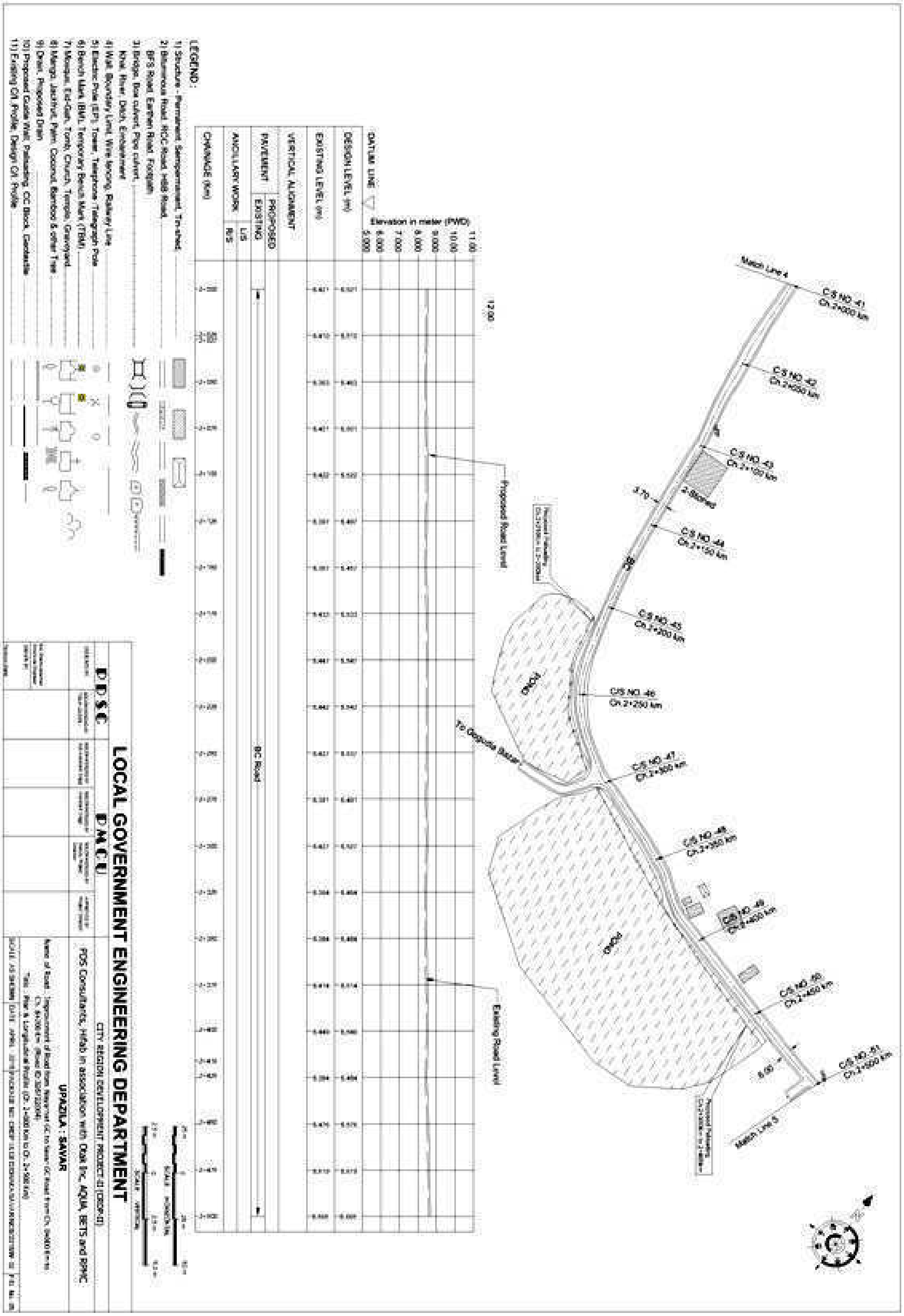
PDS Consultants, Hifab in association with Oiai Inc, AQUA, BETS and RPMC

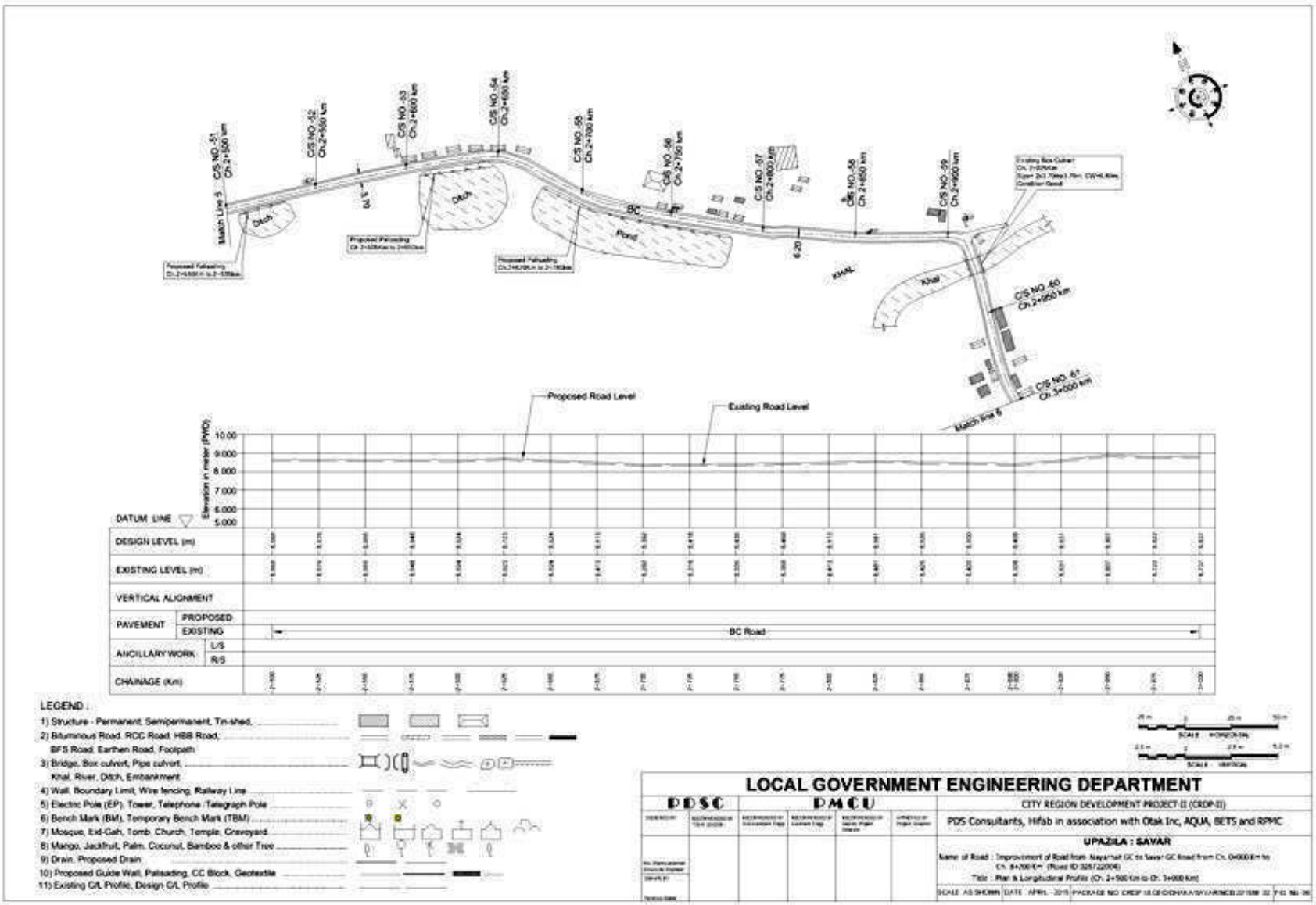
UPAZILA : SAVAR

Name of Road : Improvement of Road from Bayar bat (IC to Savar IC Road From Ch. 0+000 Km to Ch. 2+000 Km) (Road ID 328122004)

Title : Plan & Longitudinal Profile (Ch. 1+500 Km to Ch. 2+000 Km)

SCALE AS SHOWN DATE APRIL, 2015 PACKAGE NO. CRDP-II/CE/SAVAR/CW/WORKS/2015/WW-11 P.C. No. 04


LOCAL GOVERNMENT ENGINEERING DEPARTMENT
LEGEND:
DATUM LINE
DESIGN LEVEL (m)
EXISTING LEVEL (m)
VERTICAL ALIGNMENT
PAVEMENT
PROPOSED
EXISTING
ANCILLARY WORK
CHAINAGE (km)
Elevation in meter (PWD)
BC Road
Proposed Road Level
Existing Road Level
POND
To Gogulia Bazar
Match Line 4
Match Line 5
UPAZILA : SAVAR


C/S NO -51 Ch.2+500 km
C/S NO -52 Ch.2+550 km
C/S NO -53 Ch.2+600 km
C/S NO -54 Ch.2+650 km
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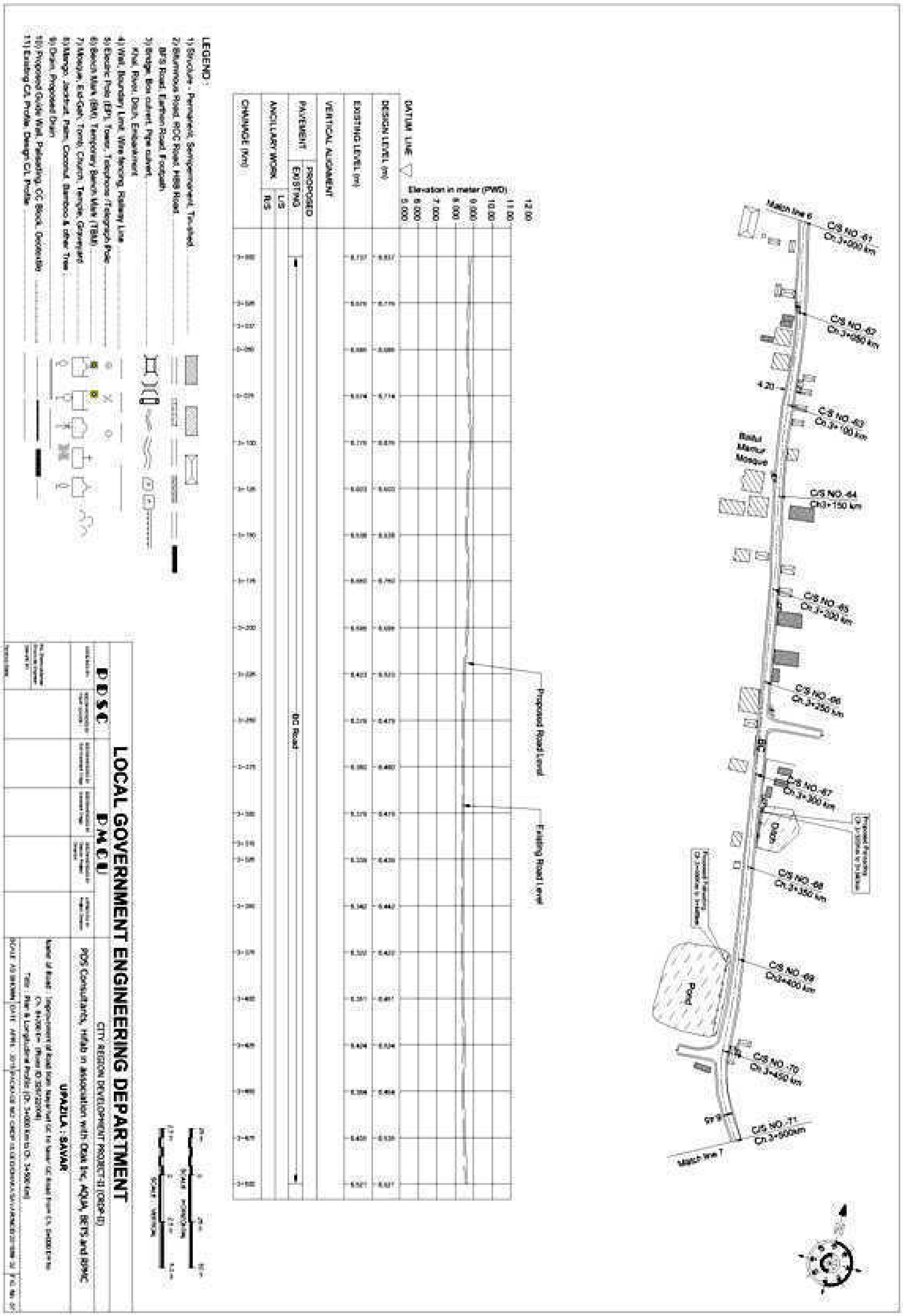
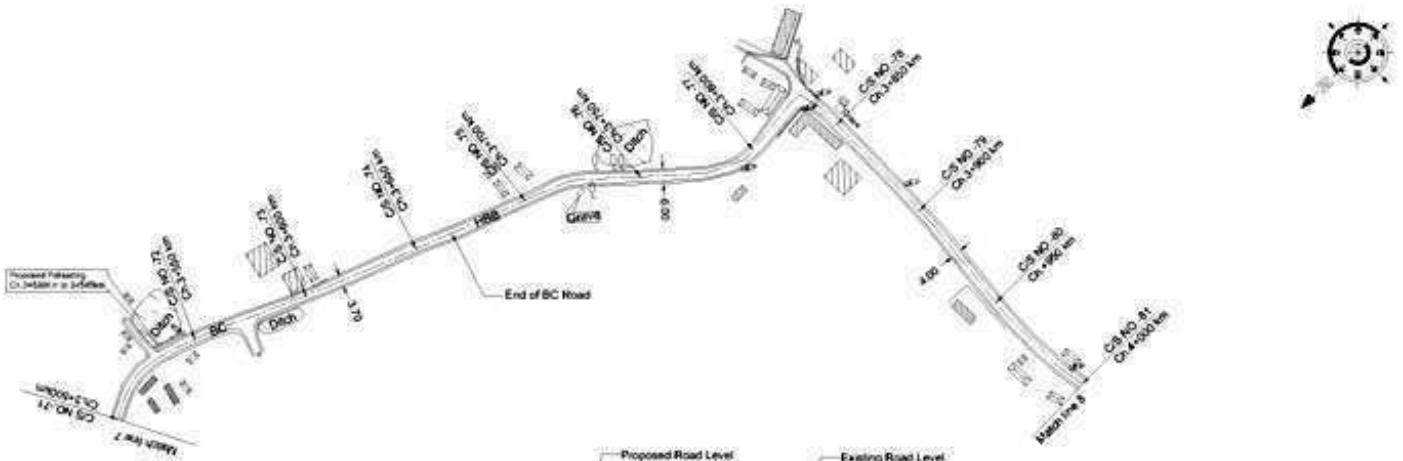
C/S NO -56 Ch.2+750 km
C/S NO -57 Ch.2+800 km
C/S NO -58 Ch.2+850 km
C/S NO -59 Ch.2+900 km
C/S NO -60 Ch.2+950 km
C/S NO -61 Ch.3+000 km
Match Line 5
Match Line 6
Ditch
Pond
BC
Khal
Proposed Road Level
Existing Road Level
Elevation in meter (PWD)
10.00
9.000
8.000
7.000
6.000
5.000
DATUM LINE
DESIGN LEVEL (m)
EXISTING LEVEL (m)
VERTICAL ALIGNMENT
PAVEMENT
PROPOSED
EXISTING
BC Road
ANCILLARY WORK
L/S
R/S
CHAINAGE (Km)
LEGEND :
1) Structure - Permanent, Semipermanent, Tin-shed,
2) Bituminous Road, RCC Road, HBB Road,
BFS Road, Earthen Road, Footpath
3) Bridge, Box culvert, Pipe culvert,
Khal, River, Ditch, Embankment
4) Wall, Boundary Limit, Wire fencing, Railway Line
5) Electric Pole (EP), Tower, Telephone /Telegraph Pole
6) Bench Mark (BM), Temporary Bench Mark (TBM)
7) Mosque, Eid-Gah, Tomb, Church, Temple, Graveyard
8) Mango, Jackfruit, Palm, Cocunut, Bamboo & other Tree
9) Drain, Proposed Drain
10) Proposed Guide Wall, Palisading, CC Block, Geotextile
11) Existing C/L Profile, Design C/L Profile
LOCAL GOVERNMENT ENGINEERING DEPARTMENT
DDSC
DMCU
CITY REGION DEVELOPMENT PROJECT-II (CRDP-II)
PDS Consultants, Hifab in association with Otak Inc, AQUA, BETS and RPMC
UPAZILA : SAVAR
Name of Road : Improvement of Road from Nayarhat GC to Savar GC Road from Ch. 0+000 Km to Ch. 8+700 Km (Road ID 326722004)
Title : Plan & Longitudinal Profile (Ch. 2+500 Km to Ch. 3+000 Km)
SCALE AS SHOWN
DATE : APRIL - 2015


LOCAL GOVERNMENT ENGINEERING DEPARTMENT
Proposed Road Level
Existing Road Level
Pond
UPAZILA : SAVAR



LEGEND

1) Structure - Permanent, Semipermanent, Tin-shed.
2) Bitumenous Road, RCC Road, HBB Road, BFS Road, Earthen Road, Footpath
3) Bridge, Box culvert, Pipe culvert, Khal, River, Ditch, Embankment
4) Wall, Boundary Limit, Wire fencing, Railway Line
5) Electric Pole (EP), Tower, Telephone /Telegraph Pole
6) Bench Mark (BM), Temporary Bench Mark (TBM)
7) Mosque, Eid-Gah, Tomb, Church, Temple, Graveyard
8) Mango, Jackfruit, Palm, Coconut, Bamboo & other Tree
9) Drain, Proposed Drain
10) Proposed Guide Wall, Palisading, CC Block, Geotextile
11) Existing C/L Profile, Design C/L Profile

SCALE : HORIZONTAL

SCALE : VERTICAL

LOCAL GOVERNMENT ENGINEERING DEPARTMENT

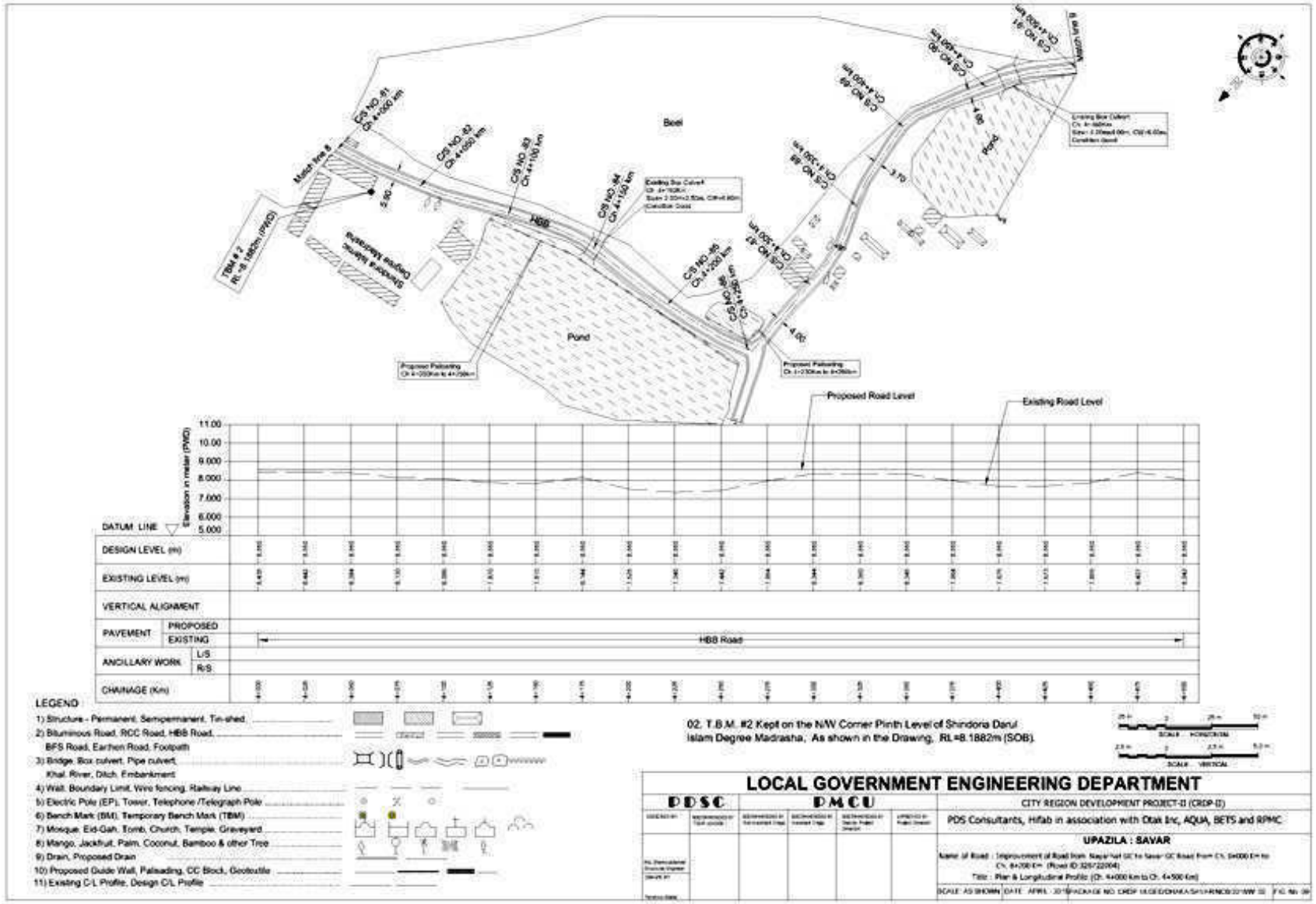
PDSC	PMCU	CITY REGION DEVELOPMENT PROJECT-II (CRDP-II)
		PDS Consultants, Hifab in association with Otak Inc, AQUA, BETS and RPMC

UPAZILA : SAVAR

Name of Road : Improvement of Road from Nayarhat GC to Savar GC Road from Ch. 0+000 Km to Ch. 8+000 Km (Road ID 328722004)

Title : Plan & Longitudinal Profile (Ch. 3+500 km to Ch. 4+000 km)

SCALE : AS SHOWN DATE : APRIL - 2015 PACKAGE NO. CRDP-II/LGED/SWK/SAVAR/NCB/2015/W-02 FIG. No. 05


Bael
Pond
Pond
HBB
Proposed Road Level
Existing Road Level
Elevation in meter (PWD)
DATUM LINE
DESIGN LEVEL (m)
EXISTING LEVEL (m)
VERTICAL ALIGNMENT
PAVEMENT
PROPOSED
EXISTING
HBB Road
ANCILLARY WORK
L/S
R/S
CHAINAGE (Km)
LEGEND
1) Structure - Permanent, Semipermanent, Tin-shed
2) Bituminous Road, RCC Road, HBB Road,
BFS Road, Earthen Road, Footpath
3) Bridge, Box culvert, Pipe culvert,
Khal, River, Ditch, Embankment
4) Wall, Boundary Limit, Wire fencing, Railway Line
5) Electric Pole (EP), Tower, Telephone /Telegraph Pole
6) Bench Mark (BM), Temporary Bench Mark (TBM)
7) Mosque, Eid-Gah, Tomb, Church, Temple, Graveyard
8) Mango, Jackfruit, Palm, Coconut, Bamboo & other Tree
9) Drain, Proposed Drain
10) Proposed Guide Wall, Palisading, CC Block, Geotextile
11) Existing C/L Profile, Design C/L Profile
02. T.B.M. #2 Kept on the N/W Corner Plinth Level of Shindora Darul Islam Degree Madrasha, As shown in the Drawing, RL=8.1882m (SOB).
SCALE : HORIZONTAL
SCALE : VERTICAL
LOCAL GOVERNMENT ENGINEERING DEPARTMENT
PDSC
DMCU
CITY REGION DEVELOPMENT PROJECT-II (CRDP-II)
PDS Consultants, Hifab in association with Otak Inc, AQUA, BETS and RPMC
UPAZILA : SAVAR
Name of Road : Improvement of Road from Nagar Hat GC to Savar GC Road from Ch. 0+000 Km to Ch. 6+700 Km (Road ID 325722004)
Title : Plan & Longitudinal Profile (Ch. 4+000 km to Ch. 4+500 Km)
SCALE: AS SHOWN DATE: APRIL, 2015 PACKAGE NO: CRDP-II/GED/DHAKA/SAVAR/NCB/2015/W-02 F.C. No. 04