Draft Initial Environmental Examination

October 2013

BAN: Coastal Towns Infrastructure Improvement Project – Galachipa Sanitation

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

CURRENCY EQUIVALENTS

(as of 10 October 2013)

Currency unit	–	Taka (Tk)
BDT.1.00	=	$.01287
$1.00	=	Tk 77.69

ABRREVIATIONS

ADB	–	Asian Development Bank
AP	–	affected person
DoE	–	Department of Environment
DPHE	–	Department of Public Health Engineering
EARF	–	environmental assessment and review framework
ECA	–	Environmental Conservation Act
ECC	–	environmental clearance certificate
ECR	–	Environmental Conservation Rules
EIA	–	environmental impact assessment
EMP	–	environmental management plan
ETP	–	effluent treatment plant
GRC	–	grievance redressal committee
GRM	–	grievance redress Mechanism
IEE	–	initial environmental examination
LCC	–	location clearance certificate
LGED	–	Local Government Engineering Department
MLGRDC	–	Ministry of Local Government, Rural Development, and Cooperatives
O&M	–	operations and maintenance
PMU	–	project management unit
PPTA	–	project preparatory technical assistance
REA	–	rapid environmental assessment
RP	–	resettlement plan
SPS	–	Safeguard Policy Statement
ToR	–	terms of reference

GLOSSARY OF BANGLADESHI TERMS

crore	–	10 million (= 100 lakh)
ghat	–	boat landing station
khal	–	drainage ditch/canal
khas, khash	–	belongs to government (e.g. land)
katcha	–	poor quality, poorly built
lakh, lac	–	100,000
madrasha	–	Islamic college
mahalla	–	community area
mouza	–	government-recognized land area
parashad	–	authority (pourashava)
pourashava	–	municipality
pucca	–	good quality, well built, solid
thana	–	police station
upazila	–	subdistrict

WEIGHTS AND MEASURES

ha	–	hectare
km	–	kilometer
m	–	meter
mm	–	millimeter

NOTES

(i) In this report, "$" refers to US dollars.
(ii) —BDT. refers to Bangladeshi Taka

CONTENTS

LIST OF TABLES:

LIST OF FIGURES:

LIST OF APPENDICES:

EXECUTIVE SUMMARY

1. The Coastal Towns Infrastructure Improvement Project (the project) is a key infrastructure initiative of the Government of Bangladesh. The project is located in the coastal area of Bangladesh, and is designed to improve and expand municipal infrastructure and related services in selected pourashavas (municipalities) incorporating climate chance resilience measures. The project consists of four components (i) improved climate-resilient municipal infrastructure, (ii) strengthened governance and institutional capacity, (iii) enhanced public awareness, behavior change, and community-based climate adaptation, and (iv) project management support. The impact of the project will be improved climate change resilience and natural disaster preparedness in coastal towns. The outcome of the project will be improved access to climate-disaster resilient municipal services, including (i) municipal infrastructure such as drainage, cyclone shelters, urban roads, bridges, culverts, solid waste management, bus terminals, slum improvements, boat landings, and markets, (ii) water supply, and (iii) sanitation. The project is to be implemented in 6 years from 2014 to 2020.

2. The project is a project lending modality using a sector approach for selection of subprojects. The release of project funds to the pourashavas will be administered under a 2-stage process known as Performance Criteria Mechanism, whereby the project pourashavas have to meet certain institutional capacity and governance criteria to receive funding. Infrastructure subprojects are therefore divided between Stage I funding and Stage II funding.

3. Galachipa sanitation subproject is one of the subprojects proposed under Performance Criteria Stage I which is considered critical as existing sanitation facilities, mostly latrines, are easily inundated due to rain water accumulation in the monsoon season resulting in loss of accessibility to latrines and pollution caused by discharge of the contents. The findings of the socio-economic and willingness to pay survey conducted during project preparation indicate that there is hardly any usage of existing public toilets as these are poorly maintained and equipped (no water line or electricity). The pourashava does not have de-sludging equipment for cleaning latrine pits and septic tanks. Consequently, the communities suffer from water-sanitation related diseases.

4. **Subproject Scope.** The subproject is formulated under this project to provide accessible, reliable and climate-resilient sanitation facilities in a holistic and integrated manner. Investments under this subproject include (i) construction of 5 public toilets, 3 school latrines, 8 community latrines, and 3 pilot septage treatment plants; and (ii) provision of 1 de-sludging equipment in Galachipa.

5. **Categorization.** ADB requires the consideration of environmental issues in all aspects of the Bank's operations, and the requirements for environmental assessment are described in ADB's Safeguard Policy Statement (SPS, 2009). An environmental assessment using ADB's Rapid Environmental Assessment (REA) checklist for sanitation (Appendix 1) was conducted and results of the assessment show that the subproject is unlikely to cause significant adverse impacts. Galachipa sanitation subproject is classified as Environmental Category B as per the SPS as no significant impacts are envisioned. This initial environmental examination (IEE) has been prepared in accordance with ADB SPS's requirements for environment category B projects and provides mitigation and monitoring measures to ensure no significant impacts as a result of the subproject.

6. Per Government of Bangladesh Environment Conservation Act, 1995 (ECA, 1995) and Environment Conservation Rules (ECR, 1997), the subproject is categorized as "Red" and

Location Clearance Certificate (LCC) and Environmental Clearance Certificate (ECC) must be obtained from the DoE.

7. **Implementation Arrangements.** Local Government Engineering Department (LGED) is the executing agency (EA), and Department of Public Health Engineering (DPHE) is co-executing agency.[1] LGED is responsible for providing support and guidance to pourashavas concerning performance criteria and pourashava development planning. Implementation activities will be overseen by a separate program management unit (PMU). The participating pourashavas are the implementing agencies (IA), with a project implementation unit (PIU) within the pourashava structure. Local LGED and DPHE offices will be involved in the functioning of the PIUs to provide technical support. Consultant teams[2] are responsible for (i) detailed engineering design, contract documents preparation and safeguards facilitation; (ii) project management and administration support; (iii) assistance in supervising construction; (iii) strengthening of local governance, conducting studies/surveys on flood inundation and climate change impacts, facilitating disaster risk management capacity building and community level adaptation through locally managed climate resilience funds; and (iv) community-based climate adaptation and disaster preparedness, awareness raising on behavioural change in water, sanitation and hygiene (WASH) activities and facilitating resettlement procedures.

8. **Description of the Environment.** Subproject components are located in Galachipa urban area or in its immediate surroundings which were converted into urban use for many years ago, and there is no natural habitat left at these sites. The subproject sites are located in government-owned land. There are no protected areas, wetlands, mangroves, or estuaries in or near the subproject location. There are no forest areas within or near Galachipa.

9. **Environmental Management.** An environmental management plan (EMP) is included as part of this IEE, which includes (i) mitigation measures for environmental impacts during implementation; (ii) an environmental monitoring program, and the responsible entities for mitigating, monitoring, and reporting; (iii) public consultation and information disclosure; and (iv) a grievance redress mechanism. A number of impacts and their significance have already been reduced by amending the designs. The EMP will be included in civil work bidding and contract documents.

10. Locations and siting of the proposed infrastructures were considered to further reduce impacts. The concepts considered in design of the Galachipa sanitation subproject are: (i) sites should be located within or very close to locality of users; (ii) sites must be prioritized in educational or institutional compound where concerned authority has no objection; (iii) sites should be selected in the area where significant number of population live; (iv) locating facilities on government-owned land to avoid the need for land acquisition and relocation of people; (v) sites are selected according to the environmental criteria for project selection specified in the environmental assessment and review framework; (vi) ensuring all planning and design interventions and decisions are made in consultation with local communities and reflecting inputs from public consultation and disclosure for site selection.

11. Preliminary designs integrate a number of measures, both structural and non-structural, to mainstream climate resilience into the Galachipa sanitation subproject, including: (i) proposed

[1] LGED is responsible for (i) roads, (ii) bridges, (iii) solid waste management, (iv) cyclone shelters, and (v) drainage and flood control. DPHE is responsible for (i) water supply, and (ii) sanitation.

[2] Consultant teams are composed of project design advance (PDA) detailed design consultants, project management and supervision consultants (PMSC), and institutional capacity and community development consultants (ICCDC)

remedial measures to overcome existing problems in pit latrines; (ii) use of septic tanks in public toilets, school latrines and community latrines based on availability of land size, flooding condition, location and use; and (iii) combination of treatment modules that are applicable for diverse land uses for the pilot septage treatment plants. As a result, some measures have already been included in the subproject designs. This means that the impacts and their significance have already been reduced.

12. During the construction phase, impacts mainly arise from (i) disturbance of residents, businesses, and traffic; (ii) need to manage excess construction materials and spoils; and (iii) community and workers health and safety. These are common impacts of construction in urban areas, and there are well developed methods for their mitigation. Measures such as conducting work in lean season and minimizing inconvenience by best construction methods will be employed.

13. In the operational phase, all facilities and infrastructure will operate with routine maintenance, which should not affect the environment. The toilets and latrines will need to be repaired from time to time, but environmental impacts will be much less than those of the construction period as the work will be infrequent, affecting small areas only. While pit latrines must be emptied frequently, solids that accumulate in septic systems (septage) must also be removed periodically, usually every 2 to 5 years depending on design and usage to maintain proper function and prevent plugging, overflows, and the resulting release of septic tank contents. Recommended measures to prevent, minimize, and control releases of septage and other fecal sludge are included in the EMP. Operation and maintenance of pilot septage treatment plants will be shared responsibility between the user communities or maintenance committee formed by the local community, who will be educated on the technology and with support from the pourashava for periodical maintenance.

14. Mitigation measures have been developed to reduce all negative impacts to acceptable levels. Mitigation will be assured by a program of environmental monitoring to ensure that all measures are implemented, and will determine whether the environment is protected as intended. It will include observations on- and off-site, document checks, and interviews with workers and beneficiaries. Any requirements for corrective action will be reported to the ADB.

15. **Consultation, Disclosure and Grievance Redress.** The stakeholders were involved in developing the IEE through discussions on-site and public consultation. Their views were incorporated into the IEE and in the planning and development of the subproject. The IEE will be made available at public locations in the city and will be disclosed to a wider audience via the ADB, LGED, and DPHE websites. The consultation process will be continued and expanded during project implementation to ensure that stakeholders are fully engaged in the project and have the opportunity to participate in its development and implementation. A grievance redress mechanism is described within the IEE to ensure any public grievances are addressed quickly.

16. **Monitoring and Reporting.** The PMU and project management and supervision consultants (PMSC) will be responsible for monitoring. The PMSC will submit monthly monitoring reports to PMU, and the PMU will send semi-annual monitoring reports to ADB. ADB will post the environmental monitoring reports on its website.

17. **Conclusions and Recommendations.** The citizens of Galachipa will be the major beneficiaries of this subproject. The benefits of improved sanitation translate into improved health, an increase in productivity, fewer days absent from school for children, and improved quality of life. In addition to improved environmental conditions, the subproject will reduce

exposure to climate extremes. On-site/decentralised systems of waste management will improve community health and hygiene, particularly in socially deprived groups, and reduce financial burden of Galachipa pourashava. People would spend less on healthcare and lose fewer working days due to illness, so their economic status should also improve, as well as their overall health. Therefore the proposed subproject is unlikely to cause significant adverse impacts and net environmental and health benefits to citizens of Galachipa will be positive. The potential impacts that are associated with design, construction and operation can be mitigated to standard levels without difficulty through proper engineering design and the incorporation or application of recommended mitigation measures and procedures.

18. Based on the findings of the IEE, there are no significant impacts and the classification of the subproject as Category “B” is confirmed. No further special study or detailed environmental impact assessment (EIA) needs to be undertaken to comply with ADB SPS (2009).

I. INTRODUCTION

1. The Coastal Towns Infrastructure Improvement Project (the project) is a key infrastructure initiative of the Government of Bangladesh. The project is located in the coastal area of Bangladesh, and is designed to improve and expand municipal infrastructure and related services in selected pourashavas (municipalities) incorporating climate chance resilience measures. The project consists of four components (i) improved climate-resilient municipal infrastructure, (ii) strengthened governance and institutional capacity, (iii) enhanced public awareness, behavior change, and community-based climate adaptation, and (iv) project management support. The impact of the project will be improved climate change resilience and natural disaster preparedness in coastal towns. The outcome of the project will be improved access to climate-disaster resilient municipal services, including (i) municipal infrastructure such as drainage, cyclone shelters, urban roads, bridges, culverts, solid waste management, bus terminals, slum improvements, boat landings, and markets, (ii) water supply, and (iii) sanitation. The project is to be implemented in 6 years from 2014 to 2020.

2. The project is a project lending modality using a sector approach for selection of subprojects. The release of project funds to the pourashavas will be administered under a 2-stage process known as Performance Criteria Mechanism, whereby the project pourashavas have to meet certain institutional capacity and governance criteria to receive funding. Infrastructure subprojects are therefore divided between Stage I funding and Stage II funding.

3. Galachipa sanitation subproject is one of the subprojects proposed under Performance Criteria Stage I which is considered critical as existing sanitation facilities, mostly latrines, are easily inundated due to rain water accumulation in the monsoon season resulting in loss of accessibility to latrines and pollution caused by discharge of the contents. The findings of the socio-economic and willingness to pay survey conducted during project preparation indicate that there is hardly any usage of existing public toilets as these are poorly maintained and equipped (no water line or electricity). The pourashava does not have de-sludging equipment for cleaning latrine pits and septic tanks. Consequently, the communities suffer from water-sanitation related diseases.

4. ADB requires the consideration of environmental issues in all aspects of the Bank's operations, and the requirements for environmental assessment are described in ADB's Safeguard Policy Statement (SPS, 2009). An environmental assessment using ADB's Rapid Environmental Assessment (REA) Checklist for Urban Development (Appendix 1) was conducted, and results of the assessment show that the project is unlikely to cause significant adverse impacts. Thus, this initial environmental examination (IEE) has been prepared in accordance with ADB SPS's requirements for environment category B projects.

II. POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK

A. ADB Policy

5. ADB requires the consideration of environmental issues in all aspects of ADB's operations, and the requirements for environmental assessment are described in ADB SPS, 2009. This states that ADB requires environmental assessment of all project loans, program loans, sector loans, sector development program loans, loans involving financial intermediaries, and private sector loans.

6. **Screening and categorization.** The nature of the environmental assessment required for a project depends on the significance of its environmental impacts, which are related to the

type and location of the project; the sensitivity, scale, nature, and magnitude of its potential impacts; and the availability of cost-effective mitigation measures. Projects are screened for their expected environmental impacts, and are assigned to one of the following four categories:

(i) **Category A.** Projects could have significant adverse environmental impacts. An EIA is required to address significant impacts.
(ii) **Category B.** Projects could have some adverse environmental impacts, but of lesser degree or significance than those in category A. An IEE is required to determine whether significant environmental impacts warranting an EIA are likely. If an EIA is not needed, the IEE is regarded as the final environmental assessment report.
(iii) **Category C.** Projects are unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are reviewed.
(iv) **Category FI.** Projects involve a credit line through a financial intermediary or an equity investment in a financial intermediary. The financial intermediary must apply an environmental management system, unless all projects will result in insignificant impacts.

7. **Environmental management plan.** An EMP, which addresses the potential impacts and risks identified by the environmental assessment, shall be prepared. The level of detail and complexity of the EMP and the priority of the identified measures and actions will be commensurate with the project's impact and risks.

8. **Public disclosure.** ADB will post the following safeguard documents on its website so affected people, other stakeholders, and the general public can provide meaningful inputs into the project design and implementation:

(i) for environmental category A projects, draft EIA report at least 120 days before Board consideration;
(ii) final or updated EIA and/or IEE upon receipt; and
(iii) environmental monitoring reports submitted by the project management unit (PMU) during project implementation upon receipt.

B. National Laws

9. Implementation of all subprojects will be governed by the environmental acts, rules, policies, and regulations of the Government of Bangladesh. These regulations impose restrictions on the activities to minimize/mitigate likely impacts on the environment. Many of these are cross-sectoral and several of them are directly related to environmental issues. The most important of these are the Environment Conservation Act, 1995 (ECA, 1995), and the Environment Conservation Rules (ECR, 1997).

10. In addition to the Environmental Conservation Act and Rules, there are a number of other policies, plans and strategies which deal with the water sector, coastal areas, and climate change. These are the Forest Act 1927 (last modified 30th April 2000); National Water Policy, 1999; Coastal Zone Policy, 2005; Coastal Development Strategy, 2006; Bangladesh Climate Change Strategy and Action Plan, 2009; and National Safe Drinking Water Supply and Sanitation Policy of 1998. Table 1 presents specific requirements for the subproject. Appendix 2 provides the environmental standards for air, surface water, groundwater, drinking water, emissions, noise and vehicular exhaust.

Table 1: Applicable Government of Bangladesh Environmental Legislations

	Legislation	Requirements for the Project	Relevance
1.	Environmental Conservation Act of 1995 and amendments in 2000, 2002 and 2010 [3]	- Restriction on operation and process, which can be continued or cannot be initiated in the ecologically critical areas - Regulation on vehicles emitting smoke harmful to the environment - Remedial measures for injuries to ecosystems - Standards for quality of air, water, noise and soil for different areas for various purposes and limits for discharging and emitting waste - Environmental guidelines	The provisions of the act apply to the entire subproject in the construction and operation and maintenance (O&M) phases.
2.	Environmental Conservation Rules of 1997 and amendments in 2002 and 2003	- Environmental clearances - Compliance to environmental quality standards	The subproject is categorized as Red and requires LCC and ECC. All requisite clearances (LCC and ECC) from DoE shall be obtained prior to commencement of civil works.
3.	Forest Act of 1927 and amendments (2000)	- Clearance for any felling, extraction, and transport of forest produce	Considered in subproject preparation.
4.	Bangladesh Climate Change Strategy and Action Plan of 2009	- Ensure existing assets (e.g., coastal and river embankments) are well maintained and fit for purpose and that urgently needed infrastructures (cyclone shelters and urban drainage) is put in place to deal with the likely impacts of climate change. - enhance the capacity government ministries, civil society and private sector to meet the challenge of climate change	Considered in subproject preparation.
5.	Bangladesh Labor Law of 2006	- Compliance to the provisions on employment standards, occupational safety and health, welfare and social protection, labor relations and social dialogue, and enforcement - Prohibition of employment of children and adolescent	The provisions of the act apply to the entire subproject in the construction and O&M phases. Provides for safety of workforce during construction phase.

C. Government of Bangladesh Environmental Assessment Procedures

11. Under the ECR 1997 industrial units and projects are classified into four categories according to "their site and impact on the environment", and each category (green, orange-A, orange-B and red) requires a different level of environmental assessment as a prerequisite for granting the ECC that allows the project to proceed. The ECA indicates that all industrial units or projects must obtain a Location Clearance Certificate (LCC) and Environmental Clearance Certificate (ECC) from the Department of Environment (DoE).

[3] *ECA Amendment 2000* focuses on ascertaining responsibility for compensation in cases of damage to ecosystems, increased provision of punitive measures both for fines and imprisonment and the authority to take cognizance of offences. *ECA Amendment 2002* elaborates restrictions on polluting automobiles; restrictions on the sale, production of environmentally harmful items like polythene bags; assistance from law enforcement agencies for environmental actions; break up of punitive measures; and authority to try environmental cases. In *ECA Amendment 2010,* no individual or institution (government or semi-government/non-government/self-governing can cut any hill or hillock; fill-up or changed any remarked water body however in case of national interest; the mentioned activities can be done after getting clearance from respective the departments.

12. Schedule 1 of the law provides a classification for industrial projects and types of development that are common in Bangladesh. Table 2 indicates that the proposed subproject components are likely to be classified as red category.

Table 2: Likely Government of Bangladesh Classification of Galachipa sanitation subproject

	Subproject	Component	Equivalent in Schedule I of ECR	DoE Classification
1.	Sanitation	Toilet facilities and latrines	Public toilet	Orange-B
		Septage and wastewater treatment plants	Sewage treatment plant	Red

13. Rule 7 of the ECR indicates that the application for ECC must be made to the relevant DoE Divisional Officer, and the application for Red category projects will include the following:

(i) Completed Application for ECC, and the appropriate fee;
(ii) Report on the feasibility of the project;
(iii) Report on the IEE for the project, and Terms of Reference for the EIA;[4] or EIA report prepared on the basis of ToR previously approved by DoE;
(iv) Report on the environmental management plan (EMP);
(v) No objection certificate from the local authority;
(vi) Emergency plan relating to adverse environmental impact and plan for mitigation of the effect of pollution; and
(vii) Outline of the relocation and rehabilitation plan (where applicable).

14. Under the ECR DoE has 60 days to respond to receipt of the ECC application for a Red category project.

III. DESCRIPTION OF THE PROJECT

A. The Study Area

15. Galachipa is located in Patuakhali District of Barisal Division. It is the largest *upazila* of Patuakhali District in respect of both area and population. Galachipa is located between 21°48' and 22°21' north and between 90°15' and 90°37' east. The proposed sanitation facilities will be located in educational institutions, government-owned land, or community-managed lands. The location map of the town is shown as Figure 1.

B. Existing Condition and Need for the Project

16. As per Bangladesh Bureau of Statistics (BBS) census in 2011, about 41.2% of the latrines are sanitary water sealed, 38.5% latrines are sanitary non-water sealed, 18.3% latrines are non-sanitary and 2% have no toilets.

17. **Public toilets.** There are few public toilets in Galachipa which are in bad condition as the pits/septic tanks and superstructures are mostly damaged. There are no arrangement for

[4] Consultations with DoE on 9 September indicate that ADB's environmental categorization is different from DoE's categorization. Projects categorized as "B" as per ADB SPS 2009 may be "Red" in DoE's categorization. DoE may require preparation and submission of an EIA during detailed design stage to obtain the necessary LCC and ECC. Minutes of the meeting is included in Appendix 6.

electricity and water supply, and no separate provision for females.

18. **Latrines.** The latrines are generally located in relatively low areas in the household. The latrines consists of 4/5 nos. rings placed to the depth of around 3-4ft (0.9-1.2m) in the ground; a platform is simply positioned on the uppermost ring of the pit which is almost at the ground level. Consequently the latrines are easily inundated due to rain water accumulation in the monsoon season, resulting in a loss of accessibility to the latrine and pollution caused by discharge of the contents. It was observed in some places during the field visits in March and September 2013 that holes have been made to allow the flow of sludge over the ground to a nearby ditches or *khals* (drainage channels).

19. **Septage management.** Galachipa does not have de-sludging equipment for cleaning pit latrines and septic tanks. As a result the community themselves take initiative of cleaning these facilities, mainly through sweepers at a cost of Tk 500 to Tk 1,000 depending on the size of the latrine pit or septic tank. Treatment facility is not available in Galachipa and presently the fecal sludge from pit latrines and septage from septic tanks are disposed unscientifically (buried into the nearby ground or sometimes disposed to nearby *khals*).

C. Proposed Components

19. Investments under this subproject include (i) construction of 5 public toilets, 3 school latrines, 8 community latrines, and 3 pilot septage treatment plants; and (ii) provision of 1 de-sludging equipment in Galachipa. Details are provided in Table 3 and proposed designs are shown in figures 2 to 6.

Table 3: Basic Data on Proposed Sanitation in Galachipa (Civil Works)

	Items	Unit	Quantity	Description
1.0 Public Toilets				
1.1	Udayan Madhyamik Vidyalaya	No.	1	- Semi-government institutional land; vacant land available - No Objection Certificate (NOC) required from school authorities - Improved septic tank with soak pit[5]
1.2	Lipi Tokij Mor, Ward No. 5	No.	1	- Government land - NOC required from *upazila parishad* - Existing compound wall will need to be demolished - Improved septic tank with soak pit
1.3	Dhaka Launch Ghat, Ward No. 1	No.	1	- Khas land, presently vacant. - NOC required from District Commissioner (DC) - Improved septic tank with soak pit
1.4	Ferry Ghat, Ward No. 4	No.	1	- DC land, presently vacant

[5] Improved septic tank designs have been developed to enhance the removal efficiency of unsettleable and dissolved solids, a major drawback of conventional septic tank. The basic principle of such a system is to increase contact between entering wastewater and active biomass in the accumulated sludge. This can be achieved by constructing additional compartments (2 to 3) with vertical baffle system in to the conventional septic tank to force the wastewater to flow through the accumulated biomass as it passes from the inlet to outlet. Wastewater flowing from bottom to top passes through the settled sludge and enables contact between incoming wastewater and bio mass. The treatment efficiency of this system is 20 to 30% higher than the conventional septic tank in terms of BOD and TSS removal. The first chamber is made twice the size of other chambers. In order to ensure anaerobic condition within the system, a minimum depth of 1.8 to 2 m is maintained. The retention time is designed for a minimum of 24 to 48 hrs. A vent pipe is provided over the tank slab so that gases produced in the degradation process can escape in the atmosphere. The system is designed for a minimum desludging period of 2 to 3 years. The effluent from the improved septic tank flows out into the soak pit for further treatment. Soak pits can be circular or like a trench in shape. In case of high ground water level, a collection device is provided along with the percolation system. This is mainly to prevent back flow of water from soak pit to septic tank. The soak pit is a covered, porous walled pit that allows water to slowly redistribute and infiltrate it in surrounding soil for absorption.

	Items	Unit	Quantity	Description
				- NOC required from DC - Improved septic tank with soak pit
1.5	Galachipa Girls High School, Ward No. 4	No.	1	- Semi-government institutional land. - Toilets required for male and female teachers and students on ground floor - Preferable location: adjacent to existing toilet. - Wall/corridor required for privacy for girls (as expressed during focus group discussions) - Improved septic tank with soak pit
2.0 School latrines				
2.1	Ratandi Palli Unnayan Govt. Primary School, Ward No. 9	No.	1	- Government land - Toilets for male and female required at newly constructed cyclone shelter cum school building (minimum of 2 toilets for male and 2 toilet for female on each floor) - Tube wells will be required to supply water to each floor - Improved septic tank with soak pit
2.2	Galachipa Degree College, Ward No. 9	No.	1	- Existing toilet in disrepair to be replaced. - Few toilets available for use by students/authorities during construction period - Improved septic tank with soak pit
2.3	Ratandi Shishu Sadan Hafizia Madrasha, Ward No. 9	No.	1	- *Madrasha* land. - Proposed location is a vacant piece of land on south side of existing tin shed. - NOC required from *madrasha* - Improved septic tank with soak pit
3.0 Community latrines				
3.1	Shantibagh Sluice Gate Basti, Ward No. 3	No.	4	- Government land - Vacant land available - Improved twin pit system[6] or improved septic tank with soak pit
3.2	Ratanpur Sluice Gate Basti, Ward No. 6	No.	4	- Government land - Vacant land available - Improved twin pit system or improved septic tank with soak pit
3.3	Along main *khal* for affected persons during drainage improvement works at Shanti Bagh and Shyamoli Bagh	No.	to be determined during detailed design stage	- Community toilets will be required to replace affected toilets encroaching drainages (minimum of 3 toilets for male and 3 toilets for female) - Improved twin pit system or improved septic tank with soak pit
4.0 Pilot Septage Treatment Plants				
5.0	Septage Management System at WAPDA Road	No.	1	- WAPDA land - Collection, conveyance, treatment and disposal of fecal sludge from the pit latrines and septage from septic tanks
5.1	Public sanitation facility near Bailey Bridge opposite Galachipa Degree College	No.	1	- *Upazila parishad* land - 2 abandoned tin sheds to be demolished - NOC required from *upazila parishad* - Toilet complex with at least 6 numbers of pour flush toilets and minimum 4 numbers of urinals for male. Out of the 6 proposed toilets, 3 toilet seats for male and 3 toilet seats for female - The design of the toilet complex needs to be finalized in consultation with the involved stakeholders of the project.

[6] The twin pit system is an improved version of a single pit system wherein two pits are provided to hold fecal matter. This provides a long holding period for digestion of fecal matter since pits are used alternatively. These systems retain the simplicity of construction and maintenance and fulfil the low cost requirements of single pit systems. The number of rings to be provided for each pit is arrived based on the number of users and desludging period. For a household with 5 persons, it is suggested to have 10 rings (5 rings for each pit) with a diameter of 75 cm and depth of 30 cm for each ring. It is recommended that grey water should not be discharged in the pits to avoid frequent desludging and maintain the required moisture level of the fecal matter. The contents of the first pit are emptied when the second pit is almost full. The dehydrated feces from the first pit are safe to handle. To stop the water from infiltrating, the pit should be covered with a watertight concrete top slab.

	Items	Unit	Quantity	Description
5.2	Wastewater management in housing settlement covering 40 barracks at Launch Ghat Road	No.	1	- 20 water flush toilets with 5 toilets for each cluster to serve 10 households. Each toilet is shared by two families. - It is proposed to (i) collect wastewater from each cluster and conveyed to respective treatment unit using the sewer pipes; (ii) provide one common treatment unit (1.0 cubic meter capacity per day) for two clusters (covering 20 houses); and (iii) treat the wastewater in the improved septic tank. The effluent from the treatment tank is further treated in the planted drain and discharged into the nearby drain. The possibility of disposal options needs to be explored during the detailed feasibility study and design stage. - Deep tube wells need to be shifted to at least 20 m from proposed treatment plant. Final distance to be determined during detailed design stage.

Source: PPTA Consultants.

D. Implementation Schedule

20. The subproject is to be implemented over a period of 6 years. The detailed design stage is expected to commence in 2013, and the construction period will cover 24 months.

Figure 1: Location Map

★ **Study town**

Figure 2: Preliminary Design for Improved Septic Tank

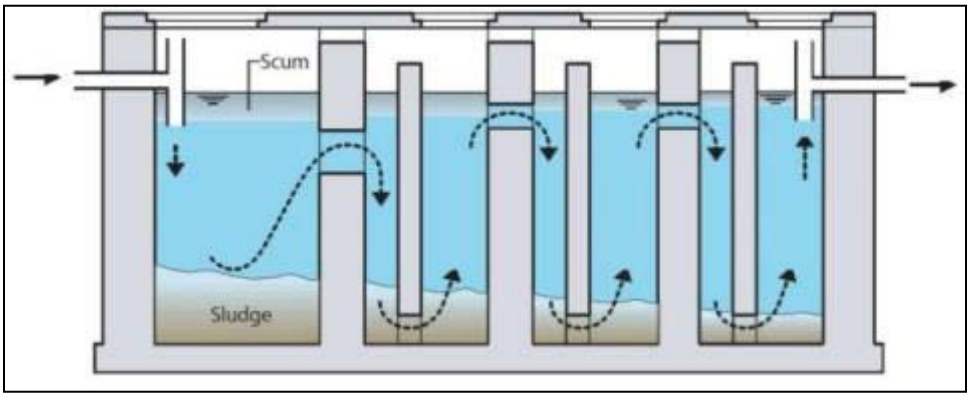


Figure 3: Preliminary Design for Improved Twin Pit System

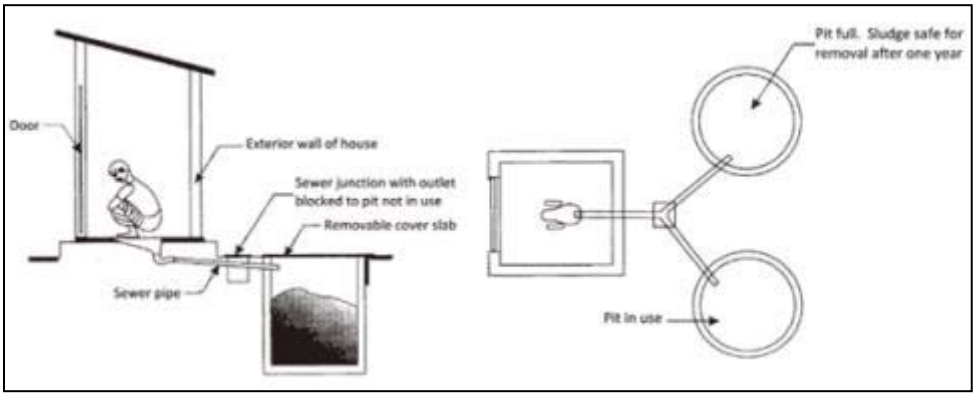


Figure 4: Preliminary Design for Proposed Septage Management System at WAPDA Road

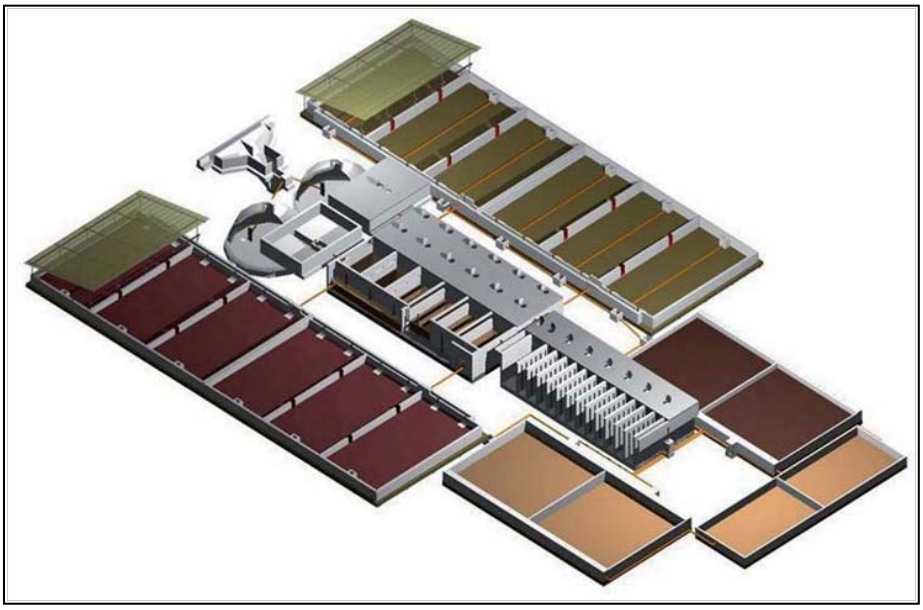


Figure 5: Preliminary Design for Proposed Public Sanitation Facility near Bailey Bridge

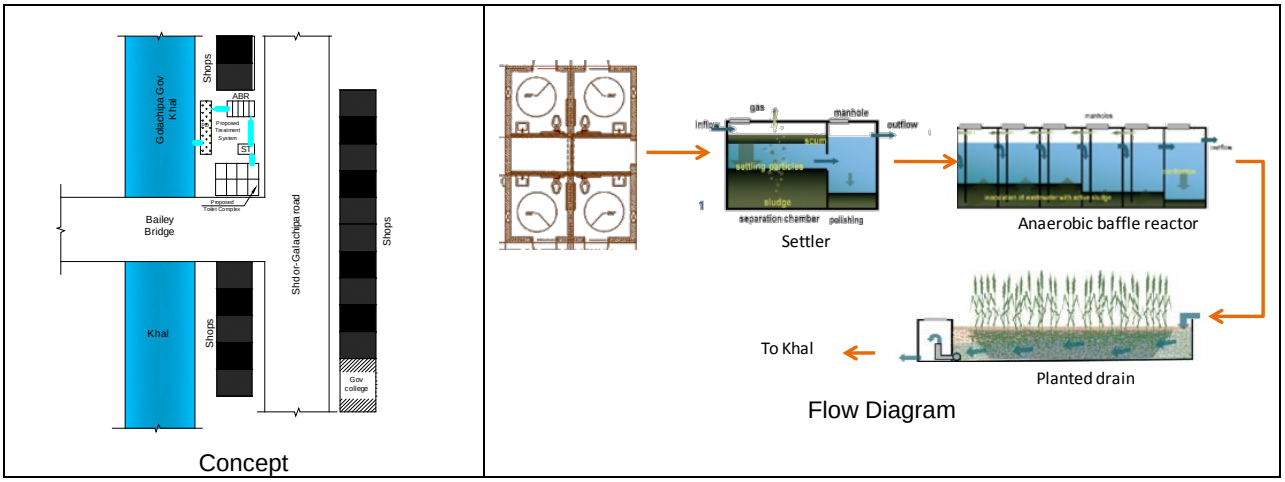
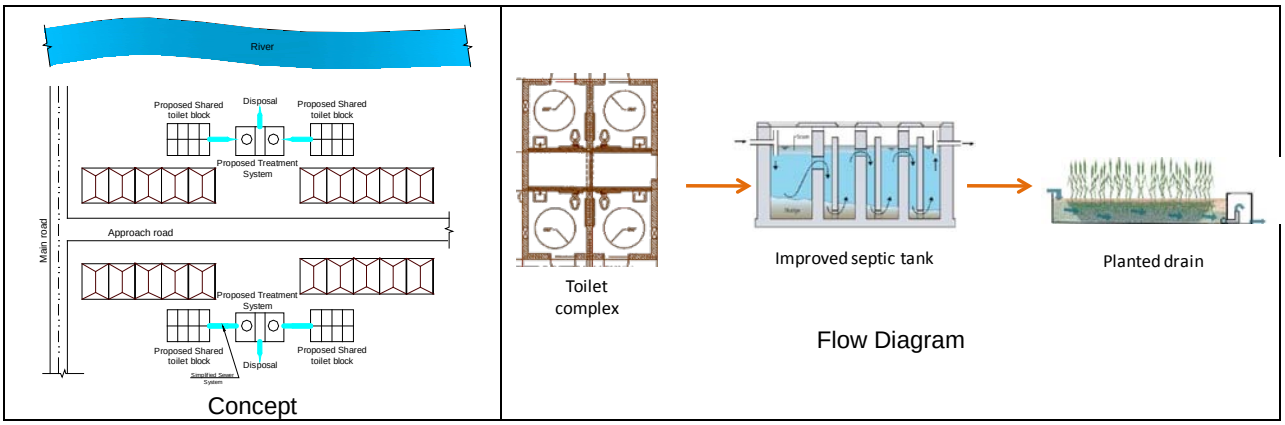


Figure 6: Preliminary Design for Proposed Wastewater Management in Launch Ghat Road



IV. DESCRIPTION OF THE ENVIRONMENT

A. Methodology Used for the Baseline Study

21. **Data collection and stakeholder consultations.** Data for this study has been primarily collected through comprehensive literature survey, discussion with stakeholder agencies, and field visits to the proposed subproject sites. The literature survey broadly covered the following:

(i) subproject details, reports, maps, and other documents available with the ADB CDTA and PPTA consultants, LGED, and Galachipa pourashava;
(ii) relevant acts and extraordinary gazettes, and guidelines issued by Government of Bangladesh agencies; and
(iv) literature on land use, soil, geology, hydrology, climate, socioeconomic profiles, and environmental planning documents collected from Government of Bangladesh agencies and websites.

22. Several visits to the subproject sites were made during the CDTA and PPTA stages to assess the existing environment (physical, biological, and socioeconomic) and gather

information with regard to the proposed sites and scale of the proposed subproject. A separate socioeconomic study was conducted to determine the demographic information, archeological and religious places, densely populated pockets, and settlements.

23. **Data analysis and interpretation.** The data collected was analyzed and interpretations made to assess the physical, biological, and socioeconomic features of the project area. The relevant information is presented in the succeeding paragraphs.

B. Physical Characteristics

24. **Topography, landforms, geology and soils.** Galachipa pourashava, with an area of 3.4 km^2 located about 32 km from the sea, covers 9 wards and 2 *mouzas*. It is bordered by River Ramnabad, coast-estuary and Bay of Bengal. A topographic and physical feature survey of the pourashava was undertaken by Sheltech consultants in 2012. According to that survey, The minimum and maximum ground level varies from 1.5 m to 4.2 m and the average height is about 2.43 m. The physical survey found that all the wards have flat land. It is greatly influenced by the river network and *khals*.

25. **Climatic conditions.** Galachipa has a tropical monsoon-type climate. January is the coolest month with temperatures averaging near 26 ºC (78 ºF) and April the warmest with temperatures from 33 to 36 ºC (91 to 96 ºF). The climate is one of the wettest in the world. Most places receive more than 1,525 mm of rain a year. Most rains occur during the monsoon (June-September) and little in winter (November-February). Galachipa is subject to devastating cyclones, originating over the Bay of Bengal, in the periods of April to May and September to November. Often accompanied by surging waves, these storms can cause great damage and loss of life.

26. **Water quality.** Galachipa is bounded by the River Ramnabad however the subproject sites are not located in or adjacent to this river or *khals*.

27. **Air quality.** As there are no major air pollution sources, the air quality of Galachipa pourashava, in general, is within acceptable limits. Currently, no air quality monitoring stations are in operation within the pourashava limit.

28. **Acoustic environment.** Subproject components are in the built-up part of Galachipa, with residential, commercial, and institutional establishments. The volume of traffic that passes through these sections is not significant and traffic jams are not frequent. However vehicular movement can be considered as major cause of noise pollution.

C. Biological Characteristics

29. **Flora and fauna.** Subproject components are located in Galachipa urban area or in its immediate surroundings which were converted into urban use for years ago, and there is no natural habitat left at these sites. Animals and plants in the subproject area are those commonly found in urban and built-up areas. No endangered/protected species of either flora or fauna are found in the pourashava or its immediate surroundings.

30. **Protected areas.** There are no forest areas, wetlands, mangroves, or estuaries in or near the subproject sites. No natural forest exists in the subproject sites or in the surrounding areas.

D. Socioeconomic Characteristics

31. **Population.** Information about the total number of households, with average size, and population of Galachipa pourashava is presented in Table 4.

Table 4: Population of Galachipa Pourashava

Administrative Unit	Area (km^2)	Households (nos.)	Population			Average HH Size	Density (per km^2)
			Total	Male	Female		
Galachipa	**3.40**	**4,967**	**21,200**	**10,888**	**10,312**	**4.26**	
Ward No - 01	0.27	595	2,483	1,279	1,204	4.17	9,196
Ward No - 02	0.28	502	2,122	1,080	1,042	4.22	7,578
Ward No - 03	0.39	326	1,430	695	735	4.38	3,666
Ward No - 04	0.16	560	2,275	1,255	1,020	4.06	14,218
Ward No - 05	0.23	446	1,755	915	840	3.93	7,630
Ward No - 06	0.68	720	3,352	1,717	1,635	4.65	4,929
Ward No - 07	0.35	746	3,148	1,632	1,516	4.22	8,994
Ward No - 08	0.36	524	2,301	1,158	1,143	4.39	6,391
Ward No - 09	0.67	548	2,334	1,157	1,177	4.26	3,483

Source: Bangladesh Bureau of Statistics Community Report, Zilla: Galachipa, 2011.

32. **Land use.** A land use survey was undertaken by Sheltech Consultants in 2009. The survey results shows that there is dominance of agricultural land (44%) followed by residential land (37%) and water bodies (10%). Galachipa has 12.7 ha of road area, 1.2 ha of katcha road, 4.3 ha of semi-pucca roads and 7.2 ha of pucca roads. There are 44 bridges, 1 box culvert, 6 pipe culverts and 2 sluice gates.

33. **Type of community spread.** Galachipa is composed of 92.01% Muslim, 7.95% Hindu, and 0.04% Buddhist. Average literacy is 34.8%.

34. **Existing provisions for pedestrians and other forms of transport.** Galachipa roads generally fall into two categories: *katcha* (earthen) construction and *pucca* (formed) roads. Formed roads are mainly BT asphalt roads with CC roads in a few places for main roads, while minor roads may also be brick-on-edge soling, known locally as HBB. Nearly all roads are built above the existing ground level, not only to avoid inundation during storms, but as the silty loam and alluvial soils typical of the area compact easily, roads need a supporting base layer that is often built up to around one meter above ground level. The transportation and traffic management survey results reveal that no public or private bus service is available for intra-zonal movement of passengers. Rickshaws are the most dominant transport for intra-zonal movement. The water transport network of Galachipa has significant importance in carrying goods.

35. **Socio-economic status.** Main occupations are agriculture, agricultural laborer, wage laborer, commerce, service, fishing, transport, construction, and others. Main crops are paddy. About 70% of the households own their house with 30% living in rented houses. At present, there is predominance (74%) of katcha structures. Most single storied structures are pucca structures.

36. **Other existing amenities for community welfare.** The Upazila Health Complex (UHC) in Galachipa is responsible for providing public health services although there are a few private doctors and pharmacies in the town. In the UHC there are 10 doctors and 16 nurses/health technicians.

37. **Water supply.** Under the DPHE-DANIDA water supply and sanitation project two production tube wells with 1 km transmission pipeline and 18 km distribution line were installed in 1999. Later on another 8 km pipeline was installed by the pourashava making the pipeline total up to 26 km. Water from the production tube wells is supplied through the only overhead tank available at present. It is estimated that about 76% of the pourashava area is covered by water supply piped networks – household connections and standpipes. The rest of the population has access to public and private hand tube-wells. Water test reports of 1999 and 2012 do not indicate any salinity increase in ground water. Hydro-geological status shows that the aquifer is well protected by confining clay layers.

38. **Drainage.** Primary drains at Galachipa are about 36 km of canals or khals covering 11.4 ha. There is no secondary drainage. There are 5 km of tertiary drains that collect discharged water from households together with storm water and are mainly manmade (some being upgraded now). Galachipa *khal* is the main canal that drains the waters of the town into the Ramnabad River.

39. **Flood Control/Disaster Preparedness.** Galachipa is located adjacent to Bay of Bengal and is vulnerable to the flooding from cyclones and linked storm surges. The vulnerable period is between April-May and October-November when tropical cyclones form in the Bay of Bengal. Cyclones have struck the area in 1970, 1988, 1991, 2007 and 2008. Ward numbers 2, 3 and 4 are the most affected by flooding from high tides. Galachipa is protected by BWDB Polder 55/1. The polder embankments protect it against flood from the rivers while drainage inside the polder is affected through drainage *khals* with regulators at the outfall. The polder is 47 km long with 11 drainage sluices and 13 flushing inlets. Within the polder the maximum spot level is 5.71 m as measured by PWD (mPWD), the minimum level is 0.46 mPWD and the average ground level is 1.72 mPWD. However, a significant part of Galachipa pourashava is outside the polder.

40. **Sanitation.** 98% of population served by sanitary latrines with 40% having septic tanks, 40% having water sealed slab latrine and 18% simple pit latrines. There are only three public toilets.

41. **Solid waste management.** There is no solid waste management system in place.

E. Historical, Cultural and Archaeological Characteristics

42. **Physical and cultural heritage.** The historical places in Galachipa include the marks of war of liberation (2 monuments). The archaeological heritage and relics sites are Utabaria Dayamayee Mandir (built in 1208 BC) and the single domed Gurinda Mosque at Ratandi (built in 18th century). The subproject components are not located in or near the vicinities of these sites.

V. ASSESSMENT OF ENVIRONMENTAL IMPACTS AND SAFEGUARDS

A. Methodology

43. Issues for consideration have been raised by the following means: (i) input from interested and affected parties; (ii) desktop research of information relevant to the proposed subproject; (iii) site visits; and (iv) evaluation of proposed design scope and potential impacts. Categorization of the subproject and formulation of mitigation measures have been guided by ADB's REA Checklist for Urban Development (Appendix 1) and ADB SPS 2009.

B. Screening Out Areas of No Significant Impact

44. From the preliminary design and results of the rapid environmental assessment, it is clear that implementation of Galachipa sanitation subproject will not have major negative impacts because activities will be localized/site-specific and short in duration and construction will be conducted within a relatively small area. Because of these there are several aspects of the environment that are not expected to be affected by the subproject (Table 5) thus can be screened out of the assessment at this stage but will be assessed again during detailed design stage and before implementation.

Table 5: Fields in Which the Subproject Is Not Expected to have Significant Impacts

Field	Rationale
A. Physical Characteristics	
Topography, landforms, geology and soils	Required amount of materials will not cause alteration of topography, landforms, geology and soils. Erosion hazard is insignificant as excavation works will be conducted only during construction stage (short-term) and specific to subproject sites.
Climatic conditions	Short-term production of dust is the only effect on atmosphere. However, impact is short-term, site-specific and within a relatively small area. There are well developed methods for mitigation.
Water quality	Excavation, run-off from stockpiled materials, and chemical contamination from fuels and lubricants may result to silt-laden runoff during rainfall which may cause siltation and reduction in the quality of adjacent bodies of water (*nallahs*). However, impact is short-term, site-specific and within a relatively small area. There are well developed methods for mitigation.
Air quality	Conducting works at dry season and moving large quantity of materials may create dusts and increase in concentration of vehicle-related pollutants (such as carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons) which will affect people who live and work near the sites. However, impact is short-term, site-specific and within a relatively small area. There are well developed methods for mitigation.
Acoustic environment	Construction activities will be on settlements, in and near schools, and areas with small-scale businesses. Temporary increase in noise level and vibrations may be caused by excavation equipment, and the transportation of equipment, materials, and people. However, the impact is short-term, site-specific and within a relatively small area. There are well developed methods for mitigation.
B. Biological Characteristics	
Biodiversity	Activities being located in the built-up area of Galachipa pourashava will not cause direct impact on biodiversity values. Based on preliminary design construction activities do not anticipate any cutting of trees (to be reassessed during detailed design stage).
C. Socioeconomic Characteristics	
Land use	No alteration on land use. Sanitation facilities will be constructed in vacant government land, existing school compounds and built up areas of the pourashava.
Type of community spread	No alteration on type of community spread.
Existing provisions for pedestrians and other forms of transport	Road closure is not anticipated. Hauling of construction materials and operation of equipment on-site can cause traffic problems. However, the impact is short-term, site-specific and within a relatively small area. There are well developed methods for mitigation.
Socio-economic status	There is no requirement for land acquisition or any resettlements. Manpower will be required during the 24-month construction stage. This can result to generation of contractual employment and increase in local revenue. Thus potential impact is positive and long-term.
Other existing amenities for community	Although construction of subproject components involves quite simple

Field	Rationale
welfare	techniques of civil work, the invasive nature of excavation and the subproject sites being in built-up areas of Galachipa pourashava where there are a variety of human activities, will result to impacts to the sensitive receptors such as residents, businesses, and the community in general. These anticipated impacts are temporary and for short duration. Deep tube wells may be shifted to ensure water contamination is prevented.
D. Historical, Cultural, and Archaeological Characteristics	
Physical and cultural heritage	The subproject components are not located in or near and excavation works will not be conducted in the vicinities of identified historical and sites.

C. Anticipated Impacts and Mitigation Measures – Planning and Design Phase

45. **Land acquisition and resettlement.** The proposed sanitation facilities will be located in government-owned land, semi-government institutional lands, existing school compounds, and common community areas. There are no encroachers or residential/commercial structures in these lands. Cutting of trees, if required based on detailed design, will be minimized. Compensatory plantation for trees lost at a rate of 10 trees for every tree cut, in addition to the required tree plantation in the design, will be implemented by the contractor, who will also maintain the saplings for the duration of his contract.

46. Planning principles and design considerations have been reviewed and incorporated into the site planning process whenever possible. Locations and siting of the proposed infrastructures were considered to further reduce impacts. The subproject will be in properties held by the pourashava and access to the subproject sites is thru public ROW and existing roads.

47. The concepts considered in design of the Galachipa sanitation subproject are: (i) sites should be located within or very close to locality of users; (ii) sites must be prioritized in educational or institutional compound where concerned authority has no objection; (iii) sites should be selected in the area where significant number of population live; (iv) locating facilities on government-owned land to avoid the need for land acquisition and relocation of people; (v) sites are selected according to the environmental criteria for project selection specified in the environmental assessment and review framework; (vi) ensuring all planning and design interventions and decisions are made in consultation with local communities and reflecting inputs from public consultation and disclosure for site selection.

48. Preliminary designs integrate a number of measures, both structural and non-structural, to mainstream climate resilience into the Galachipa sanitation subproject, including: (i) raising the floor level of latrines and associated facilities including access, to protect them from flooding; (ii) application of sufficient buffer zones between water supply and sanitation facilities to protect contamination of the water supply; and (iii) use of appropriate liner materials to protect the groundwater from contamination in septage treatment sites as the project sites are low lying. As a result, some measures have already been included in the subproject designs. This means that the impacts and their significance have already been reduced.

D. Anticipated Impacts and Mitigation Measures – Construction Phase

49. In the case of this subproject (i) most of the individual elements 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 that process is invasive, involving excavation and earth movements; and (iii) being located in the built-up area of the pourashava, will not cause direct impact on biodiversity values.

50. **Construction method.** Tasks to be performed for construction of the sanitation facilities are: (i) demolition of any existing structures; (ii) site clearing and shifting of any affected deep tube wells; (iii) laying of foundations; (iv) casting of ground floor slab; (v) construction of floor beams and floor slabs; (vi) construction of roof beams and roofing; (vii) installation of doors; (viii) architectural components and finishes; and (ix) ordering, procurement and installation of water and electrical services. Excavation for the foundation will be dug by backhoe digger, supplemented by manual digging where necessary. Excavated soil will be placed nearby, and the materials (brought to site on trucks and stored on unused land nearby) will be placed in the trench by crane or using a small rig. The infrastructures will be constructed manually according to design specifications. Any excavated road will be reinstated.

51. There is sufficient space for a staging area, construction equipment, and stockpiling of materials. However, the contractor will need to remove all construction and demolition wastes on a daily basis.

52. Although construction of these subproject components involves quite simple techniques of civil work, the invasive nature of excavation and the subproject sites in built-up areas of Galachipa where there are a variety of human activities, will result to impacts to the environment and sensitive receptors such as residents, businesses, and the community in general. These anticipated impacts are short-term, site-specific and within a relatively small area. There are no impacts that are significant or complex in nature, or that need an in-depth study to assess the impact. Thus, Galachipa sanitation subproject is unlikely to cause significant adverse impacts. The potential adverse impacts that are associated with construction activities can be mitigated to acceptable levels with the following mitigation measures (Table 6).

Table 6: Anticipated Impacts and Mitigation Measures – Construction Phase

Field	Impacts	Mitigation Measures
A. Physical Characteristics		
Topography, landforms, geology and soils	Significant amount of gravel, sand, and cement will be required for this subproject. Extraction of construction materials may cause localized changes in topography and landforms. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	- Utilize readily available sources of materials. If contractor procures materials from existing burrow pits and quarries, ensure these conform to all relevant regulatory requirements. - Borrow areas and quarries (If these are being opened up exclusively for the subproject) must comply with environmental requirements, as applicable. No activity will be allowed until formal agreement is signed between PIU, landowner and contractor.
Water quality	Excavation, run-off from stockpiled materials, and chemical contamination from fuels and lubricants may result to silt-laden runoff during rainfall which may cause siltation and reduction in the quality of adjacent bodies of water. The impacts are negative but short-term, site-specific within a relatively small area and	- Prepare and implement a spoils management plan (Appendix 4). - Prioritize re-use of excess spoils and materials in construction activities. If spoils will be disposed, consult with Galachipa local authority on designated disposal areas. - All earthworks must to be conducted during dry season to maximum extent possible to avoid the difficult working conditions that prevail during monsoon season such as problems from runoff. - Location for stockyards for construction materials shall be identified at least 300m away from watercourses. Place

Field	Impacts	Mitigation Measures
	reversible by mitigation measures.	storage areas for fuels and lubricants away from any drainage leading to water bodies. - Take all precautions to minimize the wastage of water in the construction activities. - Take all precautions to prevent entering of wastewater into streams, watercourses, or irrigation system. Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies. - Ensure diverting storm water flow during construction shall not lead to inundation and other nuisances in low lying areas. - While working across or close to any water body, the flow of water must not be obstructed. Ensure no construction materials like earth, stone, or appendage are disposed of in a manner that may block the flow of water of any watercourse and cross drainage channels. - Monitor water quality according to the environmental management plan.
Air quality	Conducting works at dry season and moving large quantity of materials may create dusts and increase in concentration of vehicle-related pollutants (such as carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons) which will affect people who live and work near the sites. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	- Damp down exposed soil and any sand stockpiled on site by spraying with water when necessary during dry weather; - Use tarpaulins to cover soils, sand and other loose material when transported by trucks. - Unpaved surfaces used for haulage of materials within settlements shall be maintained dust-free. - Arrangements to control dust through provision of windscreens, water sprinklers, and dust extraction systems shall be provided at all hot-mix plants, batching plants and crushers (if these establishments are being set up exclusively for the subproject). - Monitor air quality.
Acoustic environment	Construction activities will be on settlements, in and near schools, and areas with small-scale businesses. Temporary increase in noise level and vibrations may be caused by excavation equipment, and the transportation of equipment, materials, and people. However, the proposed subproject will follow existing ROW alignment and impact is short-term, site-specific and within a relatively small area. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	- Involve the community in planning the work program so that any particularly noisy or otherwise invasive activities can be scheduled to avoid sensitive times. - Plan activities in consultation with Galachipa local authority so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance. - Use of high noise generating equipment shall be stopped during night time. - Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach; - Utilize modern vehicles and machinery with the requisite adaptations to limit noise and exhaust emissions, and ensure that these are maintained to manufacturers' specifications at all times. - All vehicles and equipment used in construction shall be fitted with exhaust silencers. Use silent-type generators (if required). - Monitor noise levels. Maintain maximum sound levels not exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s. - If it is not practicable to reduce noise levels to or below noise exposure limits, the contractor must post warning signs in the noise hazard areas. Workers in a posted noise hazard area must wear hearing protection. - Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity. Complete work in these areas quickly.
Aesthetics	The construction activities do	- Prepare the Debris Disposal Plan

Field	Impacts	Mitigation Measures
	not anticipate any cutting of trees but will produce excess excavated earth (spoils), excess construction materials, and solid waste such as removed concrete, wood, packaging materials, empty containers, spoils, oils, lubricants, and other similar items. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	- Remove all construction and demolition wastes on a daily basis. - Coordinate with Galachipa local authority for beneficial uses of excess excavated soils or immediately dispose to designated areas Avoid stockpiling of any excess spoils - Suitably dispose of collected materials from drainages, unutilized materials and debris either through filling up of pits/wasteland or at pre-designated disposal locations. - All vehicles delivering fine materials to the site and carrying waste debris for disposal shall be covered to avoid spillage of materials. All existing roads used by vehicles of the contractor, shall be kept clear of all dust/mud or other extraneous materials dropped by such vehicles. - Lighting on construction sites shall be pointed downwards and away from oncoming traffic and nearby houses. - In areas where the visual environment is particularly important or privacy concerns for surrounding buildings exist, the site may require screening. This could be in the form of shade cloth, temporary walls, or other suitable materials prior to the beginning of construction. - The site must be kept clean to minimize the visual impact of the site. Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
B. Biological Characteristics		
Biodiversity	Activities being located in the built-up area of Galachipa pourashava. There are no protected areas in or around subproject sites, and no known areas of ecological interest. Based on preliminary design there are no trees at the site that need to be removed (to be reassessed based on detailed design).	- Check if tree-cutting will be required during detailed design stage. No trees, shrubs, or groundcover may be removed or vegetation stripped without the prior permission of the environment management specialist. - If during detailed design cutting of trees will be required, compensatory plantation for trees lost at a rate of 10 trees for every tree cut, in addition to tree plantation as specified in the design, will be implemented by the contractor, who will also maintain the saplings for the duration of his contract. - All efforts shall be made to preserve trees by evaluation of minor design adjustments/ alternatives (as applicable) to save trees. - Special attention shall be given for protecting giant trees and locally-important trees (with religious importance) during implementation. - Prevent workers or any other person from removing and damaging any flora (plant/vegetation) and fauna (animal) including fishing in any water body in the subproject vicinity. - Prohibit employees from poaching wildlife and cutting of trees for firewood.
C. Socioeconomic Characteristics		
Existing provisions for pedestrians and other forms of transport	Road closure is not anticipated. Hauling of construction materials and operation of equipment on-site can cause traffic problems. However, the proposed subproject will follow existing ROW alignment. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	- Prepare and implement a Traffic Management Plan (Appendix 5) - Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites. - Maintain safe passage for vehicles and pedestrians throughout the construction period. - Schedule truck deliveries of construction materials during periods of low traffic volume. - Erect and maintain barricades, including signs, markings, flags and flagmen informing diversions and alternative routes when required. - Notify affected sensitive receptors by providing sign boards informing nature and duration of construction activities and contact numbers for concerns/complaints.

Field	Impacts	Mitigation Measures
		- Leave spaces for access between mounds of soil. - Provide walkways and metal sheets where required to maintain access across for people and vehicles. - Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools. - Consult businesses and institutions regarding operating hours and factoring this in work schedules. Ensure there is provision of alternate access to businesses and institutions during construction activities, so that there is no closure of these shops or any loss of clientage. - Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.
Socio-economic status	Subproject components will be located in government land and existing school compounds thus there is no requirement for land acquisition or any resettlements. Manpower will be required during the 24-month construction stage. This can result to generation of contractual employment and increase in local revenue. Thus potential impact is positive and long-term.	- Employ at least 50% of labor force from communities in the vicinity of the site. This will have the added benefit of avoiding social problems that sometimes occur when workers are imported into host communities, and avoiding environmental and social problems from workers housed in poorly serviced camp accommodation. - Secure construction materials from local market.
Other existing amenities for community welfare	Although construction of subproject components involves quite simple techniques of civil work, the invasive nature of excavation and the subproject sites being in built-up areas of Galachipa pourashava where there are a variety of human activities, will result to impacts to the sensitive receptors such as residents, businesses, and the community in general. Excavation may also damage existing infrastructure (such as water distribution pipes, electricity pylons, etc) located alongside the roads. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	- Obtain details from pourashava nature and location of all existing infrastructure, and plan excavation carefully to avoid any such sites to maximum extent possible; - Integrate construction of the various infrastructure subprojects to be conducted in Galachipa (roads, water supply, etc.) so that different infrastructure is located on opposite sides of the road where feasible and roads and inhabitants are not subjected to repeated disturbance by construction in the same area at different times for different purposes. - Consult with local community to inform them of the nature, duration and likely effects of the construction work, and to identify any local concerns so that these can be addressed. - Existing infrastructure (such as water distribution pipes, electricity pylons, etc.) shall be relocated before construction starts at the subproject sites. - Prior permission shall be obtained from respective local authority for use of water for construction. Use of water for construction works shall not disturb local water users. - If construction work is expected to disrupt users of community water bodies, notice to the affected community shall be served 7 days in advance and again 1 day prior to start of construction. - Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.
Community health and safety	Construction works will impede the access of residents and businesses in limited cases. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	- Contractor's activities and movement of staff will be restricted to designated construction areas. - Locations of hot-mix plants, batching plants and crushers (if these establishments are being set up exclusively for the subproject) shall be shall be located at least 100 m away from the nearest dwelling preferably in the downwind direction. - Consult with Galachipa local authority on the designated areas for stockpiling of, soils, gravel, and other construction materials. - If the contractor chooses to locate the work camp/storage

Field	Impacts	Mitigation Measures
		area on private land, he must get prior permission from the environment management specialist and landowner. - Use small mechanical excavators to attain faster excavation progress. For rock and concrete breaking, use non-explosive blasting chemicals, silent rock cracking chemicals, and concrete breaking chemicals.[7] - Under no circumstances may open areas or the surrounding bushes be used as a toilet facility. - Recycling and the provision of separate waste receptacles for different types of waste shall be encouraged. - A general regard for the social and ecological well-being of the site and adjacent areas is expected of the site staff. Workers need to be made aware of the following general rules: (i) no alcohol/drugs on site; (ii) prevent excessive noise; (iii) construction staff are to make use of the facilities provided for them, as opposed to ad hoc alternatives (e.g. fires for cooking, the use of surrounding bushes as a toilet facility); (iv) no fires permitted on site except if needed for the construction works; (v) trespassing on private/commercial properties adjoining the site is forbidden; (vi) other than pre-approved security staff, no workers shall be permitted to live on the construction site; and (vii) no worker may be forced to do work that is potentially dangerous or that he/she is not trained to do. - Interested and affected parties need to be made aware of the existence of the complaints book and the methods of communication available to them. The contractor must address queries and complaints by: (i) documenting details of such communications; (ii) submitting these for inclusion in complaints register; (iii) bringing issues to the environment management specialist's attention immediately; and (iv) taking remedial action as per environment management specialist's instruction. - The contractor shall immediately take the necessary remedial action on any complaint/grievance received by him and forward the details of the grievance along with the action taken to the environment management specialist within 48 hours of receipt of such complaint/grievance.
Workers health and safety	There is invariably a safety risk when construction works such as excavation and earthmoving are conducted in urban areas. Workers need to be mindful of the occupational hazards which can arise from working in height and excavation works. Potential impacts are negative and long-term but reversible by mitigation measures.	- Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers health and safety (H&S). - Ensure that all site personnel have a basic level of environmental awareness training. If necessary, the environmental management specialist and/or a translator shall be called to the sites to further explain aspects of environmental or social behavior that are unclear. - Produce and implement a site H&S plan which include measures as: (i) excluding the public from worksites; (ii) ensuring all workers are provided with and required to use personal protective equipment (reflectorized vests, footwear, gloves, goggles and masks) at all times; (iii) providing H&S training[8] for all site personnel; (iv) documenting procedures to

[7] These products come in powder forms, and once mixed with water (being the catalyst) simply expand, and crack the rock from hole to hole. This product is environmentally friendly and can be washed away after it has been used.

[8] Some of the key areas that may be covered during training as they relate to the primary causes of accidents include (i) slips, trips and falls; (ii) personal protective equipment; (iii) ergonomics, repetitive motion, and manual handling; (iv) workplace transport; and (v) legislation and responsibilities. Training can provide the foundations of competence but it does not necessarily result in a competent worker. Therefore, it is essential to assess staff competence to ensure that the training provided is relevant and effective. Supervision and monitoring arrangements shall be in place to ensure that training has been effective and the worker is competent at their job. The level of supervision and monitoring required is a management decision that shall be based on the risks

Field	Impacts	Mitigation Measures
		be followed for all site activities; and (v) maintaining accident reports and records. - Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances - Maintain necessary living accommodation and ancillary facilities in functional and hygienic manner in work camps. Ensure (i) uncontaminated water for drinking, cooking and washing, (ii) clean eating areas where workers are not exposed to hazardous or noxious substances; and (iii) sanitation facilities are available at all times. - Provide medical insurance coverage for workers; - Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; - Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted; - Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; - Ensure moving equipment is outfitted with audible back-up alarms; - Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and - Disallow worker exposure to noise level greater than 85 dBA for duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.
D. Historical, Cultural, and Archaeological Characteristics		
Physical and cultural heritage	Construction works will be in built-up areas of Galachipa thus risk for chance finds is low.	- All fossils, coins, articles of value of antiquity, structures and other remains of archaeological interest discovered on the site shall be the property of the government. - Prevent workers or any other persons from removing and damaging any fossils, coins, articles of value of antiquity, structures and other remains of archaeological interest. - Stop work immediately to allow further investigation if any finds are suspected.

E. Anticipated Impacts and Mitigation Measures – Operations and Maintenance Phase

53. In the operational phase, all facilities and infrastructure will operate with routine maintenance, which should not affect the environment. The toilets and latrines will need to be repaired from time to time, but environmental impacts will be much less than those of the construction period as the work will be infrequent, affecting small areas only. While pit latrines must be emptied frequently, solids that accumulate in septic systems (septage) must also be removed periodically, usually every 2 to 5 years depending on design and usage to maintain proper function and prevent plugging, overflows, and the resulting release of septic tank

associated with the job, the level of competence required, the experience of the individual and whether the worker works as part of a team or is a lone worker.

contents. Recommended measures to prevent, minimize, and control releases of septage and other fecal sludge are included in the EMP. Operation and maintenance of pilot septage treatment plants will be shared responsibility between the user communities or maintenance committee formed by the local community, who will be educated on the technology and with support from the pourashava for periodical maintenance. The potential adverse impacts that are associated with O&M activities can be mitigated to acceptable levels with the following mitigation measures (Table 7).

54. **Improved twin pit system.** The pits must be used alternately and the diversion chamber must be accessible so that flow can be diverted between chambers. Wastewater should never be diverted back to the first chamber before digested sludge has been removed from it. The seal on 'Y' junction should be checked regularly to prevent infiltration of water. To avoid the clogging in the pipes as well as 'Y' junction a minimum of 1.5 to 2 L of water should be used for each flush. If the pits are directly below the superstructure then adequate access to each pit should be ensured for regular maintenance. If digestion of fecal matter cannot be ensured due to high moisture content then it has to be transported for further treatment in sludge drying beds (or can be used in co-composting) prior to reuse or disposal. Collection methods need to be hygienic, preventing contact between workers and feces. Operation and maintenance of the improved twin pit system will be shared responsibility between the user communities or maintenance committee formed by the local community

55. **Improved septic tank with soak pit.** One of the major advantages of the septic tank is that it has no moving parts and, therefore, needs very little routine maintenance. A well-designed and maintained concrete, fiberglass, or plastic tank should last for 50 years. The inlet, outlet and tank condition has to be monitored regularly. The scum generated from the system should be removed regularly. Desludging needs to be carried out as per the design period (2-3 years). The sludge has to be removed manually or by pumping. Some amount of activated sludge should be left in the baffle compartments to ensure continuity of treatment process. If the soak pit is provided with a filter media, then once in 3-5 years it needs to be removed and cleaned or replaced. If not provided with filter media, then desludging of accumulated biomass needs to be ensured. If discharge of effluent is not possible through soak pit, then further treatment needs to be ensured. The sludge accumulated in the septic tank needs to be desludged through appropriate mechanical means and transported to designated sludge treatment facility. Operation and maintenance of the toilets will be shared responsibility between the user communities or maintenance committee formed by the local community

56. **Pilot projects.** The site specific O&M manual needs to be developed as per the actual designs of the chosen treatment modules and handed over to the owner of the facility, concerned staff/unit or agency dedicated to O&M with adequate training.

57. **Hazard potentials.** Biosolids are non-hazardous and non-toxic. If a spill occurs, there is no need for special equipment or emergency protocol. Biosolids are primarily processed solids produced by sewage treatment plants. Biosolids are not combustible under ordinary circumstances. If stored in airtight containers for an extended period, methane gas may be produced which could ignite in the presence of a spark or open flame. Hydrogen sulfide may also be generated in sufficient quantities to be a hazard in enclosed areas. Hydrogen sulfide gas, which smells like rotten eggs, can be toxic. Biosolids spilled onto pavement pose a potential road hazard because they can create wet, slick surfaces for motor vehicles, and/or can obstruct traffic flow.

58. **Land application of biosolids.** Land application is an economical and environmentally

sound method of handling biosolids that is the method of choice for most rural communities with sufficient suitable land. A properly managed land application program achieves beneficial reuse of waste organic matter and nutrients without adversely affecting public health. Meeting regulatory requirements, finding suitable sites, and overcoming local opposition may be difficult, however. In many cases, septage is stabilized before application to land to reduce levels of pathogenic organisms, lower the potential for putrefaction, and reduce odors. The simplest and most economical technique for stabilization of septage is the addition of lime or other alkaline material which is added to liquid septage in quantities sufficient to increase the pH of the septage to at least 12.0 for 30 minutes. O&M requirements for land application of biosolids vary widely depending on the application technique and the type of equipment used.

Table 7: Anticipated Impacts and Mitigation Measures – O&M Phase

Field	Impacts	Mitigation Measures
A. Physical Characteristics		
Sludge from twin pit latrines	Source of potential contamination of nearby storm drains, waterways, or groundwater.	- Re-use sludge from twin pits - Use adequate water for flushing to prevent clogging - Further treatment of sludge if sludge is not fully digested - Temporary stockpiles of biosolids to be covered with lime mud (high pH) that acts as an odor control measure until material is reused
Septage from septic tanks	Groundwater contamination	- Secondary treatment for sludge required - Temporary stockpiles of biosolids to be covered with lime mud (high pH) that acts as an odor control measure until material is reused - Construct roofed facilities to prevent water or precipitation from contacting biosolids, and provide additional water management as needed.
Odor	Nuisance to community	- Ensure that only properly treated biosolids. Unless biosolids will be stored for limited periods (60 days) and/or during cool weather months, vector attraction reduction should be met prior to storage. Reduce the potential for unacceptable off-site odors by minimizing storage time. - Develop written odor control and response plans. - Operator training can increase sensitivity of personnel to odor concerns and ensure proper implementation of the odor control plan. - Regular inspections and odor monitoring, coupled with appropriate corrective action and recordkeeping, will help site and facility managers maintain good neighbor status and public acceptance of the project. - Conduct loading/unloading and spreading operations as quickly and efficiently as possible to minimize the time that odors may be emitted - Observe good housekeeping practices during facility loading and unloading. Clean trucks and equipment regularly to prevent biosolids build-up that may give rise to odors. If biosolids spills occur, clean up promptly. - If significant odor should develop during handling operations, the following remedial measures can be taken: (i) immediately correct any poor housekeeping problems (such as dirty equipment); (ii) immediately treat any accumulated water that has turned septic with lime, chlorine, potassium permanganate or other odor control product; remove the water as quickly as possible to a suitable land application site; or (iii) cover biosolids with compost or sawdust.
Acoustic environment	Temporary increase in noise level and vibrations. The impacts are negative but short-	- Plan activities in consultation with Galachipa local authority so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in

Field	Impacts	Mitigation Measures
	term, site-specific within a relatively small area and reversible by mitigation measures.	least disturbance. - Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity. Complete work in these areas quickly.
Collection and conveyance	Septage spilled onto pavement pose a potential road hazard because they can create wet, slick surfaces for motor vehicles, and/or can obstruct traffic flow.	- Regular check of desludging pump and attending the wear and tear - Regular check of desludging equipment and attending the wear and tear - Regular chemical coating of the collection tank - Prevent biosolids from being tracked onto public roadways - Desludging equipment should be inspected for cleanliness before leaving the site - Use mud flaps on the back of desludgers to preclude biosolids getting on tires or undercarriage during unloading operations - Public roadways accessing the site should be inspected each day during operational periods, and cleaned promptly (shovel and sweep).
Treatment and disposal		- Cleaning of intermediate sewer pipes once in 15 days - Ensuring the regular desludging of biogas digester as per the detention time - Desludging of anaerobic modules once in two to three years depending on the desludging period adopted for the designs - Cleaning of filter media in the planted gravel filter once in two to three years - Regular emptying of sludge drying beds (once in 10 days) and storing the dried compost for its use - If planted drain provided then cleaning of filter media once in two to three years - Ensure biosolids are stabilized before land application
B. Socioeconomic Characteristics		
Workers health and safety	Workers need to be mindful of the occupational hazards. Potential impacts are negative and long-term but reversible by mitigation measures.	- Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers H&S. - Ensure that all site personnel have a basic level of H&S training. - Mark and provide sign boards. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate. - Always wash hands after contact with biosolids. - Avoid touching face, mouth, eyes, nose, or genitalia before washing hands. - Eat in designated areas away from biosolids handling activities. - Do not smoke or chew tobacco or gum while working in direct contact with biosolids - Use gloves, when applicable. - Keep wounds covered with clean, dry bandages. - Change into clean work clothing on a daily basis. - If contact occurs, wash contact area thoroughly with soap and water. Use antiseptic solutions on wounds, and bandage with a clean, dry dressing. For contact with eyes, flush thoroughly but gently. - Consult a doctor regarding direct exposure to an open wound or mouth.
Hazard potentials	Accumulated methane and hydrogen sulfide in enclosed containers that can cause fire (methane) and foul odor (hydrogen sulfide)	- Extinguish flames/fires caused by methane accumulation with dry chemical, water spray or foam. - Avoid use of open flames in confined areas and around sealed transport containers. - Vent confined areas and transport containers if biosolids

Field	Impacts	Mitigation Measures
		have been stored for any significant length of time.
Community health and safety	Non-acceptance of the sanitation facilities and pilot projects by the community ; complaints from community	- Operator staff should politely receive citizen questions or complaints, collect the individual's name and phone number, conduct a prompt investigation, undertake control measures, if necessary, follow-up with the person who filed the complaint, and document the event and actions.

F. Cumulative Impact Assessment

59. The cumulative impact assessment examined the interaction between the subproject's residual effects (i.e., those effects that remain after mitigation measures have been applied) and those associated with other past, existing, and reasonably foreseeable future projects or activities. The interaction of residual effects associated with multiple projects and/or activities can result in cumulative impacts, both positive and negative. The project's potential cumulative effects were considered with respect to valued components in environmental and socioeconomic categories, in four areas:

(i) of any potential residual project effects that may occur incrementally over time;
(ii) consideration of other known relevant projects or activities within the specified study area boundaries, even if not directly related to the project;
(iii) potential overlapping impacts that may occur due to other developments, even if not directly related to the proposed subproject; and
(iv) future developments that is reasonably foreseeable and sufficiently certain to proceed.

60. The project has identified the valued components as acoustic environment, socioeconomic and socio-community components, and human health and safety. There are no foreseeable projects that will overlap with the subproject. The spatial boundary of the subproject is the area along alignment of the cyclone shelters. The temporal boundary can be considered as the whole Galachipa pourashava.

61. **Acoustic environment.** Noise levels during construction activities in immediate proximity of work sites are expected to increase. The duration of exposure will be relatively brief and imperceptible. The exposure represents a temporary, localized, adverse residual effect of low significance for affected receptors.

62. **Socioeconomic and socio-community.** Concerns on existing provisions for pedestrians and other forms of transport will occur spatially during construction activities. Traffic movement along the access roads will be improved once the activities are completed. The subproject will not conflict with existing or planned land use. However, following improvement in infrastructures and services, added residential developments, commercial, and business facilities and increased densities are expected to develop and enhance Galachipa pourashava. This can be considered a long-term cumulative benefit of the subproject.

63. Given the scale of the project it is likely that large numbers of local people will obtain at least temporary socio-economic benefits, by gaining employment in the construction workforce, and thus raising their levels of income. These benefits can bring wider social gains if they are directed at vulnerable[9] groups.

[9]Vulnerable groups as those without legal title to land and other assets; households headed by single earner females, the elderly or disabled; indigenous peoples (based on ADB OM); and households

64. Upon completion of the project, the socio-community will be the major beneficiaries of this subproject. The citizens of Galachipa will be the major beneficiaries of this subproject. The benefits of improved sanitation translate into improved health, an increase in productivity, fewer days absent from school for children, and improved quality of life. In addition to improved environmental conditions, the subproject will reduce exposure to climate extremes. On-site/decentralized systems of waste management will improve community health and hygiene, particularly in socially deprived groups, and reduce financial burden of Galachipa pourashava. People would spend less on healthcare and lose fewer working days due to illness, so their economic status should also improve, as well as their overall health. Cost savings in health care are mainly due to the reduced number of treatments of diarrheal cases. Also, patients will avoid costs incurred by seeking treatment, including expenditures on care, drugs and transport and the opportunity costs of time spent on seeking care. Another set of benefits related to less illness are the avoided days lost, with respect to formal or informal employment, other productive activities in the household, or school attendance. These are considered a long-term cumulative benefit.

65. **Community and workers health and safety.** No adverse residual effects to human health will occur as a result of construction. While exposure to elevated noise levels, fugitive dust and common air pollutants will occur in proximity to work sites during construction, due to their short-term and localized nature, these effects are expected to be minor and insignificant with no measurable effects on human health. The sanitation facilities will improve hygiene behavior practices thereby reducing transmission of diseases and cleaner environment for the community.

66. Therefore the project will benefit the general public by contributing to the long-term improvement of municipal services and community livability in Galachipa pourashava.

VI. INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION

A. Public Consultation Conducted

67. The public participation process included (i) identifying interested and affected parties (stakeholders); (ii) informing and providing the stakeholders with sufficient background and technical information regarding the proposed development; (iii) creating opportunities and mechanisms whereby they can participate and raise their viewpoints (issues, comments, and concerns) with regard to the proposed development; (iv) giving the stakeholders feedback on process findings and recommendations; and (v) ensuring compliance to process requirements with regards to the environmental and related legislation.

68. Public consultations and focus group discussions (FGDs) were conducted by PPTA on 20-21 June 2013. The objective of the meetings was to appraise the stakeholders about environmental and social impacts of the proposed subproject and safeguards to mitigate the same. A questionnaire was designed and environmental information was collected. Key respondents included project-affected persons, who may suffer temporary access disruptions during construction activities, shopkeepers/businessmen from the subproject area, and daily commuters consulted randomly. Issues discussed and feedback received along with details of date, time, location, and list of participants are given in Appendix 6. The environmental concerns and suggestions made by the participants were listed, and discussed, and suggestions

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with incomes that are below the poverty line.

accordingly incorporated in the EMP.

B. Future Consultation and Disclosure

69. This IEE and other relevant documents will be made available at public locations in the pourashava and posted on the websites of executing agencies and ADB. The consultation process will be continued and expanded during the project implementation through a nongovernment organization (NGO), to ensure stakeholders participate fully in project execution, as well as to implement comprehensive information, education, and communication plan.

70. The public consultation and disclosure program with all interested and affected partied will remain a continuous process throughout the project implementation, and shall include the following:

(i) **Consultations during construction phase:** (a) public meetings with affected communities to discuss and plan work programs and allow issues to be raised and addressed once construction has started; and (b) smaller-scale meetings to discuss and plan construction work with individual communities to reduce disturbance and other impacts, and to provide a mechanism through which stakeholders can participate in project monitoring and evaluation.

(ii) **Project disclosure:** (a) public information campaigns (via newspaper, flyers, and media) to explain the project to the wider city population and prepare them for disruptions they may experience once construction is underway; (b) public disclosure meetings at key project stages to inform the public of progress and future plans, and to provide copies of summary documents in local language; (c) formal disclosure of completed project reports by making copies available at convenient locations in the study areas, and informing the public of their availability; and (d) providing a mechanism through which comments can be made.

71. For the benefit of the community, the summary of the IEE will be translated in the local language and made available at (i) offices of executing and implementing agencies, (ii) area offices, (iii) consultant teams' offices; and (iv) contractor's campsites. It will be ensured that the hard copies of IEE are kept at places which are conveniently accessible to people, as a means to disclose the document and at the same time creating wider public awareness. An electronic version of the IEE will be placed in the official website of executing and implementing agencies and the ADB website after approval of the IEE by ADB.

VII. GRIEVANCE REDRESS MECHANISM

72. A project-specific grievance redress mechanism (GRM) will be established to receive, evaluate, and facilitate the resolution of AP's concerns, complaints, and grievances about the social and environmental performance at the level of the project. The GRM will aim to provide a time-bound and transparent mechanism to voice and resolve social and environmental concerns linked to the project.

73. **Common GRM.** A common GRM will be in place for social, environmental, or any other grievances related to the project; the resettlement plans (RPs) and IEEs will follow the GRM described below, which is developed in consultation with key stakeholders. The GRM will provide an accessible and trusted platform for receiving and facilitating resolution of affected

persons' grievances related to the project. The multi-tier GRM for the project is outlined below, each tier having time-bound schedules and with responsible persons identified to address grievances and seek appropriate persons' advice at each stage, as required.

74. Pourashava-wide public awareness campaigns will ensure that awareness on grievance redress procedures is generated through the campaign. The project implementation unit (PIU) safeguards assistant and institutional capacity and community development consultants (ICCDC) that will conduct pourashava-wide awareness campaigns to ensure that poor and vulnerable households are made aware of grievance redress procedures and entitlements, and will work with the PIU safeguards assistant to help ensure that their grievances are addressed.

75. Affected persons (APs) will have the flexibility of conveying grievances/suggestions by dropping grievance redress/suggestion forms in complaints/suggestion boxes that have already been installed by project pourashavas or through telephone hotlines at accessible locations, by e-mail, by post, or by writing in a complaints register in pourashava offices. Appendix 6 has the sample grievance registration form. Careful documentation of the name of the complainant, date of receipt of the complaint, address/contact details of the person, location of the problem area, and how the problem was resolved will be undertaken. The project management unit (PMU) safeguards officer will have the overall responsibility for timely grievance redressal on environmental and social safeguards issues and for registration of grievances, related disclosure, and communication with the aggrieved party through the PIU safeguards assistant.

76. **Grievance redress process.** In case of grievances that are immediate and urgent in the perception of the complainant, the contractor and supervision personnel from the project management and supervision consultants (PMSC) on-site will provide the most easily accessible or first level of contact for quick resolution of grievances. Contact phone numbers and names of the concerned PIU safeguards assistant, contractors, PMU safeguards officer, PMSC environmental and social safeguards specialists will be posted at all construction sites at visible locations.

(i) **1st Level Grievance.** The contractors, PIU supervision personnel and PIU safeguards assistant can immediately resolve issues on-site in consultation with each other, and will be required to do so within 3 days of receipt of a complaint/grievance. Assistance of ward level coordination committees (WLCC) will be sought if required for resolution of the issue, by any one or all of them jointly.

(ii) **2nd Level Grievance.** All grievances that cannot be redressed within 3 days at field/ward level will be jointly reviewed by the grievance redress committee (GRC) at town-level and PIU safeguards assistant (the second level of grievance redress), who will attempt to resolve them within 7 days.[10] The PIU safeguards assistant will be responsible to see through the process of redressal of each grievance.

(iii) **3rd Level Grievance.** The PIU safeguards assistant will refer any unresolved or major issues to the PMU safeguards officer and PMSC (third level of grievance redress), who will resolve them within 15 days.

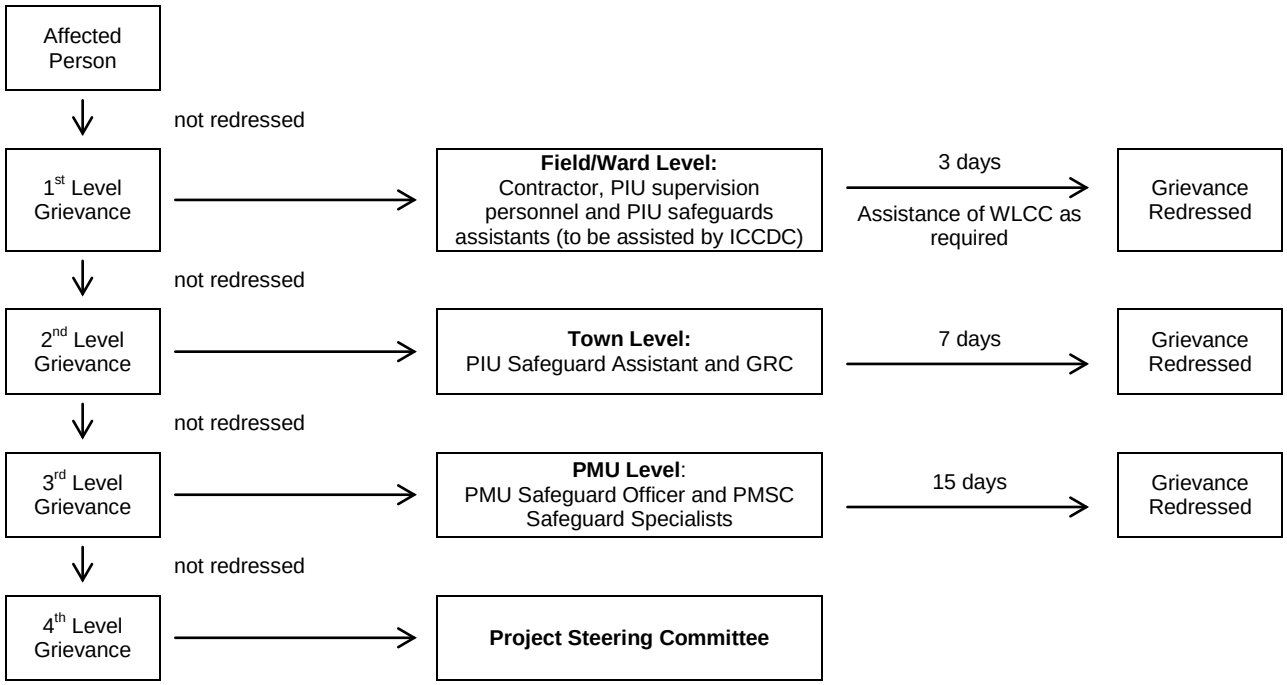
[10] Grievance redress committees (GRC) have already been formed at town-level. For example in Pirojpur pourashava, the GRC comprises: Panel Mayor as Chairperson, and 1 councilor, the pourashava Executive Engineer, Secretary pourashava and pourashava administrative officer, as members. All town-level GRCs shall have at least one woman member/chairperson and AP representative or independent NGO as committee member. In addition, for project-related grievances, representatives of APs, community-based organizations (CBOs), and eminent citizens must be invited as observers in GRC meetings.

(iv) **4th Level Grievance.** Very major issues that are beyond the jurisdictional authority of the GRC or those that have the potential to cause social conflicts or environmental damage or those that remain unresolved at PMU level, will be referred to the project steering committee (PSC)[11]. All paperwork (details of grievances) needs to be completed by the PIU safeguards assistant and circulated to the respective WLCC, GRC and PSC members at least a week in advance of the scheduled meetings. All decisions taken by the GRC and PSC will be communicated to the APs by the PIU safeguards assistant.

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

78. In the event that the established GRM is not in a position to resolve the issue, the affected person also can use the ADB Accountability Mechanism (AM) through directly contacting (in writing) the Complaint Receiving Officer (CRO) at ADB headquarters or the ADB Bangladesh Resident Mission (BRM). The complaint can be submitted in any of the official languages of ADB's DMCs. The ADB Accountability Mechanism information will be included in the PID to be distributed to the affected communities, as part of the project GRM.

Figure 7: Grievance Redress Process



[11] The project steering committee (PSC) responsible for grievance redress will have the following as members: Secretary, Local Government Department, as chair; Chief Engineer, LGED; Chief Engineer, DPHE; Project Director, member secretary; General Economic Division, Planning Commission; Physical Planning, Water Supply and Housing (PPWS&H) Sector, Planning Commission; Representative of Implementation, Monitoring, and Evaluation Division of the Ministry of Planning; Representative of Economic Relations Division and Finance Division of the Ministry of Finance; Representative of Ministry of Environment and Forest (Climate Change Unit); Representative of Bangladesh Water Development Board (BWDB); Urban Development Directorate; Disaster Management Bureau; representatives of pourashavas (mayor, engineer, secretary/ chief executive officer, LGD engineer, DPHE engineer) and special invitees to advise the committee on technical issues.

Note: GRC = grievance redressal committee; ICCDC = Institutional Capacity and Community Development Consultants; PIU = project implementation unit; PMSC = project management and supervision consultants; PMU = project management unit; WLCC = ward level coordination committee

79. **Recordkeeping.** Records will be kept by PIU of all grievances received, including contact details of complainant, date the complaint was received, nature of grievance, agreed corrective actions and the date these were effected and final outcome. The number of grievances recorded and resolved and the outcomes will be displayed/disclosed in the PMU office, municipal office, and on the web, as well as reported in monitoring reports submitted to ADB on a semi-annual basis.

80. **Periodic review and documentation of lessons learned.** The PMU safeguard officer will periodically review the functioning of the GRM in each town and record information on the effectiveness of the mechanism, especially on the project's ability to prevent and address grievances.

81. **Costs.** All costs involved in resolving the complaints (meetings, consultations, communication and reporting/information dissemination) will be borne by the concerned PIU at town-level; while costs related to escalated grievances will be met by the PMU. Cost estimates for grievance redress are included in resettlement cost estimates.

VIII. ENVIRONMENTAL MANAGEMENT PLAN

82. The purpose of the environmental management plan (EMP) is to ensure that the activities are undertaken in a responsible, non-detrimental manner with the objectives of: (i) providing a proactive, feasible, and practical working tool to enable the measurement and monitoring of environmental performance on-site; (ii) guiding and controlling the implementation of findings and recommendations of the environmental assessment conducted for the project; (iii) detailing specific actions deemed necessary to assist in mitigating the environmental impact of the project; and (iv) ensuring that safety recommendations are complied with.

83. A copy of the EMP must be kept on work sites at all times. This EMP will be included in the bid documents and will be further reviewed and updated during implementation. The EMP will be made binding on all contractors operating on the site and will be included in the contractual clauses. Non-compliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance.

84. For civil works, the contractor will be required to (i) establish an operational system for managing environmental impacts (ii) carry out all of the monitoring and mitigation measures set forth in the EMP; and (iii) implement any corrective or preventative actions set out in safeguards monitoring reports that the employer will prepare from time to time to monitor implementation of this IEE and EMP. The contractor shall allocate a budget for compliance with these EMP measures, requirements and actions.

A. Safeguard Implementation Arrangement

85. **Executing Agency.** LGED will be the lead EA for the project, and DPHE will be a co-executing agency (for water supply and sanitation). A PMU will be established in LGED.

86. **Project Management Unit.** The PMU will be staffed with a safeguards officer and will receive support from safeguards specialists (environment and resettlement) on the DDS and

PMSC consultant team. Key tasks and responsibilities of the PMU safeguards officer are as follows:

(i) confirm existing IEEs/EMPs are updated based on detailed designs and that new IEEs/EMPs are prepared in accordance with the EARF and subproject selection criteria related to safeguards;
(ii) confirm whether IEEs/EMPs are included in bidding documents and civil works contracts;
(iii) provide oversight on environmental management aspects of subprojects and ensure EMPs are implemented by project implementation unit (PIU) and contractors;
(iv) establish a system to monitor environmental safeguards of the project including monitoring the indicators set out in the monitoring plan of the EMP;
(v) facilitate and confirm overall compliance with all Government rules and regulations regarding site and environmental clearances as well as any other environmental requirements (e.g., Location Clearance Certificates, Environmental Clearance Certificates etc.), as relevant;
(vi) supervise and provide guidance to the PIUs to properly carry out the environmental monitoring and assessments as per the EARF;
(vii) review, monitor and evaluate the effectiveness with which the EMPs are implemented, and recommend necessary corrective actions to be taken as necessary;
(viii) consolidate monthly environmental monitoring reports from PIUs and submit semi-annual monitoring reports to ADB;
(ix) ensure timely disclosure of final IEEs/EMPs in locations and form accessible to the public; and
(x) address any grievances brought about through the Grievance Redress Mechanism in a timely manner.

87. **Implementing Agencies.** The participating pourashavas will be the IAs, and will establish a PIU within the pourashava structure.

88. **Project Implementation Unit.** The PIU will be staffed with a safeguards officer and will receive support from the PMU safeguards officer and safeguards specialists (environment and resettlement) on the DDS and PMSC consultant team. Key tasks and responsibilities of the PMU safeguards officer are as follows:

(i) include IEEs/EMPs in bidding documents and civil works contracts;
(iv) oversee day-to-day implementation of EMPs by contractors including compliance with all government rules and regulations;
(v) take necessary action for obtaining rights of way;
(vi) oversee implementation of EMPs including environmental monitoring by contractors;
(vii) take corrective actions when necessary to ensure no environmental impacts;
(viii) submit monthly environmental monitoring reports to PMU,
(ix) conduct continuous public consultation and awareness;
(x) address any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs; and

(xi) organize an induction course for the training of contractors preparing them on EMP implementation, environmental monitoring requirements related to mitigation measures; and taking immediate actions to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation.

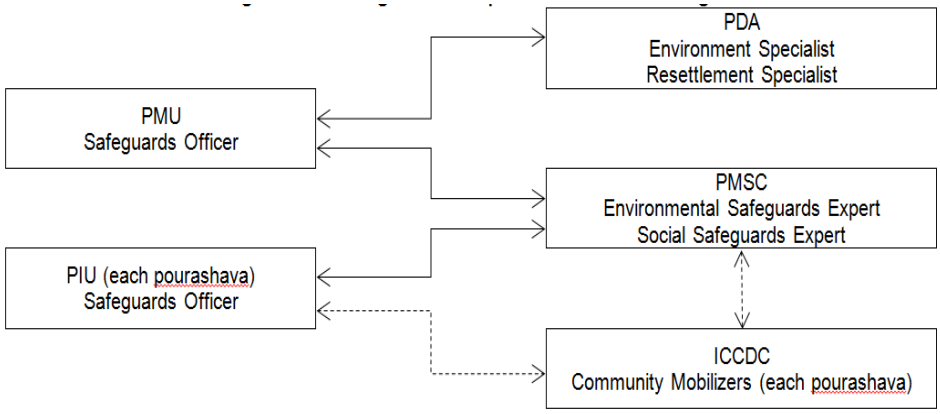
89. **Civil works contracts and contractors.** EMPs are to be included in bidding and contract documents and verified by the PIUs and PMU. The contractor will be required to designate an environment supervisor to ensure implementation of EMP during civil works. Contractors are to carry out all environmental mitigation and monitoring measures outlined in their contract.

90. The community mobilizers in the Institutional Capacity and Community Development Consultants (ICCDC) will be responsible for formation of water and sanitation user groups identify follow-up actions to ensure sustainability of user groups formed; and implement and follow-up on behavioral change, 3R and WASH programs;[12]

91. .

92. The government will ensure that bidding and contract documents include specific provisions requiring contractors to comply with all: (i) applicable labor laws and core labor standards on (a) prohibition of child labor as defined in national legislation for construction and maintenance activities, on (b) equal pay for equal work of equal value regardless of gender, ethnicity or caste, and on (c) elimination of forced labor; and (ii) the requirement to disseminate information on sexually transmitted diseases including HIV/AIDS to employees and local communities surrounding the project sites.

Figure 8: Safeguards Implementation Arrangement



[12] Reduce, reuse and recycle (3R) and water, sanitation, and hygiene program (WASH)

Table 8: Program of Actions – Prior, During, and Post Construction Phase

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
1. Prior to Construction Activities						
Consents, permits, clearances, no objection certificate (NOC), etc.	Failure to obtain necessary consents, permits, NOCs, etc can result to design revisions and/or stoppage of works	- Obtain all necessary consents, permits, clearance, NOCs, etc. prior to start of civil works. - Acknowledge in writing and provide report on compliance all obtained consents, permits, clearance, NOCs, etc. - Include in detailed design drawings and documents all conditions and provisions if necessary	Project management unit (PMU), project implementing unit (PIU), project design advance (PDA) detailed design consultants, and project management and supervision consultants (PMSC)	Incorporated in final design and communicated to contractors.	Prior to award of contract	No cost required. Cost of obtaining all consents, permits, clearance, NOCs, etc. prior to start of civil works responsibility of PMU and PIU. Mitigation measures are included as part of TOR of PMU, PIU, PDA and PMSC.
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 activities - Require construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services. - Require contractors to prepare spoils management plan (Appendix 4) and traffic management plan (Appendix 5)	PMU, PIU, PDA and PMSC	- List of affected utilities and operators; - Bid document to include requirement for a contingency plan for service interruptions (example provision of water if disruption is more than 24 hours), spoil management plan (Appendix 4), and traffic management plan (Appendix 5) - Number of deeptube wells to be shifted	During detailed design phase	No cost required. Mitigation measures are included as part of TOR of PMU, PIU, PDA and PMSC. Cost of shifting deep tube to be included in the detailed design documents
Construction work camps, hot mix plants, stockpile areas, storage areas,	Disruption to traffic flow and sensitive receptors	- Determine locations prior to award of construction contracts.	PMU, PIU, PDA and PMSC	(i) List of selected sites for construction work camps, hot mix plants, stockpile areas, storage areas,	During detailed design phase	No cost required. Mitigation measures are included as part of TOR of PMU, PIU,

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
and disposal areas.				and disposal areas. (ii) Written consent of landowner/s (not lessee/s) for reuse of excess spoils to agricultural land		PDA and PMSC.
Sources of Materials	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.	- Prepare list of approved quarry sites and sources of materials	PMU, PIU, PDA and PMSC	(i) List of approved quarry sites and sources of materials; (ii) Bid document to include requirement for verification of suitability of sources and permit for additional quarry sites if necessary.	During detailed design phase	No cost required. Mitigation measures are included as part of TOR of PMU, PIU, PDA and PMSC.
EMP Implementation Training	Irreversible impact to the environment, workers, and community	- Project manager and all key workers will be required to undergo EMP implementation including spoils management, Standard operating procedures (SOP) for construction works; health and safety (H&S), core labor laws, applicable environmental laws, etc	Construction Contractor with assistance of PIU and PMSC Environmental Safeguards Specialist	- Proof of completion (Safeguards Compliance Orientation) (ii) Posting of proof of completion at worksites (iii) Posting of EMP at worksites	During detailed design phase prior to mobilization of workers to site	Cost of EMP Implementation Orientation Training to contractor is responsibility of PMU and PIU. Other costs responsibility of contractor.
2. During Construction Activities						
A. Physical Characteristics						
Topography, landforms, geology and soils	Significant amount of gravel, sand, and cement will be required for this subproject. Extraction of construction materials may	- Utilize readily available sources of materials. If contractor procures materials from existing burrow pits and quarries, ensure these conform to all relevant regulatory requirements. - Borrow areas and	Construction Contractor	- Records of sources of materials	Monthly by PIU	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
	cause localized changes in topography and landforms. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	quarries (If these are being opened up exclusively for the subproject) must comply with environmental requirements, as applicable. No activity will be allowed until formal agreement is signed between PIU, landowner and contractor.				
Water quality	Excavation, run-off from stockpiled materials, and chemical contamination from fuels and lubricants may result to silt-laden runoff during rainfall which may cause siltation and reduction in the quality of adjacent bodies of water. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	- Prepare and implement a spoils management plan (Appendix 4). - Prioritize re-use of excess spoils and materials in construction activities. If spoils will be disposed, consult with Galachipa local authority on designated disposal areas. - All earthworks must to be conducted during dry season to maximum extent possible to avoid the difficult working conditions that prevail during monsoon season such as problems from runoff. - Location for stockyards for construction materials shall be identified at least 300m away from watercourses. Place storage areas for fuels and lubricants away from any drainage leading to water bodies. - Take all precautions to	Construction Contractor	- Areas for stockpiles, storage of fuels and lubricants and waste materials; - Number of silt traps installed along trenches leading to water bodies; - Records of surface water quality inspection; - Effectiveness of water management measures; - No visible degradation to nearby drainages, *khals* or water bodies due to construction activities	- Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
		minimize the wastage of water in the construction activities. - Take all precautions to prevent entering of wastewater into streams, watercourses, or irrigation system. Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies. - Ensure diverting storm water flow during construction shall not lead to inundation and other nuisances in low lying areas. - While working across or close to any water body, the flow of water must not be obstructed. Ensure no construction materials like earth, stone, or appendage are disposed of in a manner that may block the flow of water of any watercourse and cross drainage channels. - Monitor water quality according to the environmental management plan.				
Air quality	Conducting works at dry season and moving large quantity of materials may create dusts and increase in concentration of	- Damp down exposed soil and any sand stockpiled on site by spraying with water when necessary during dry weather; - Use tarpaulins to cover soils, sand and other loose material when	Construction Contractor	- Location of stockpiles; - Number of complaints from sensitive receptors; - Heavy equipment and machinery with air pollution control devices;	- Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
	vehicle-related pollutants (such as carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons) which will affect people who live and work near the sites. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	transported by trucks. - Unpaved surfaces used for haulage of materials within settlements shall be maintained dust-free. - Arrangements to control dust through provision of windscreens, water sprinklers, and dust extraction systems shall be provided at all hot-mix plants, batching plants and crushers (if these establishments are being set up exclusively for the subproject). - Monitor air quality.		- Certification that vehicles are compliant with air quality standards.	and final location of subproject components	
Acoustic environment	Construction activities will be on settlements, in and near schools, and areas with small-scale businesses. Temporary increase in noise level and vibrations may be caused by excavation equipment, and the transportation of equipment, materials, and people. However, the	- Involve the community in planning the work program so that any particularly noisy or otherwise invasive activities can be scheduled to avoid sensitive times. - Plan activities in consultation with Galachipa local authority so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance. - Use of high noise generating equipment shall be stopped during	Construction Contractor	- Number of complaints from sensitive receptors; - Use of silencers in noise-producing equipment and sound barriers; - Equivalent day and night time noise levels	- Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
	proposed subproject will follow existing ROW alignment and impact is short-term, site-specific and within a relatively small area. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	night time. - Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach; - Utilize modern vehicles and machinery with the requisite adaptations to limit noise and exhaust emissions, and ensure that these are maintained to manufacturers' specifications at all times. - All vehicles and equipment used in construction shall be fitted with exhaust silencers. Use silent-type generators (if required). - Monitor noise levels. Maintain maximum sound levels not exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s. - If it is not practicable to reduce noise levels to or below noise exposure limits, the contractor must post warning signs in the noise hazard areas. Workers in a posted noise hazard area must wear hearing protection. - Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity. Complete work in these areas quickly.				

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
Aesthetics	The construction activities do not anticipate any cutting of trees but will produce excess excavated earth (spoils), excess construction materials, and solid waste such as removed concrete, wood, packaging materials, empty containers, spoils, oils, lubricants, and other similar items. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	- Prepare the Debris Disposal Plan - Remove all construction and demolition wastes on a daily basis. - Coordinate with Galachipa local authority for beneficial uses of excess excavated soils or immediately dispose to designated areas Avoid stockpiling of any excess spoils - Suitably dispose of collected materials from drainages, unutilized materials and debris either through filling up of pits/wasteland or at pre-designated disposal locations. - All vehicles delivering fine materials to the site and carrying waste debris for disposal shall be covered to avoid spillage of materials. All existing roads used by vehicles of the contractor, shall be kept clear of all dust/mud or other extraneous materials dropped by such vehicles. - Lighting on construction sites shall be pointed downwards and away from oncoming traffic and nearby houses. - In areas where the visual environment is particularly important or privacy concerns for surrounding buildings exist, the site	Construction Contractor	- Number of complaints from sensitive receptors; - Worksite clear of hazardous wastes such as oil/fuel - Worksite clear of any wastes, collected materials from drainages, unutilized materials and debris - Transport route and worksite cleared of any dust/mud	- Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
		may require screening. This could be in the form of shade cloth, temporary walls, or other suitable materials prior to the beginning of construction. - The site must be kept clean to minimize the visual impact of the site. Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;				
B. Biological Characteristics						
Biodiversity	Activities being located in the built-up area of Galachipa pourashava. There are no protected areas in or around subproject sites, and no known areas of ecological interest. Based on preliminary design there are no trees at the site that need to be removed (to be reassessed during detailed design stage).	- Check if tree-cutting will be required during detailed design stage. No trees, shrubs, or groundcover may be removed or vegetation stripped without the prior permission of the environment management specialist. - If during detailed design cutting of trees will be required, compensatory plantation for trees lost at a rate of 10 trees for every tree cut, in addition to tree plantation as specified in the design, will be implemented by the contractor, who will also maintain the saplings for the duration of his contract. - All efforts shall be made to preserve trees by evaluation of minor	Construction Contractor	- PMU and PIU to report in writing the number of trees cut and planted if tree-cutting will be required (to be determined during detailed design stage) - Number of complaints from sensitive receptors on disturbance of vegetation, poaching, fishing, etc.	- Inspection by PIU and supervision consultants on monthly basis, or more frequently as the need arises.	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
		design adjustments/ alternatives (as applicable) to save trees. - Special attention shall be given for protecting giant trees and locally-important trees (with religious importance) during implementation. - Prevent workers or any other person from removing and damaging any flora (plant/vegetation) and fauna (animal) including fishing in any water body in the subproject vicinity. - Prohibit employees from poaching wildlife and cutting of trees for firewood.				
C. Socioeconomic Characteristics						
Existing provisions for pedestrians and other forms of transport	Road closure is not anticipated. Hauling of construction materials and operation of equipment on-site can cause traffic problems. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	- Prepare and implement a Traffic Management Plan (Appendix 5) - Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites. - Maintain safe passage for vehicles and pedestrians throughout the construction period. - Schedule truck deliveries of construction materials during periods of low traffic volume. - Erect and maintain barricades, including signs, markings, flags	Construction Contractor	- Traffic route during construction works including number of permanent signages, barricades and flagmen on worksite as per Traffic Management Plan (Appendix 5); - Number of complaints from sensitive receptors; - Number of signages placed at project location - Number of walkways, signages, and metal sheets placed at project location	- Inspection by PIU and supervision consultants on monthly basis, or more frequently as the need arises. - Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
		and flagmen informing diversions and alternative routes when required. - Notify affected sensitive receptors by providing sign boards informing nature and duration of construction activities and contact numbers for concerns/complaints. - Leave spaces for access between mounds of soil. - Provide walkways and metal sheets where required to maintain access across for people and vehicles. - Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools. - Consult businesses and institutions regarding operating hours and factoring this in work schedules. Ensure there is provision of alternate access to businesses and institutions during construction activities, so that there is no closure of these shops or any loss of clientage. - Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.				
Socio-economic status	There is no requirement for land acquisition	- Employ at least 50% of labor force from communities in the	Construction Contractor	- Employment records; - Records of sources	- Inspection by PIU and supervision consultants on	Cost for implementation of mitigation measures

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
	or any resettlements. Manpower will be required during the XXX-months construction stage. This can result to generation of contractual employment and increase in local revenue. Thus potential impact is positive and long-term.	vicinity of the site. This will have the added benefit of avoiding social problems that sometimes occur when workers are imported into host communities, and avoiding environmental and social problems from workers housed in poorly serviced camp accommodation. - Secure construction materials from local market.		of materials - Records of compliance to Bangladesh Labor Law of 2006 and other applicable standards	monthly basis, or more frequently as the need arises. - Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components	responsibility of contractor.
Other existing amenities for community welfare	Although construction of subproject components involves quite simple techniques of civil work, the invasive nature of excavation and the subproject sites being in built-up areas of Galachipa pourashava where there are a variety of human activities, will result to impacts to the sensitive receptors such as residents, businesses, and the community in	- Obtain details from pourashava nature and location of all existing infrastructure, and plan excavation carefully to avoid any such sites to maximum extent possible; - Integrate construction of the various infrastructure subprojects to be conducted in Galachipa (roads, water supply, etc.) so that different infrastructure is located on opposite sides of the road where feasible and roads and inhabitants are not subjected to repeated disturbance by construction in the same area at different times for different purposes. - Consult with local community to inform them of the nature,	Construction Contractor	- Utilities Contingency Plan - Number of complaints from sensitive receptors	- Inspection by PIU and supervision consultants on monthly basis, or more frequently as the need arises. - Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
	general. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	duration and likely effects of the construction work, and to identify any local concerns so that these can be addressed. - Existing infrastructure (such as water distribution pipes, electricity pylons, etc.) shall be relocated before construction starts at the subproject sites. - Prior permission shall be obtained from respective local authority for use of water for construction. Use of water for construction works shall not disturb local water users. - If construction work is expected to disrupt users of community water bodies, notice to the affected community shall be served 7 days in advance and again 1 day prior to start of construction. - Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.				
Community health and safety	Construction works will impede the access of residents and businesses in limited cases. The impacts are negative but	- Contractor's activities and movement of staff will be restricted to designated construction areas. - Locations of hot-mix plants, batching plants and crushers (if these establishments are being	Construction Contractor	- Number of permanent signages, barricades and flagmen on worksite as per Traffic Management Plan (Appendix 5); - Number of complaints from	- Inspection by PIU and supervision consultants on monthly basis, or more frequently as the need arises. - Frequency and sampling sites to be	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
	short-term, site-specific within a relatively small area and reversible by mitigation measures.	set up exclusively for the subproject) shall be shall be located at least 100 m away from the nearest dwelling preferably in the downwind direction. - Consult with Galachipa local authority on the designated areas for stockpiling of, soils, gravel, and other construction materials. - If the contractor chooses to locate the work camp/storage area on private land, he must get prior permission from the environment management specialist and landowner. - Use small mechanical excavators to attain faster progress. For rock and concrete breaking, use non-explosive blasting chemicals, silent rock cracking chemicals, and concrete breaking chemicals.[13] - Under no circumstances may open areas or the surrounding bushes be used as a toilet facility. - Recycling and the provision of separate waste receptacles for different types of waste shall be encouraged. - A general regard for the social and ecological well-		sensitive receptors; - Number of walkways, signages, and metal sheets placed at project location - Agreement between landowner and contractors in case of using private lands as work camps, storage areas, etc.	finalized during detailed design stage and final location of subproject components	

[13] These products come in powder forms, and once mixed with water (being the catalyst) simply expand, and crack the rock from hole to hole. This product is environmentally friendly and can be washed away after it has been used.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
		being of the site and adjacent areas is expected of the site staff. Workers need to be made aware of the following general rules: (i) no alcohol/drugs on site; (ii) prevent excessive noise; (iii) construction staff are to make use of the facilities provided for them, as opposed to ad hoc alternatives (e.g. fires for cooking, the use of surrounding bushes as a toilet facility); (iv) no fires permitted on site except if needed for the construction works; (v) trespassing on private/commercial properties adjoining the site is forbidden; (vi) other than pre-approved security staff, no workers shall be permitted to live on the construction site; and (vii) no worker may be forced to do work that is potentially dangerous or that he/she is not trained to do. - Interested and affected parties need to be made aware of the existence of the complaints book and the methods of communication available to them. The contractor must address queries and complaints by: (i) documenting details of such communications; (ii)				

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
		submitting these for inclusion in complaints register; (iii) bringing issues to the environment management specialist's attention immediately; and (iv) taking remedial action as per environment management specialist's instruction. - The contractor shall immediately take the necessary remedial action on any complaint/grievance received by him and forward the details of the grievance along with the action taken to the environment management specialist within 48 hours of receipt of such complaint/grievance.				
Workers health and safety	There is invariably a safety risk when construction works such as excavation and earthmoving are conducted in urban areas. Workers need to be mindful of the occupational hazards which can arise from working in height and excavation works. Potential impacts are negative and long-term but	- Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers H&S. - Ensure that all site personnel have a basic level of environmental awareness training. If necessary, the environmental management specialist and/or a translator shall be called to the sites to further explain aspects of environmental or social behavior that are unclear. - Produce and implement	Construction Contractor	- Site-specific H&S Plan - Equipped first-aid stations - Medical insurance coverage for workers - Number of accidents - Records of supply of uncontaminated water - Condition of eating areas of workers - Record of H&S orientation trainings - Use of personal protective equipment - % of moving equipment outfitted with audible back-up	- Daily inspection by contractors supervisor - Inspection by PIU and supervision consultants on monthly basis, or as the need arises. - Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
	reversible by mitigation measures.	a site health and safety (H&S) plan which include measures as: (i) excluding the public from worksites; (ii) ensuring all workers are provided with and required to use personal protective equipment (reflectorized vests, footwear, gloves, goggles and masks) at all times; (iii) providing (H&S) training[14] for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records. - Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances - Maintain necessary living accommodation and ancillary facilities in functional and hygienic manner in work camps. Ensure (i) uncontaminated water for drinking, cooking and washing, (ii) clean eating areas where workers are		alarms - Permanent sign boards for hazardous areas - Signages for storage and disposal areas - Condition of sanitation facilities for workers		

[14] Some of the key areas that may be covered during training as they relate to the primary causes of accidents include (i) slips, trips and falls; (ii) personal protective equipment; (iii) ergonomics, repetitive motion, and manual handling; (iv) workplace transport; and (v) legislation and responsibilities. Training can provide the foundations of competence but it does not necessarily result in a competent worker. Therefore, it is essential to assess staff competence to ensure that the training provided is relevant and effective. Supervision and monitoring arrangements shall be in place to ensure that training has been effective and the worker is competent at their job. The level of supervision and monitoring required is a management decision that shall be based on the risks associated with the job, the level of competence required, the experience of the individual and whether the worker works as part of a team or is a lone worker.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
		not exposed to hazardous or noxious substances; and (iii) sanitation facilities are available at all times. - Provide medical insurance coverage for workers; - Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; - Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted; - Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; - Ensure moving equipment is outfitted with audible back-up alarms; - Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage				

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
		equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and - Disallow worker exposure to noise level greater than 85 dBA for duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.				
D. Historical, Cultural, and Archaeological Characteristics						
Physical and cultural heritage	Construction works will be in built-up areas of Galachipa thus risk for chance finds is low.	- All fossils, coins, articles of value of antiquity, structures and other remains of archaeological interest discovered on the site shall be the property of the government. - Prevent workers or any other persons from removing and damaging any fossils, coins, articles of value of antiquity, structures and other remains of archaeological interest. - Stop work immediately to allow further investigation if any finds are suspected.	Construction Contractor	- Records of chance finds	- Inspection by PIU and supervision consultants on monthly basis	Cost for implementation of mitigation measures responsibility of contractor.
E. Others						
Submission of EMP	Unsatisfactory compliance to	(i) Appointment of supervisor to ensure EMP	Construction contractor	- Availability and competency of	- Monthly monitoring report to be	Cost for implementation of

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
implementation report	EMP	implementation (ii) Timely submission of monitoring reports including pictures		appointed supervisor - Monthly report	submitted by PIU to PMU - PMU to submit semi-annual monitoring report to ADB	mitigation measures responsibility of contractor.
3. Post-construction Activities						
Post-construction clean-up	Damage due to debris, spoils, excess construction materials	(i) Remove all spoils wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and (ii) All excavated roads shall be reinstated to original condition. (iii) All disrupted utilities restored (iv) All affected structures rehabilitated/compensated (v) The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc. and these shall be cleaned up. (vi) All hardened surfaces within the construction camp area shall be ripped, all imported materials removed, and the area shall be topsoiled and regrassed using the guidelines set out in the revegetation specification that forms part of this document. (vii) The contractor must arrange the cancellation of all temporary services.	Construction Contractor	PMU/CSS report in writing that (i) worksite is restored to original conditions; (ii) camp has been vacated and restored to pre-project conditions; (iii) all construction related structures not relevant to O&M are removed; and (iv) worksite clean-up is satisfactory.	- Prior to turn-over of completed works to pourashava	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
		(viii) Request PMU/CSS to report in writing that worksites and camps have been vacated and restored to pre-project conditions before acceptance of work.				

Table 9: Program of Actions – O&M Phase

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
A. Physical Characteristics						
Sludge from twin pit latrines	Ground water contamination risk	- Re-use sludge from twin pits - Use adequate water for flushing to prevent clogging - Further treatment of sludge if sludge is not fully digested - Temporary stockpiles of biosolids to be covered with lime mud (high pH) that acts as an odor control measure until material is reused	Galachipa pourashava	Regulations must be followed regarding specific requirements for monitoring sites receiving sludge.	To be determined during detailed design and ICCDC implementation	Included in O&M cost
Septage from septic tanks	Water contamination	- Secondary treatment for sludge required - Temporary stockpiles of biosolids to be covered with lime mud (high pH) that acts as an odor control measure until material is reused - Construct roofed facilities to prevent water or precipitation from contacting biosolids, and provide additional water management as needed.	Galachipa pourashava	Regulations must be followed regarding specific requirements for monitoring sites receiving septage.	To be determined during detailed design and ICCDC implementation	Included in O&M cost
Odor	Nuisance to	- Ensure that only	Galachipa	Regulations must be	To be determined	Included in O&M

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
	community	properly treated biosolids. Unless biosolids will be stored for limited periods (60 days) and/or during cool weather months, vector attraction reduction should be met prior to storage. Reduce the potential for unacceptable off-site odors by minimizing storage time. - Develop written odor control and response plans. - Operator training can increase sensitivity of personnel to odor concerns and ensure proper implementation of the odor control plan. - Regular inspections and odor monitoring, coupled with appropriate corrective action and recordkeeping, will help site and facility managers maintain good neighbor status and public acceptance of the project. - Conduct loading/unloading and spreading operations as quickly and efficiently as possible to minimize the time that odors may be emitted - Observe good housekeeping practices during facility loading and unloading. Clean trucks	pourashava	followed regarding specific requirements for monitoring sites receiving septage.	during detailed design and ICCDC implementation	cost

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
		and equipment regularly to prevent biosolids build-up that may give rise to odors. If biosolids spills occur, clean up promptly. - If significant odor should develop during handling operations, the following remedial measures can be taken: (i) immediately correct any poor housekeeping problems (such as dirty equipment); (ii) immediately treat any accumulated water that has turned septic with lime, chlorine, potassium permanganate or other odor control product; remove the water as quickly as possible to a suitable land application site; or (iii) cover biosolids with compost or sawdust.				
Acoustic environment	Temporary increase in noise level and vibrations. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	- Plan activities in consultation with Galachipa local authority so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance. - Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity. Complete work in these areas	Galachipa pourashava	Regulations must be followed regarding specific requirements for monitoring sites receiving septage.	Galachipa pourashava	Included in O&M cost

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
		quickly.				
Collection and conveyance		- Regular check of desludging pump and attending the wear and tear - Regular check of desludging equipment and attending the wear and tear - Regular chemical coating of the collection tank - Prevent biosolids from being tracked onto public roadways - Desludging equipment should be inspected for cleanliness before leaving the site - Use mud flaps on the back of desludgers to preclude biosolids getting on tires or undercarriage during unloading operations - Public roadways accessing the site should be inspected each day during operational periods, and cleaned promptly (shovel and sweep).	Galachipa pourashava	Regulations must be followed regarding specific requirements for monitoring sites receiving septage.	Galachipa pourashava	Included in O&M cost
Treatment and disposal		- Cleaning of intermediate sewer pipes once in 15 days - Ensuring the regular desludging of biogas digester as per the detention time - Desludging of anaerobic modules once in two to three years	Galachipa pourashava	Monitoring may include sampling and analysis of septage, soil, groundwater, and plant tissue. National and local regulations must be followed regarding specific	Monitoring requirements for land application programs may vary widely with respect to sampling points, sampling frequency, and analytical parameters. To be determined during	Included in O&M cost

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
		depending on the desludging period adopted for the designs - Cleaning of filter media in the planted gravel filter once in two to three years - Regular emptying of sludge drying beds (once in 10 days) and storing the dried compost for its use - If planted drain provided then cleaning of filter media once in two to three years - Ensure biosolids are stabilized before land application		requirements for monitoring sites receiving septage.	detailed design stage	
B. Socioeconomic Characteristics						
Workers health and safety	Workers need to be mindful of the occupational hazards. Potential impacts are negative and long-term but reversible by mitigation measures.	- Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers H&S. - Ensure that all site personnel have a basic level of H&S training. - Mark and provide sign boards. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate. - Always wash hands after contact with biosolids.	Galachipa pourashava	- No complaints from sensitive receptors - No complaints from workers related to O&M activities - Zero accident	At least monthly for health conditions and one annual physical and health check-up	Included in O&M cost

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
		- Avoid touching face, mouth, eyes, nose, or genitalia before washing hands. - Eat in designated areas away from biosolids handling activities. - Do not smoke or chew tobacco or gum while working in direct contact with biosolids - Use gloves, when applicable. - Keep wounds covered with clean, dry bandages. - Change into clean work clothing on a daily basis. - If contact occurs, wash contact area thoroughly with soap and water. Use antiseptic solutions on wounds, and bandage with a clean, dry dressing. For contact with eyes, flush thoroughly but gently. - Consult a doctor regarding direct exposure to an open wound or mouth.				
Hazard potentials	Accumulated methane and hydrogen sulfide in enclosed containers that can cause fire (methane) and foul odor (hydrogen sulfide)	- Extinguish flames/fires caused by methane accumulation with dry chemical, water spray or foam. - Avoid use of open flames in confined areas and around sealed transport containers. - Vent confined areas and transport containers if biosolids have been stored for any significant	Galachipa pourashava	Monitoring may include sampling and analysis gases. National and local regulations must be followed regarding specific requirements for monitoring.	Monitoring requirements may vary widely with respect to sampling points, sampling frequency, and analytical parameters. To be determined during detailed design stage	Included in O&M cost

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
		length of time.				
Community health and safety	Non-acceptance of the sanitation facilities and pilot projects by the community ; complaints from community	- Operator staff should politely receive citizen questions or complaints, collect the individual's name and phone number, conduct a prompt investigation, undertake control measures, if necessary, follow-up with the person who filed the complaint, and document the event and actions.	Galachipa pourashava	- No complaints from sensitive receptors	As the need arises	Included in O&M cost

B. Institutional Capacity Development Program

93. The PMSC environmental safeguards specialists will be responsible for trainings on environmental awareness and management in accordance with both ADB and government requirements. Specific modules customized for the available skill set will be devised after assessing the capabilities of the target participants and the requirements of the project. Typical modules would be as follows: (i) sensitization; (ii) introduction to environment and environmental considerations in water supply and wastewater projects; (iii) review of IEEs and integration into the project detailed design; (iv) improved coordination within nodal departments; and (v) monitoring and reporting system. The contractors will be required to conduct environmental awareness and orientation of workers prior to deployment to work sites. The proposed training project along with the frequency of sessions is presented in Table 10.

Table 10: Training Program for Environmental Management

Description	Contents	Schedule	Participants
Pre-construction stage			
Orientation workshop	**Module 1 – Orientation** - ADB Safeguards Policy Statement - Government of Bangladesh Environmental Laws and Regulations **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	1 day	LGED, DPHE, PMU, and PIUs officials involved in the project implementation
Construction stage			
Orientation program/ workshop for contractors and supervisory staff	- Roles and responsibilities of officials/contractors/consultants towards protection of environment - Environmental issues during construction - Implementation of EMP - Monitoring of EMP implementation - Reporting requirements	1 day	PMU PIUs Contractors
Experiences and best practices sharing	- Experiences on EMP implementation – issues and challenges - Best practices followed	1 day on a regular period to be determined by PMU, PIUs, and PMSC	PMU PIUs Contractors

C. Staffing Requirement and Budget

94. Costs required for implementing the EMP will cover the following activities:

(i) Updating IEE, preparing and submitting reports and public consultation and disclosure;
(ii) Application for environmental clearances; and

(iii) Implementation of EMP, environmental monitoring program and long-term surveys.

95. LGED and DPHE will aim to produce a single document that is acceptable to both ADB and DoE to avoid duplication of effort, and the documents produced by the PPTA will be used as a guide. For budgeting purposes it is assumed this IEE report will also be deemed satisfactory by DoE.

96. The infrastructure involved in each scheme is generally straightforward and will take between three and nine months to build. Environmental monitoring during construction will also be straightforward and will involve periodic site observations and interviews with workers and others, plus checks of reports and other documents. This will be conducted by PMSC environmental management specialist assisted by the PMU environment officer. The PDA environmental management specialist will update the IEE as necessary and perform tasks as specified in the TOR. Therefore no separate budget required for PMSC environment management specialist.

97. The cost of mitigation measures and surveys during construction stage will be incorporated into the contractor's costs, which will be binding on him for implementation. The surveys will be conducted by the contractors.

98. The operation phase mitigation measures are again of good operating practices, which will be the responsibility of Galachipa pourashava. All monitoring during the operation and maintenance phase will be conducted by LGED and DPHE, therefore, there are no additional costs.

99. The indicative costs of EMP implementation are shown in Table 11.

Table 8: Indicative Cost of EMP Implementation

	Particulars	Stages	Unit	Total Number	Rate (Taka)	Cost (Taka)	Cost covered by
A.	**Mitigation Measures**						
1.	Compensatory plantation measures	Construction	Per tree	50	1,500	75,000	Civil works contract
B.	**Monitoring Measures**						
1.	Noise levels monitoring	- Pre-construction - Construction	Per location	14 locations (refer to table 3)	10,000	28,000	Civil works contract
C	**Capacity Building**						
1.	(i) Orientation workshop for officials involved in the project implementation on ADB Safeguards Policy Statement, Government of Bangladesh environmental laws and regulations, and environmental assessment process; (ii) induction course contractors, preparing	Module 1 – immediately upon engagement of the PMSC environmental safeguards specialist Module 2 – prior to award of civil works contracts (twice a year for 4 years)	lump sum		Module 1 – 30,000 Module 2 – 30,000 Module 3 – 30,000	90,000	Covered under PMSC and ICCDC contracts

	Particulars	Stages	Unit	Total Number	Rate (Taka)	Cost (Taka)	Cost covered by
	them on EMP implementation and environmental monitoring requirements related to mitigation measures; and taking immediate action to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation; and (iii) lessons learned information sharing	Module 3 – prior to start of Phase 2 and upon completion of the project					
D.	**Consultants Costs**						
1.	PMSC Environmental Safeguards Specialist	Responsible for environmental safeguards of the project	24 person months (spread over entire project implement ation period)			7,000,000	Remuneration and budget for travel covered in the PMSC contract
E.	**Administrative Costs**						
1.	Legislation, permits, and agreements	Permit for excavation, tree-cutting permits, etc	Lump sum		50,000	50,000	These consents are to be obtained by contractor at his own expense.
		Environmental assessment and environmental clearances as per ECA and ECR requirements Obtaining right of way clearances with related national agencies.	Lump sum		100,000	100,000	LGED DPD cost for municipal infrastructures
F.	**Other Costs**						
1.	Public consultations and information disclosure	Information disclosure and consultations during preconstruction and construction phase, including public awareness campaign through media	As per requireme nt	Lump sum		1,000,000	Covered under PMSC and ICCDC contracts
2.	GRM implementation	Costs involved in resolving complaints (meetings,		Lump sum		As per PMU budget	PMU cost

	Particulars	Stages	Unit	Total Number	Rate (Taka)	Cost (Taka)	Cost covered by
		consultations, communication, and reporting/information dissemination)					
3.	Any unanticipated impact due to project implementation	Mitigation of any unanticipated impact arising during construction phase and defect liability period		Lump sum	Contractor's liability	As per insurance requirement	Contractor's insurance

IX. MONITORING AND REPORTING

100. PMU will monitor and measure the progress of EMP implementation. The monitoring activities will correspond with the project's risks and impacts, and will be identified in the EIAs/IEEs for the projects. In addition to recording information on the work and deviation of work components from original scope PMU, PIUs, and PMSC will undertake site inspections and document review to verify compliance with the EMP and progress toward the final outcome.

101. PMSC will submit monthly monitoring and implementation reports to PMU, who will take follow-up actions, if necessary. PMU will submit semi-annual monitoring reports to ADB. The suggested monitoring report format is in Appendix 9. Subproject budgets will reflect the costs of monitoring and reporting requirements. For projects likely to have significant adverse environmental impacts during operation, reporting will continue at the minimum on an annual basis. Monitoring reports will be posted in a location accessible to the public.

102. For projects likely to have significant adverse environmental impacts, LGED and DPHE will retain qualified and experienced external experts to verify its monitoring information. LGED and DPHE will document monitoring results, identify the necessary corrective actions, reflect them in a corrective action plan, and for each quarter, will study the compliance with the action plan developed in the previous quarter. Compliance with loan covenants will be screened by the Local Government Division (LGD) of the Ministry of Local Government, Rural Development, and Cooperatives (MLGRDC).

103. ADB will review project performance against the MLGRDC's commitments as agreed in the legal documents. The extent of ADB's monitoring and supervision activities will be commensurate with the project's risks and impacts. Monitoring and supervising of social and environmental safeguards will be integrated into the project performance management system. ADB will monitor projects on an ongoing basis until a project completion report is issued. ADB will carry out the following monitoring actions to supervise project implementation:

(i) conduct periodic site visits for projects with adverse environmental or social impacts;
(ii) conduct supervision missions with detailed review by ADB's safeguard specialists/officers or consultants for projects with significant adverse social or environmental impacts;
(iii) review the periodic monitoring reports submitted by EAs to ensure that adverse impacts and risks are mitigated, as planned and as agreed with ADB;

(iv) work with EAs to rectify to the extent possible any failures to comply with their safeguard commitments, as covenanted in the legal agreements, and exercise remedies 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.

X. CONCLUSION AND RECOMMENDATIONS

104. The process described in this document has assessed the environmental impacts of all elements of Galachipa sanitation subproject. All potential impacts were identified in relation to design and location, construction, and operation phases.

105. Planning principles and design considerations have been reviewed and incorporated into the site planning process whenever possible; thus, environmental impacts as being due to the project design or location were not significant.

106. Mitigation measures have been developed to reduce all negative impacts to acceptable levels. Mitigation will be assured by a program of environmental monitoring to ensure that all measures are implemented, and will determine whether the environment is protected as intended. It will include observations on- and off-site, document checks, and interviews with workers and beneficiaries. Any requirements for corrective action will be reported to the ADB.

107. The stakeholders were involved in developing the IEE through discussions on-site and public consultation, after which views expressed were incorporated into the IEE and in the planning and development of the subproject. The IEE will be made available at public locations in the city and will be disclosed to a wider audience via the ADB, LGED, and DPHE websites. The consultation process will be continued and expanded during project implementation to ensure that stakeholders are fully engaged in the project and have the opportunity to participate in its development and implementation. A grievance redress mechanism is described within the IEE to ensure any public grievances are addressed quickly.

108. The PMU and PMSC will be responsible for monitoring. The PMSC will submit monthly monitoring reports to PMU, and the PMU will send semi-annual monitoring reports to ADB. ADB will post the environmental monitoring reports on its website.

109. The EMP will assist the PMU, PMSC, and contractors in mitigating the environmental impacts, and guide them in the environmentally sound execution of the proposed project. The EMP will also ensure efficient lines of communication between the implementing agency, project management unit, and contractors. A copy of the EMP shall be kept on-site during the construction period at all times. The EMP shall be made binding on all contractors operating on the site, and will be included in the contractual clauses. Non-compliance with, or any deviation from, the conditions set out in this document shall constitute a failure in compliance.

110. The citizens of Galachipa will be the major beneficiaries of this subproject. The benefits of improved sanitation translate into improved health, an increase in productivity, fewer days absent from school for children, and improved quality of life. In addition to improved environmental conditions, the subproject will reduce exposure to climate extremes. On-site/decentralised systems of waste management will improve community health and hygiene, particularly in socially deprived groups, and reduce financial burden of Galachipa pourashava. People would spend less on healthcare and lose fewer working days due to illness, so their

economic status should also improve, as well as their overall health. Therefore the proposed subproject is unlikely to cause significant adverse impacts and net environmental and health benefits to citizens of Galachipa will be positive. The potential impacts that are associated with design, construction and operation can be mitigated to standard levels without difficulty through proper engineering design and the incorporation or application of recommended mitigation measures and procedures.

111. Therefore the proposed subproject is unlikely to cause significant adverse impacts and net environmental benefits to citizens of Galachipa will be positive. The potential impacts that are associated with design, construction and operation can be mitigated to standard levels without difficulty through proper engineering design and the incorporation or application of recommended mitigation measures and procedures. Based on the findings of the IEE, there are no significant impacts and the classification of the subproject as Category “B” is confirmed. No further special study or detailed environmental impact assessment (EIA) needs to be undertaken to comply with ADB SPS (2009).

112. Per Government of Bangladesh Environment Conservation Act, 1995 (ECA, 1995) and Environment Conservation Rules (ECR, 1997), the subproject is categorized as “Red” and LCC and ECC must be obtained from the DoE prior to award of civil works contracts.

Appendix 1: Rapid Environmental Assessment Checklist

Screening questions	Yes	No	Remarks
A. Project siting Is the project area adjacent to or within any of the following environmentally sensitive areas?	✓		Galachipa pourashava is predominantly residential. There are no protected areas in or around subproject sites, and no known areas of ecological interest in Galachipa.
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…		✓	
▪ impacts on the sustainability of associated sanitation and solid waste disposal systems and their interactions with other urban services.		✓	Not anticipated.
▪ deterioration of surrounding environmental conditions due to rapid urban population growth, commercial and industrial activity, and increased waste generation to the point that both manmade and natural systems are overloaded and the capacities to manage these systems are overwhelmed?		✓	Not anticipated.
▪ degradation of land and ecosystems (e.g. loss of wetlands and wild lands, coastal zones, watersheds and forests)?		✓	Not anticipated.
▪ dislocation or involuntary resettlement of people?		✓	Not anticipated.
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable group?		✓	Not anticipated.
▪ degradation of cultural property, and loss of cultural heritage and tourism revenues?		✓	Not anticipated.
▪ occupation of low-lying lands, floodplains and steep hillsides by squatters and low-income groups, and their exposure to increased health hazards and risks due to pollutive industries?		✓	Not anticipated.
▪ water resource problems (e.g. depletion/degradation of available water supply, deterioration for surface and ground water quality, and pollution of receiving waters?		✓	Not anticipated.
▪ air pollution due to urban emissions?	✓		Increase in concentration of vehicle-related pollutants during construction phase. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.
▪ risks and vulnerabilities related to occupational health and safety due to physical, chemical and biological hazards during project construction and operation?		✓	Not anticipated.
▪ road blocking and temporary flooding due to land excavation during rainy season?	✓		Road closure not anticipated. Excavations may result to temporary ponding of water during construction phase. of water. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.
▪ noise and dust from construction activities?	✓		Anticipated during construction phase. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.

Screening questions	Yes	No	Remarks
▪ traffic disturbances due to construction material transport and wastes?	✓		Anticipated during construction phase. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.
▪ temporary silt runoff due to construction?	✓		Excavations may result to silt-laden runoff during rainfall which may cause siltation and reduction in the quality of adjacent bodies of water. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.
▪ hazards to public health due to ambient, household and occupational pollution, thermal inversion, and smog formation?		✓	Not anticipated.
▪ water depletion and/or degradation?		✓	Not anticipated.
▪ overpaying of ground water, leading to land subsidence, lowered ground water table, and salinization?		✓	Not anticipated.
▪ contamination of surface and ground waters due to improper waste disposal?		✓	Not anticipated.
▪ pollution of receiving waters resulting in amenity losses, fisheries and marine resource depletion, and health problems?		✓	Not anticipated.
▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		✓	Not anticipated.
▪ social conflicts if workers from other regions or countries are hired?		✓	Not anticipated.
▪ 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 operation and construction?		✓	Not anticipated.
▪ community safety risks due to both accidental and natural hazards, 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?		✓	Not anticipated.

Climate Change and Disaster Risk Questions The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.	Yes	No	Remarks
Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes (see Appendix I)?	✓		Low lying areas of Galachipa are subject to flooding during heavy rainfall in monsoon. Preliminary designs integrate a number of measures, both structural and non-structural, to mainstream climate resilience.
Could changes in temperature, precipitation, or extreme events patterns over the Project lifespan affect technical or financial sustainability (e.g., increased extreme rainfall increases flooding, damaging proposed infrastructure)?	✓		
Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (e.g., high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)?		✓	Proposed project will not impact any marginalized population, rural-urban migrants, illegal settlement, etc.
Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., by paving vulnerable groundwater recharge areas, or using water from a vulnerable source that is relied upon by		✓	

many user groups, or encouraging settlement in earthquake zones)?			

Appendix 2: Environmental Standards and Application Fees

The standards for air, water, sound, odor and other components of the environment applicable to the project shall be determined in accordance with the standards specified in Schedules 2, 3, 4, 5, 6, and 8 of ECR, 1997.

	Standards	**ECR, 1997 (Rule 12) http://www.moef.gov.bd/html/laws/env_law/178-189.pdf**
1.	Air	Schedule 2
2.	Inland surface water	Schedule 3
	Drinking water	
3.	Sound	Schedule 4
4.	Sound Originating from Motor Vehicles or Mechanized Vessels	Schedule 5
5.	Emission from Motor Vehicles	Schedule 6
7.	Odor	Schedule 8

The standard limits of discharge of liquid waste and gaseous emissions applicable to the project shall be determined in accordance with the standards specified in Schedule 9 and 10

	Environmental Component	**ECR, 1997 (Rule 13) http://www.moef.gov.bd/html/laws/env_law/178-189.pdf**
1.	Sewage Discharge	Schedule 9
2.	Waste from Industrial Units or Projects Waste (see discharge to inland surface water and irrigated land)	Schedule 10

The fees for issuance of environmental clearance certificate and its renewal shall be payable in accordance with Schedule 13. The fees for analysis of samples of water, liquid waste, air and sound and also the information or data derived from such analysis are described in Schedule 14.

	Fees	**ECR, 1997 (Rule 14 and 15) http://www.moef.gov.bd/html/laws/env_law/178-189.pdf**
1.	Environmental clearance certificate or renewal	Schedule 13
2.	Supplying various analytical information or data or test results of samples of water, effluent, air and sound	Schedule 14

Appendix 3: Sample Outline Spoils Management Plan

I. Spoils information

- A. Materials type
- B. Potential contamination
- C. Expected volume and sources
- D. Spoil classification

II. Spoils management

- A. Transportation of spoil
- B. Storage of spoil
- C. Contaminated spoil
- D. Approved reuse and/or disposal sites

III. Records of reuse and/or disposal

Appendix 4: Sample Outline Traffic Management Plan

A. Principles

1. One of the prime objectives of this TMP is to ensure the safety of all the road users along the work zone, and to address the following issues:

(i) the safety of pedestrians, bicyclists, and motorists travelling through the construction zone;
(ii) protection of work crews from hazards associated with moving traffic;
(iii) mitigation of the adverse impact on road capacity and delays to the road users;
(iv) maintenance of access to adjoining properties; and
(v) addressing issues that may delay the project.

B. Operating Policies for TMP

2. The following principles will help promote safe and efficient movement for all road users (motorists, bicyclists, and pedestrians, including persons with disabilities) through and around work zones while reasonably protecting workers and equipment.

(i) Make traffic safety and temporary traffic control an integral and high-priority element of every project from planning through design, construction, and maintenance.
(ii) Inhibit traffic movement as little as possible.
(iii) Provide clear and positive guidance to drivers, bicyclists, and pedestrians as they approach and travel through the temporary traffic control zone.
(iv) Inspect traffic control elements routinely, both day and night, and make modifications when necessary.
(v) Pay increased attention to roadside safety in the vicinity of temporary traffic control zones.
(vi) Train all persons that select, place, and maintain temporary traffic control devices.
(vii) Keep the public well informed.
(viii) Make appropriate accommodation for abutting property owners, residents, businesses, emergency services, railroads, commercial vehicles, and transit operations.

3. **Figure A2 to Figure A12** illustrates the operating policy for TMP for the construction of water pipes and the sewers along various types of roads.

C. Analyze the impact due to street closure

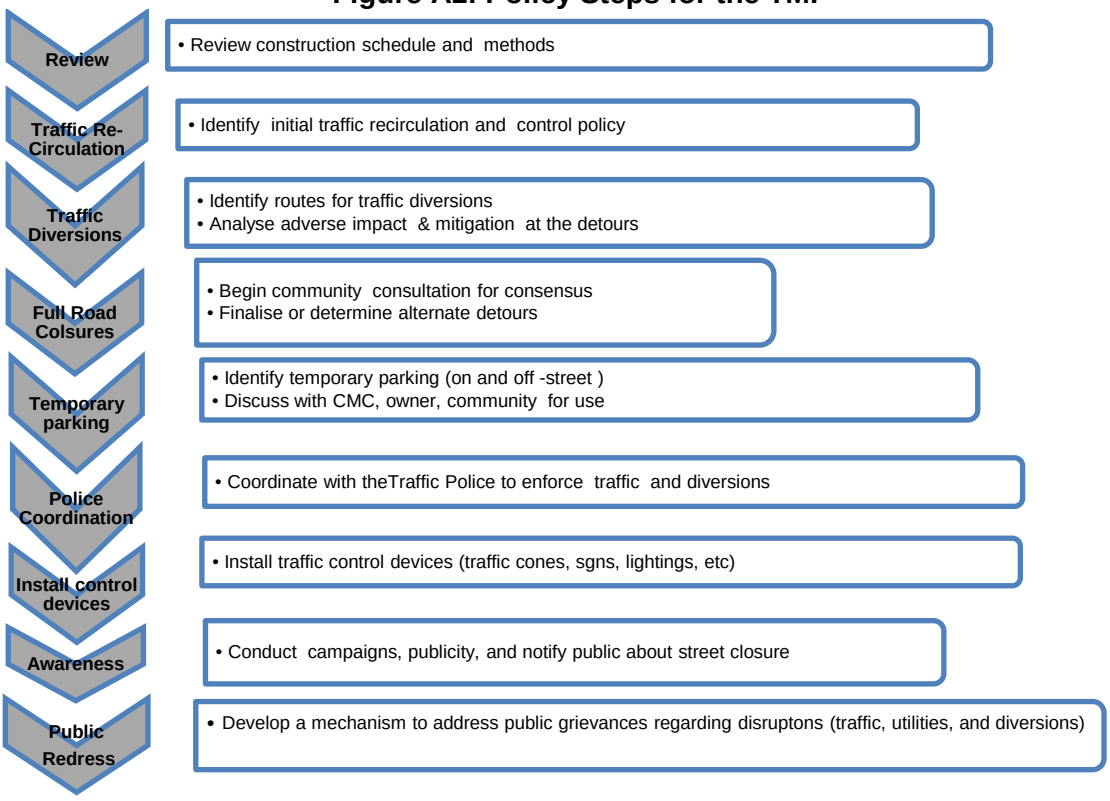
4. Apart from the capacity analysis, a final decision to close a particular street and divert the traffic should involve the following steps:

(i) approval from the ULB/CMC/Public Works Department (PWD) to use the local streets as detours;
(ii) consultation with businesses, community members, traffic police, PWD, etc, regarding the mitigation measures necessary at the detours where the road is diverted during the construction;
(iii) determining of the maximum number of days allowed for road closure, and incorporation of such provisions into the contract documents;

(iv) determining if additional traffic control or temporary improvements are needed along the detour route;
(v) considering how access will be provided to the worksite;
(vi) contacting emergency service, school officials, and transit authorities to determine if there are impacts to their operations; and
(vii) developing a notification program to the public so that the closure is not a surprise. As part of this program, the public should be advised of alternate routes that commuters can take or will have to take as result of the traffic diversion.

5. If full road-closure of certain streets within the area is not feasible due to inadequate capacity of the detour street or public opposition, the full closure can be restricted to weekends with the construction commencing on Saturday night and ending on Monday morning prior to the morning peak period.

Figure A1: Policy Steps for the TMP



D. Public awareness and notifications

5. As per discussions in the previous sections, there will be travel delays during the constructions, as is the case with most construction projects, albeit on a reduced scale if utilities and traffic management are properly coordinated. There are additional grounds for travel delays in the area, as most of the streets lack sufficient capacity to accommodate additional traffic from diverted traffic as a result of street closures to accommodate the works.

6. The awareness campaign and the prior notification for the public will be a continuous activity which the project will carry out to compensate for the above delays and minimize public

claims as result of these problems. These activities will take place sufficiently in advance of the time when the roadblocks or traffic diversions take place at the particular streets. The reason for this is to allow sufficient time for the public and residents to understand the changes to their travel plans. The project will notify the public about the roadblocks and traffic diversion through public notices, ward level meetings and city level meeting with the elected representatives.

7. The PIU will also conduct an awareness campaign to educate the public about the following issues:

(i) traffic control devices in place at the work zones (signs, traffic cones, barriers, etc.);
(ii) defensive driving behaviour along the work zones; and
(iii) reduced speeds enforced at the work zones and traffic diversions.

8. It may be necessary to conduct the awareness programs/campaigns on road safety during construction.

9. The campaign will cater to all types of target groups i.e. children, adults, and drivers. Therefore, these campaigns will be conducted in schools and community centers. In addition, the project will publish a brochure for public information. These brochures will be widely circulated around the area and will also be available at the PIU, and the contractor's site office. The text of the brochure should be concise to be effective, with a lot of graphics. It will serve the following purpose:

(i) explain why the brochure was prepared, along with a brief description of the project;
(ii) advise the public to expect the unexpected;
(iii) educate the public about the various traffic control devices and safety measures adopted at the work zones;
(iv) educate the public about the safe road user behaviour to emulate at the work zones;
(v) tell the public how to stay informed or where to inquire about road safety issues at the work zones (name, telephone, mobile number of the contact person; and
(vi) indicate the office hours of relevant offices.

E. Install traffic control devices at the work zones and traffic diversion routes

10. The purpose of installing traffic control devices at the work zones is to delineate these areas to warn, inform, and direct the road users about a hazard ahead, and to protect them as well as the workers. As proper delineation is a key to achieve the above objective, it is important to install good traffic signs at the work zones. The following traffic control devices are used in work zones:

- Signs
- Pavement Markings
- Channelizing Devices
- Arrow Panels
- Warning Lights

11. Procedures for installing traffic control devices at any work zone vary, depending on road configuration, location of the work, construction activity, duration, traffic speed and volume, and pedestrian traffic. Work will take place along major roads, and the minor internal roads. As such, the traffic volume and road geometry vary. The main roads carry considerable traffic; internal roads in the new city areas are wide but in old city roads very narrow and carry considerable traffic. However, regardless of where the construction takes place, all the work zones should be cordoned off, and traffic shifted away at least with traffic cones, barricades, and temporary signs (temporary “STOP” and “GO”).

12**.** **Figure A2 to Figure A12** illustrates a typical set-up for installing traffic control devices at the work zone of the area, depending on the location of work on the road way, and road geometrics:

- Work on shoulder or parking lane
- Shoulder or parking lane closed on divided road
- Work in Travel lane
- Lane closure on road with low volume
- Lane closure on a two-line road with low volume (with yield sign)
- Lane closure on a two-line road with low volume (one flagger operation)
- Lane closure on a two lane road (two flagger operation)
- Lane closure on a four lane undivided Road
- Lane closure on divided roadway
- Half road closure on multi-lane roadway
- Street closure with detour

13. The work zone should take into consideration the space required for a buffer zone between the workers and the traffic (lateral and longitudinal) and the transition space required for delineation, as applicable. For the works, a 30 cm clearance between the traffic and the temporary STOP and GO signs should be provided. In addition, at least 60 cm is necessary to install the temporary traffic signs and cones.

14. Traffic police should regulate traffic away from the work zone and enforce the traffic diversion result from full street closure in certain areas during construction. Flaggers/ personnel should be equipped with reflective jackets at all times and have traffic control batons (preferably the LED type) for regulating the traffic during night time.

16. In addition to the delineation devices, all the construction workers should wear fluorescent safety vests and helmets in order to be visible to the motorists at all times. There should be provision for lighting beacons and illumination for night constructions.

Figure A2 & A3: Work on shoulder or parking lane and shoulder or parking lane closed on divided road

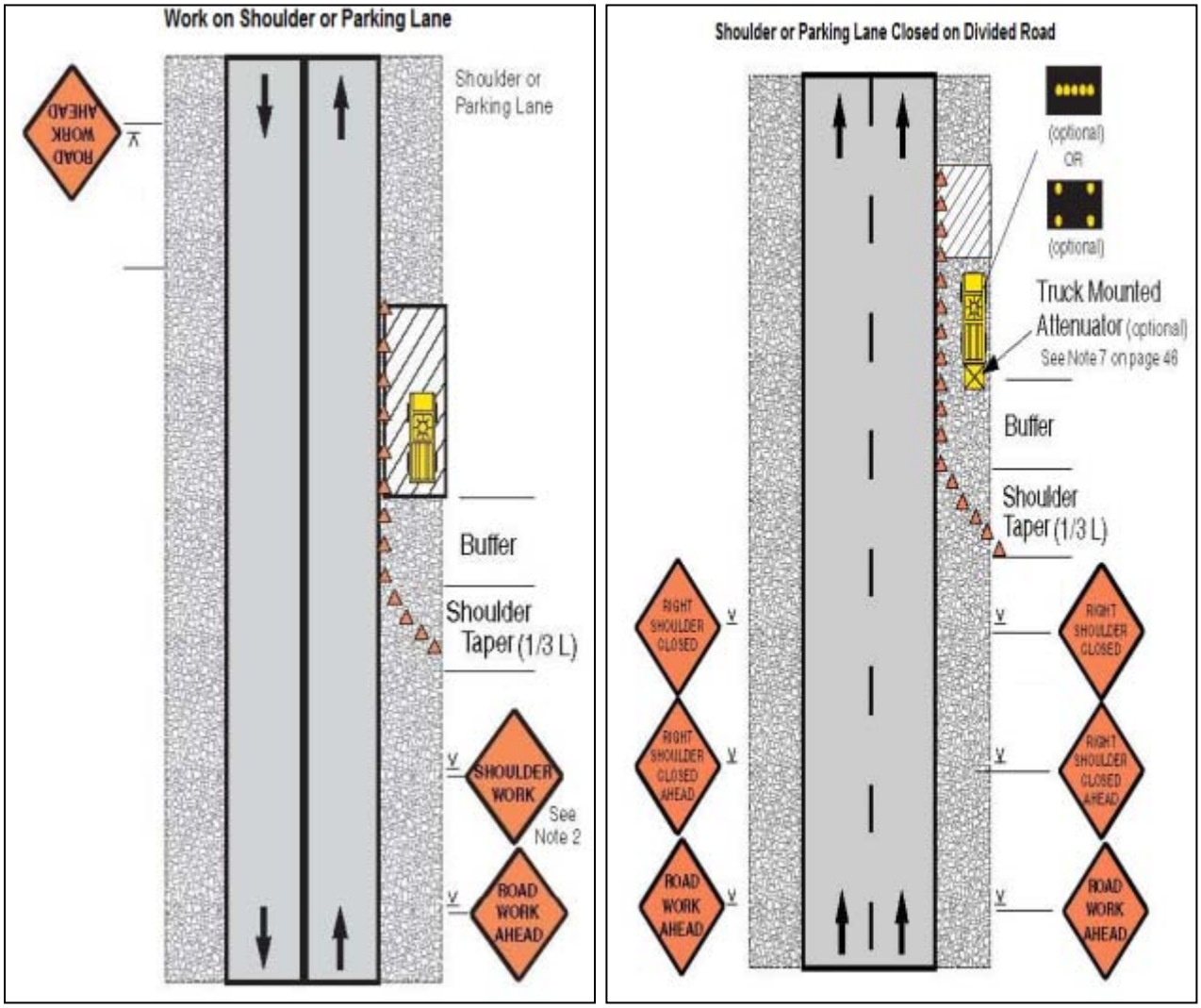


Figure A4 & A5: Work in Travel lane & Lane closure on road with low volume

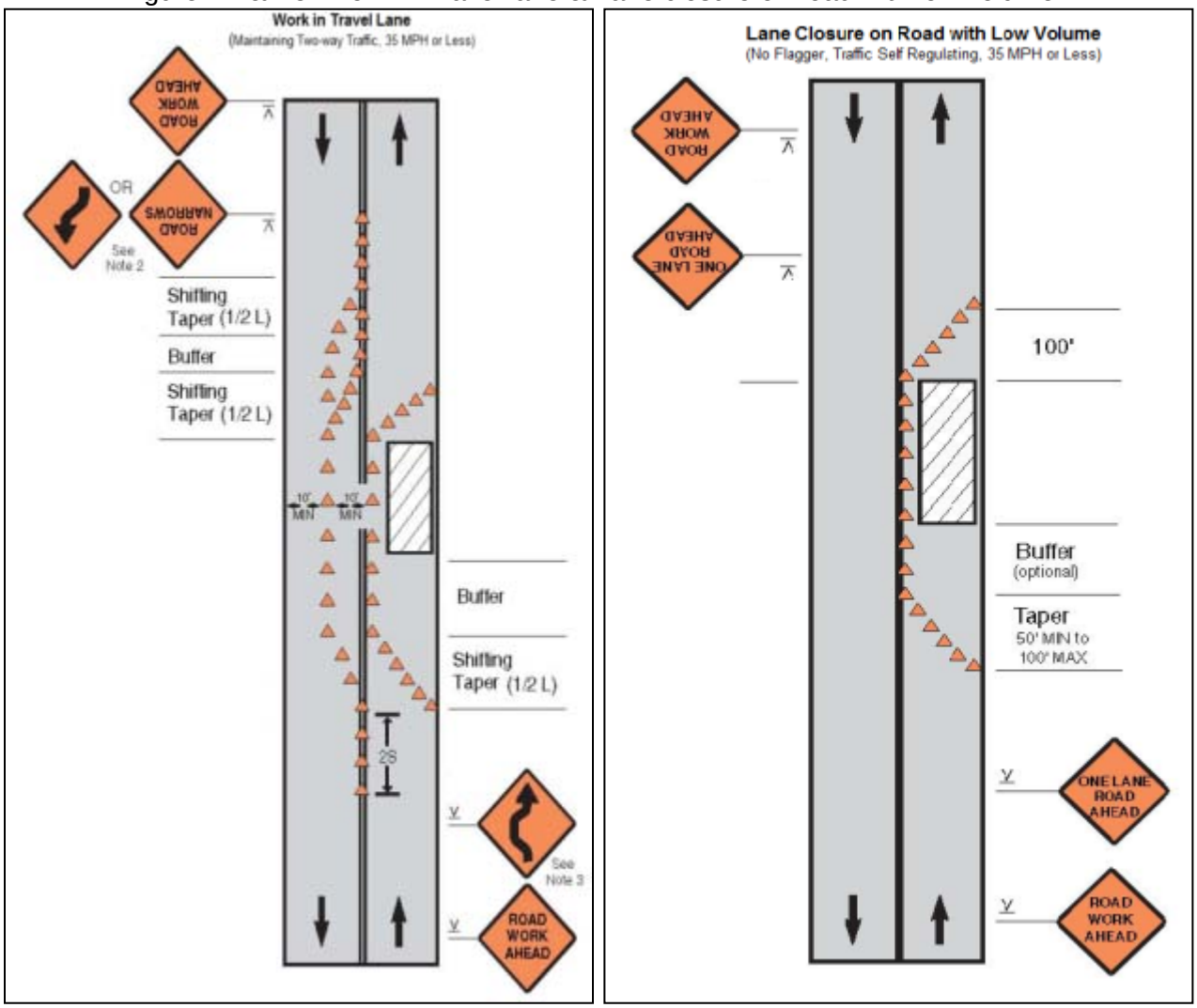
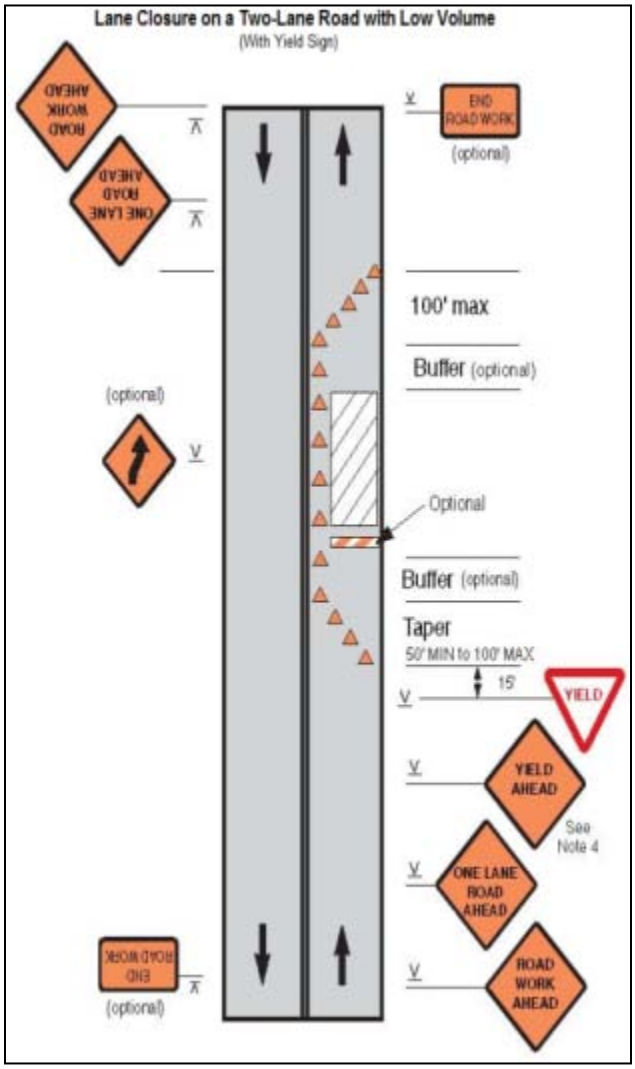


Figure A6 & A7: Lane closure on a two-line road with low volume (with yield sign) & Lane closure on a two-line road with low volume (one flagger operation)



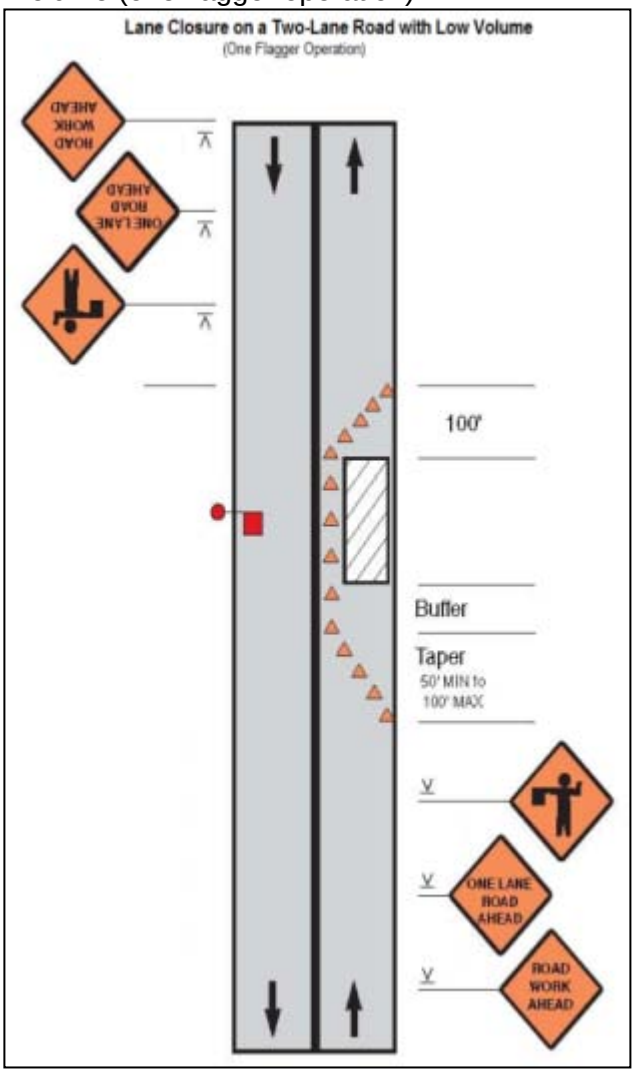


Figure A8 & A9: Lane Closure on a Two-Lane Road (Two Flagger Operation) & Lane Closure on a Four-Lane Undivided Road

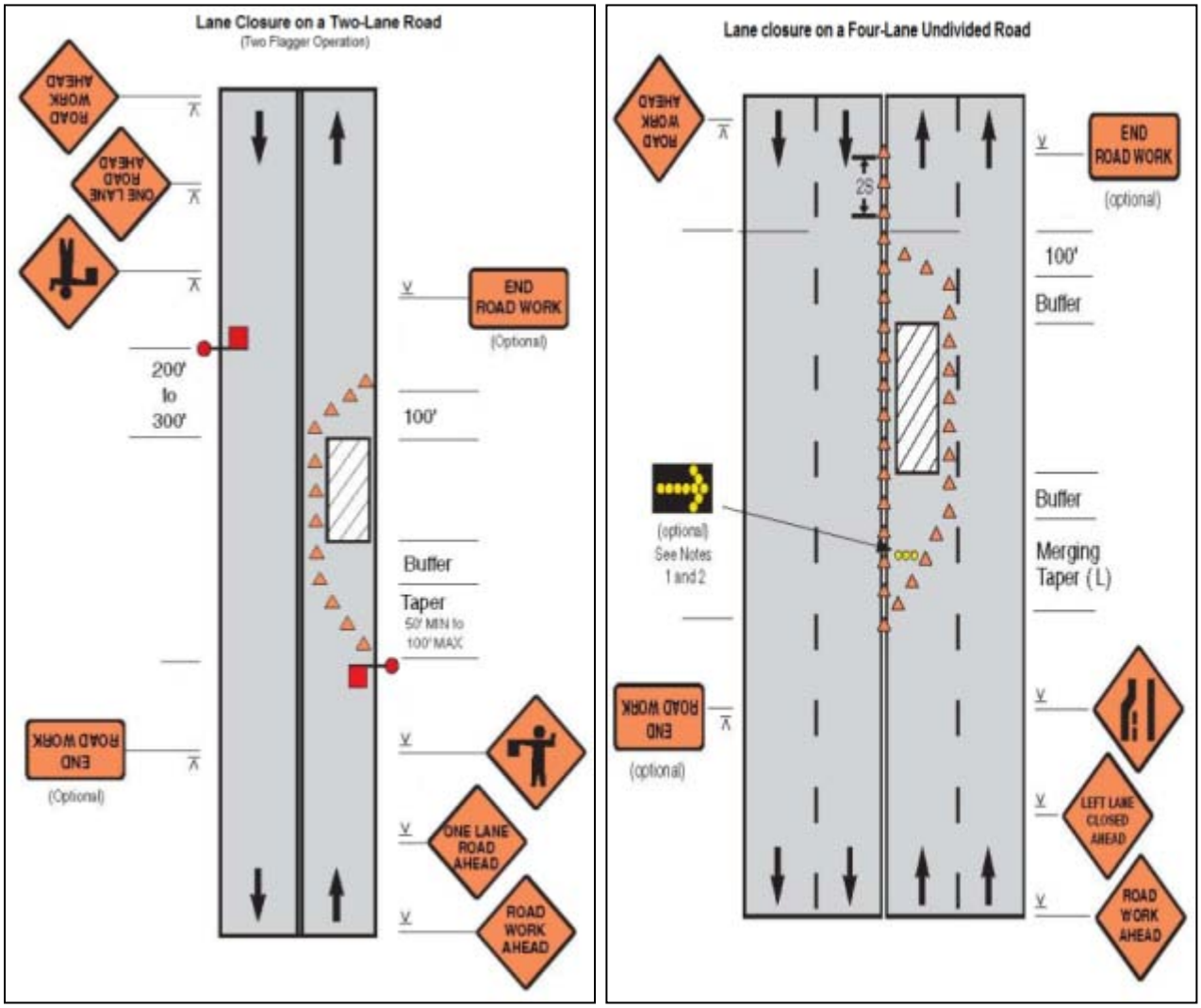


Figure A10 & A11: Lane Closure and Divided Roadway & Half Road Closure On Multi-Lane Roadway

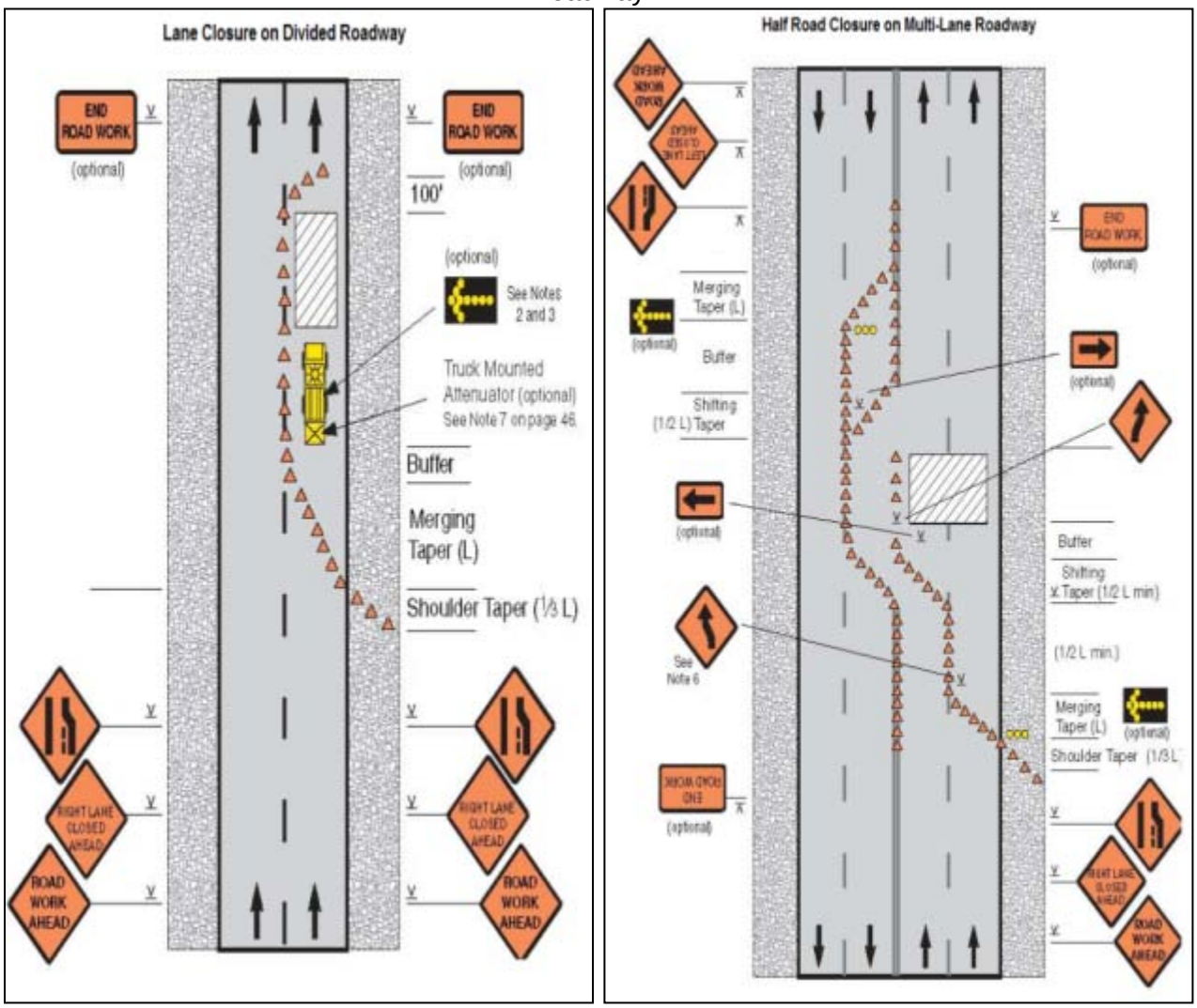
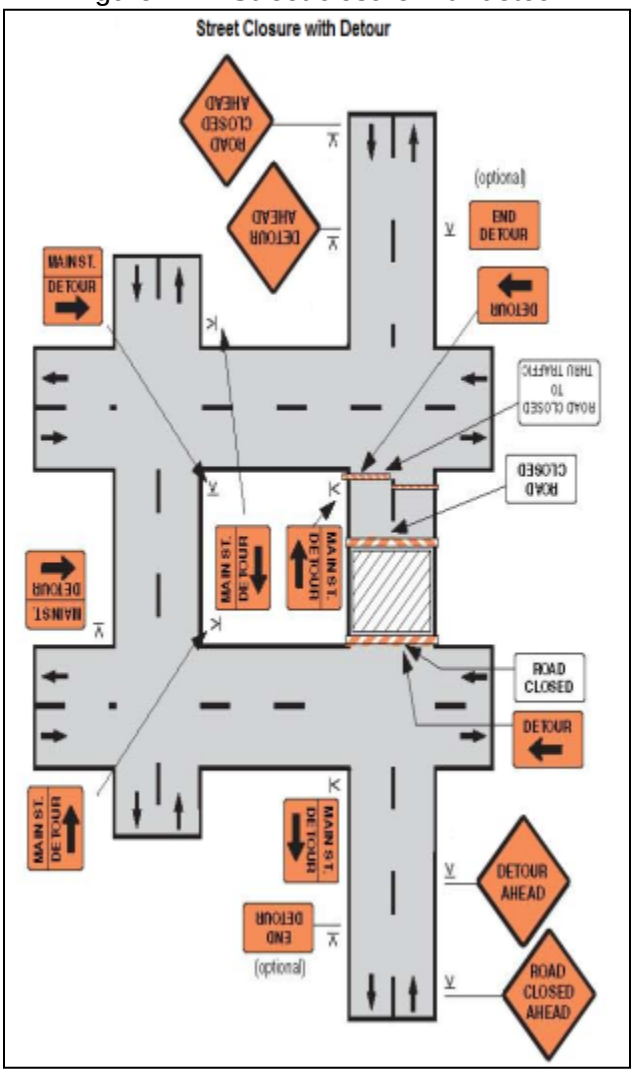


Figure A12: Street closure with detour



Appendix 5: Records of Public Consultations and FGDs

	Proposed Project Facility/Alignment Related to Which Discussion Held	Date	Venue	No. of Participants & gender	Key Safeguard Issues Discussed	Overall Concerns Expressed Related to Project	Suggestions From People	Willingness to Participate in Project
1	Community Toilet	21-06-13	Shantibag, Galachipa	M=11 F=7 T=18	• Govt. free land; • No resettlement or safeguard issue;	• Local people would like to cooperate in constructing the Community Toilet as they badly need for such facilities; • According to them, proposed Community Toilet should be maintained by Pourashava;	• Water Supply/tube well, lighting/solar, Separate arrangements for male and female should be ensured;	• The participants will cooperate in all respect during construction
2	Public Toilet	20-06-13	Baily bridge, near Galachipa Degree College		• Govt. free land (along the side of road and bridge); • No resettlement or safeguard issue;	• According to them, proposed Community Toilet should be maintained by Pourashava;	• Water Supply/tube well, lighting/solar, Separate arrangements for male and female should be ensured;	• The participants will cooperate in all respect during construction
3	Public Toilet	21-06-13	Al Aksa Jame Mosque near Poshu Hospital, Galachipa		• Govt. free land in front of the mosque, at the side of road ; (Mosque is also built socially on a Govt. free land; • No resettlement or safeguard issue;	• This project should be maintained by Mosque committee;	• Water Supply/tube well, lighting/solar, Separate arrangements for male and female should be ensured; • Separate Oju khana for male and females should be ensured; • Separate entry and exit for male and females should be ensured;	• The participants will cooperate in all respect during construction
4	Public Toilet	21-06-13	Lipi Tokij Cinema Hall, Galachipa		• Proposed site's land is private land. Proprietor of Lipi Tokij Cinema Hal is the owner of that land. Value of the proposed	• Hall owner might not give the land for setting public toilet there; • Interviewers had expressed that the Public Toilet should be constructed inside Upazilla Parishad Complex, which would be	• Water supply/tube well, lighting/solar, male, female separate;	• The participants will cooperate in all respect during construction

	Proposed Project Facility/Alignment Related to Which Discussion Held	Date	Venue	No. of Participants & gender	Key Safeguard Issues Discussed	Overall Concerns Expressed Related to Project	Suggestions From People	Willingness to Participate in Project
					land is high due to its location (very busy place);	adjacent to this proposed place. That place is a free Govt. Land as well; • Based on public opinion, that place will be better and people, in fact, are in badly need of such facility there; • The Public Toilet should be maintained by Pourashava;		
5	Public Toilet	21-06-13	Majher Stand, Galachipa		• Govt. land at the side of road and bridge; • Back side of a tin shed temporary restaurant built on that Govt. land falls in the project site;	• The shopkeeper is ready to shift the shed for the project by his own cost; • The Public Toilet should be maintained by Pourashava;	• Water supply/tube well, lighting/solar, male, female separate;	• The participants will cooperate in all respect during construction
6	Public Toilet	21-06-13	Registry Office, Galachipa		• Govt. Land. Few trees would be required to remove to get the place for setting the proposed Public Toilet ;	• They had expressed their views that they would easily plant trees again at the side of the public toilet; • However, the Public Toilet should be maintained by Pourashava;	• Water supply/tube well should be ensured;	• The participants will cooperate in all respect during construction
7	Public Toilet	21-06-13	Chourasta, Galachipa		• Govt. free land; • No resettlement or safeguard issue;	• This Public Toilet should be maintained by Pourashava;	• Water Supply/tube well, lighting/solar, Separate arrangements for male and female should be ensured;	• The participants will cooperate in all respect during construction
8	Public Toilet	21-06-13	Kheya Ghat, Galachipa		• Vacant Govt. land. Being Kheya Ghat, there are temporary restaurants on that Govt. Land; • No resettlement or safeguard issue;	• Temporary restaurants owners suggested for setting Public Toilet at the side nearby workshop; • This Public Toilet should be maintained by Kheya Ghat Committee/Pourashava;	• Water Supply/tube well, lighting/solar, Separate arrangements for male and female should be ensured;	• The participants will cooperate in all respect during construction
9	Public Toilet	21-06-13	Launch		• Govt. free land;	• This project should be maintained	• Water	• The

	Proposed Project Facility/Alignment Related to Which Discussion Held	Date	Venue	No. of Participants & gender	Key Safeguard Issues Discussed	Overall Concerns Expressed Related to Project	Suggestions From People	Willingness to Participate in Project
			Ghat, Galachipa		• No resettlement or safeguard issue;	by Pourashava;	Supply/tube well, lighting/solar, Separate arrangements for male and female should be ensured;	participants will cooperate in all respect during construction
10	College Toilet	20-06-13	Galachipa Degree College		• Free land owned by College, No resettlement issues;	• Proposed toilet should be maintained by the college authority;	• Separate arrangements should be made for male/ female;	• The participants will cooperate in all respect during construction

(M=No. of male participants; F= No. of female participants; T=Total participants)

Photograph

Santibag

Chourasta

College Para

Kheya Ghat

Launch Ghat

Lipi-Takies

Majer Stand

Register Office

Degree College

Samalibagh

PARTICIPANTs LIST

Focus Group Discussion-CTIIP
Galachipa Town
Component: Water-Overhead Tank, Pump, Cyclone Shelter and School Toilet
Location: Galachipa Degree College, Ward No-9
Meeting Place: Galachipa Degree College Hall Room
Date: 20-06-13
Time: 11.45 am

	Name	Designation
1	Md. Forkan Kabir	Principal-Galachipa Degree College
2	Md. Khalid Hossain Milton	Member-Government Committee-Galachipa Degree College
3	Md. Shorab Ali	Teaching
4	Md. Shafiul Islam	Teaching
5	Md. Mohsin	Teaching
6	Gazi Mohammad Babul Akhter	Teaching
7	Goalm Moula	Teaching
8	Md. Mosharraf Hossain	Teaching
9	ASM Khalilur Rahman	Teaching
10	Md. Riaduzzaman	Teaching
11	Md. Shah Alam	Teaching
12	Tapash Kumar Karmaker	Teaching
13	Md. Liakat Hossain Ghosh	Teaching
14	Md. Mizanur Rahman	Teaching
15	Md. Delwar	Teaching

Focus Group Discussion-CTIIP
Galachipa Town
Component: Public Toilet
Location: Baily Bridge near Galachipa Degree College, Ward No-9
Meeting Place: Baily Bridge near Galachipa Degree College
Date: 20-06-13
Time: 12.45 pm

	Name	Designation
1	Md. Shah Alam	Labor
2	Khandaker Shorab Howlader	Business
3	Abdul Aziz	Business
4	Md. Rubel	Business
5	Abdul Jabbar	Business
6	Md. Zakir	Business
7	Md. Shamim	Business
8	Md. Miraz	Business
9	Md. Arif	Business
10	Md. Nazrul Islam	Business
11	Md. Ismail	Business
12	Md. Chand Mia	Business
13	Uttam Kumar	Business
14	Md. Delwar Hossain	Business
15	Monika Rakkhit	Business
16	Sujana Khatun	Student
17	Jannatul Firdous	Student
18	Md. Khalilur Rahman	Business
19	Abdur Rob	Worker
20	Md. Mosharraf Hossain	Worker

	Name	Designation
21	Md. Mizanur Rahman	Business
22	Md. Jamal	Business

Focus Group Discussion-CTIIP
Galachipa Town
Component: Public Toilet
Location: Al Aksa Jame Mosque, Shamoli Bag (near Poshu Hospital), Ward No-2
Meeting Place: Al Aksa Jame Mosque, Shamoli Bag (near Poshu Hospital)
Date: 21-06-13
Time: 11.30am

	Name	Designation
1	Md. Hamedul Khan	Labor
2	Md. Mizanur Rahman	Labor
3	Md. Halim Hawlader	Business
4	Firoza Begom	Housewife
5	Md. Nurul Islam	Teaching
6	Md. Shah Alam	Service
7	Md. Hazrat Ali	Service
8	Md. Faruk Ahmed	Business
9	Md. Moshiur Rahman Shahin	Business
10	Md. Mahmudul Hasan	Service-Deed Register
11	Md. Harunur Rashid	Stamp Vander
12	Md. Abbas Molla	Business
13	Md. Moniruzzaman	Service
14	Md. Sumon	Student
15	Md. Mamun	Student

Focus Group Discussion-CTIIP
Galachipa Town
Component: Community Toilet
Location: Shantibag, Ward No-3
Meeting Place: Shantibag Sluice Gate
Date: 21-06-13
Time: 12.30am

Sl.No	Name	Designation
1	Md. Eskander Bapery	Fisherman
2	Md. Saiful Islam Sujon	Business
3	Mir Ali Sarder	Fisherman
4	Md. Majibur Howlader	Fisherman
5	Md. Bachhu Mia	Fisherman
6	Firaja Begom	Housewife
7	Md. Mizan	Business
8	Md. Nazrul Islam	Fisherman
9	Moslem Howlader	Business
10	Md. Shahjahan	Labor
11	Nasima	Housewife
12	Renu Begom	Housewife
13	Md. Jamal Uddin	Business
14	Laili Begom	Business
15	Munni Begom	Student
16	Abu Saleh	Business
17	Reshma Begom	Housewife
18	Nurjahan	Housewife

Focus Group Discussion-CTIIP
Galachipa Town
Component: Public Toilet
Location: Lipi Tokij, Ward No-5
Meeting Place: Lipi Tokij (near Upa Zila Complex)
Date: 21-06-13
Time: 1.30pm

	Name	Designation
1	Md. Zahir	Shopkeeper
2	Md. Harun	Service
3	Md. Hiron	Business
4	Amir Hossain	Fisherman
5	Md. Nnur Islam Hawlader	Fisherman
6	Md. Prince	Business
7	Md. Sohel Rana	Service
8	Md. Arifur Rahman Himel	Student

Focus Group Discussion-CTIIP
Galachipa Town
Component: Public Toilet
Location: Majher Stand, Ward No-7
Meeting Place: Majher Stand
Date: 21-06-13
Time: 2.45pm

	Name	Designation
1	Jugal Sheel	Saloon worker
2	Md. Alamin	Labor
3	Md. Badal Akand	Service
4	Md. Habib	Business
5	Md. Jahid	Business
6	Md. Zafar	Business
7	Sanjib Kumar Mitra	Business

Focus Group Discussion-CTIIP
Galachipa Town
Component: Public Toilet
Location: Land Registry Office Premise, Ward No-7
Meeting Place: Land Registry Office Premise
Date: 21-06-13
Time: 3.40pm

Sl.No	Name	Designation
1	Md. Rubel	Driving
2	Md. Milon	Driving
3	Md. Liton	Business
4	Md. Bazlu	Driver
5	Md. Shakil	Labor
6	Md. Mahabub	Driving
7	Jadab Das	Business
8	Md. Sirajul Islam Taluldar	Business
9	Md. Nasirudddin Talukdar	Business

Focus Group Discussion-CTIIP

Galachipa Town
Component: Public Toilet
Location: Chowrasta, Ward No-8
Meeting Place: Chowrasta
Date: 21-06-13
Time: 4.50pm

	Name	Designation
1	Md. Mamun Howlader	Business
2	Md. Shakil	Driving
3	Md. Sujan Mia	Driving
4	Md. Rashel Sarder	Business
5	Md. Shamim	Driving
6	Md. Shahin	Driving
7	Md. Azizul Hoque	Service
8	Md. Nannu	Business
9	Md. Jewel Sikder	Business

Focus Group Discussion-CTIIP
Galachipa Town
Component: Public Toilet
Location: Kheya Ghat, Ward No-4
Meeting Place: Kheya Ghat
Date: 21-06-13
Time: 5.45pm

	Name	Designation
1	Md. Dulal	Labor
2	Md. Rasel	Labor
3	Abdul Halim Sarder	Labor
4	Md. Salam	Labor
5	Md. Jahid	Labor
6	Md. Ohidur Rahman	Labor
7	Md. Mokbul	Sweeper
8	Md. Harun	Sweeper
9	Hazi Ismail Dewan	Business
10	Md. Nazrul Islam	Business
11	Md. Shohag Hawlader	Labor
12	Md. Shahidul Islam	Boatman
13	Taslima Begom	Business
14	Md. Fazlul Hoque	Business
15	Md. Alamgir Howlader	Business

Focus Group Discussion-CTIIP
Galachipa Town
Component: Public Toilet
Location: Launch Ghat, Ward No-1
Meeting Place: Launch Ghat
Date: 21-06-13
Time: 6.30pm

	Name	Designation
1	Daku Sarder	Fisherman
2	Md. Zakir Hossain	Business
3	Md. Salim	Labor
4	Anawara	Business

	Name	Designation
5	Nasima Begom	Business
6	Md. Nuruzzaman Howlader	Labor
7	Md. Roni	Student
8	Md. Zabbar Gazi	Business
9	Md. Aziz Mia	Business
10	Abdus Salam	Business
11		

Minutes of Discussion Meeting held in DOE Office regarding EARF of CTIIP at 10:30AM on 09-09-2013
Vanue: Chamelee Conference Room
Attendance in the Meeting:

The following persons are present in the meeting
1. Md. Shahjahan, Addl. Director General, DOE, Dhaka. Tel:+88-02-8181767, email: shahjahan@doe-bd.org; shahjahan5519@yahoo.com
2. Dr. Sultan Ahmed, Joint Secretary, Director (Natural Resources Management and Research), DOE, Dhaka. Tel:+88-02-8181784; Cell:+88-0155-2328617, email: sulbul2002@yahoo.com
3. AKM Rafiqul Islam, Deputy Director (Reasearch and Monitoring), DOE, Dhaka
4. SM Tarique, Deputy Director (EIA), DOE, Dhaka
5. Solaiman Haider, Deputy Director (Technicl), DOE, Dhaka
6. Syed Nazmul Ahsan, Deputy Director (Environmental Clearance), DOE, Dhaka. Tel:+88-02-8181778; cell: +88-0181-9427358, email: nazmul@doe-bd.org; syednazmulahsan@yahoo.com
7. Md. Shamsuzzaman Shorkar, Asstt. Director (EIA), DOE, Dhaka
8. Shah Md. Nur-e-Huda, Asst. Director (Environmental Clearance), DOE, Dhaka
9. Ninette, Ramirez, Environmental Specialist International (Recruited by ADB), email: ninette.ramirez@gmail.com
10. Md. Yasin Mozumder, Environmental Expert (National), CTIIP, Cell:+88-0171-1665408; +88-0173-1062331, email: yasin_afroza@yahoo.com

Agenda of Discussion:
Following item are discussed:
1. Classification of CTIIP subproject components as pr ECR, 1997;
2. Nature of documentation required for the locational and environmental clearances;
3. Confirmation that conformance to ADB safeguard policies will be considered as compliance to government requirements;
4. Confirmation that no additional studies are envisaged as the environmental assessment documents have been prepared satisfying both ADB and government requirement.

Background

The Coastal Towns Infrastructure Improvement Project (CTIIP) is a key infrastructure initiative of the Government of Bangladesh. The outcome of the project will be improved access to climate-disaster resilient municipal services, including (i) municipal infrastructure such as drainage, cyclone shelters, urban roads, bridges, culverts, solid waste management, bus terminals, slum improvements, boat landings, and markets, (ii) water supply, and (iii) sanitation.

Discussion:

- A draft Environmental Assessment and Review Framework (EARF) prepared by LGED for submitting to ADB and Ms Ninette presented draft EARF.
- CTIIP, four (4) project towns (Amtali, Galachipa, Pirojpur and Mathbaria) are selected for improvement infrastructure.
- Six (6), Initial Environmental Examination (IEE), will be prepared for each project town for complying ADB Safeguard Policy.
- Ms Ninette Presented one draft sample of Water Supply component of Amtali Pourashava.

View of Additional Director General (DG) (the Chairperson):

- (i) Considering time and money, prepare one IEE/EIA Report for each project town the report may containing several sections for Identification, Assessment, Prediction of impact of each subproject components. EMP and monitoring plan should also be prepared accordingly; OR (ii) prepare individual IEE/EIA for each components subproject town, submit at a time to DOE for clearance (i.e., six IEE/EIA, six volumes at a time) for each subproject town.
- Executive Agency (EA), here DPHE and LGED, will prepare the IEE/EIA as per ECA/ECR of DOE and submit to and submit to DG for environmental clearance.
- The report should be in accordance to DOE guidelines
- Formally submit an EARF prepared for ADB through Project Director to DOE for reviewing.
- Coastal Towns (Amtali, Galachipa, Pirojpur and Mathbaria) are not situated in ecological sensitive areas or within the reserved locations..
- Finally, the DG assures providing every cooperation relating to environmental clearance.

Appendix 6: Sample Grievance Registration Form

(To be available in Bangla and English)

The _____Project welcomes complaints, suggestions, queries and comments regarding project implementation. We encourage persons with grievance to provide their name and contact information to enable us to get in touch with you for clarification and feedback.
Should you choose to include your personal details but want that information to remain confidential, please inform us by writing/typing *(CONFIDENTIAL)* above your name. Thank you.

Date		**Place of Registration**			
Contact Information/Personal Details					
Name		**Gender**	* Male * Female	**Age**	
Home Address					
Place					
Phone no.					
E-mail					
Complaint/Suggestion/Comment/Question Please provide the details (who, what, where, and how) of your grievance below: If included as attachment/note/letter, please tick here:					
How do you want us to reach you for feedback or update on your comment/grievance?					

FOR OFFICIAL USE ONLY

Registered by: (Name of Official Registering Grievance)	
Mode of Communication: Note/Letter E-mail Verbal/Telephonic	
Reviewed by: (Names/Positions of Officials Reviewing Grievance)	
Action Taken:	
Whether Action Taken Disclosed:	Yes No
Means of Disclosure:	

Appendix 7: Sample Semi-Annual Reporting Format

This template must be included as an appendix in the EIA/IEE that will be prepared for the project. It can be adapted to the specific project as necessary.

I. INTRODUCTION

- Overall project description and objectives
- Description of subprojects
- Environmental category of the sub-projects
- Details of site personnel and/or consultants responsible for environmental monitoring
- Overall project and sub-project progress and status

No.	Sub-Project Name	Status of Sub-Project				List of Works	Progress of Works
		Design	Pre-Construction	Construction	Operational Phase		
		☐	☐	☐	☐		
		☐	☐	☐	☐		
		☐	☐	☐	☐		

Compliance status with National/ State/ Local statutory environmental requirements

No.	Sub-Project Name	Statutory Environmental Requirements	Status of Compliance	Action Required

Compliance status with environmental loan covenants

No. (List schedule and paragraph number of Loan Agreement)	Covenant	Status of Compliance	Action Required

II. COMPLIANCE STATUS WITH THE ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

- Provide the monitoring results as per the parameters outlined in the EMP. Append supporting documents where applicable, including Environmental Site Inspection Reports.
- There should be reporting on the following items which can be incorporated in the checklist of routine Environmental Site Inspection Report followed with a summary in the semi-annual report send to ADB. Visual assessment and review of relevant site documentation during routine site inspection needs to note and record the following:

(i) What are the dust suppression techniques followed for site and if any dust was noted to escape the site boundaries;
(ii) If muddy water was escaping site boundaries or muddy tracks were seen on adjacent roads;
(iii) Adequacy of type of erosion and sediment control measures installed on site, condition of erosion and sediment control measures including if these were intact following heavy rain;
(iv) Are there designated areas for concrete works, and refueling;
(v) Are there spill kits on site and if there are site procedures for handling emergencies;
(vi) Is there any chemical stored on site and what is the storage condition?
(vii) Is there any dewatering activities if yes, where is the water being discharged;
(viii) How are the stockpiles being managed;
(ix) How is solid and liquid waste being handled on site;
(x) Review of the complaint management system;
(xi) Checking if there are any activities being under taken out of working hours and how that is being managed.

Summary Monitoring Table

Impacts (List from IEE)	Mitigation Measures (List from IEE)	Parameters Monitored (As a minimum those identified in the IEE should be monitored)	Method of Monitoring	Location of Monitoring	Date of Monitoring Conducted	Name of Person Who Conducted the Monitoring
Design Phase						
Pre-Construction Phase						
Construction Phase						
Operational Phase						

Overall Compliance with CEMP/ EMP

No.	Sub-Project Name	EMP/ CEMP Part of Contract Documents (Y/N)	CEMP/ EMP Being Implemented (Y/N)	Status of Implementation (Excellent/ Satisfactory/ Partially Satisfactory/ Below Satisfactory)	Action Proposed and Additional Measures Required

III. APPROACH AND METHODOLOGY FOR ENVIRONMENTAL MONITORING OF THE PROJECT

Brief description on the approach and methodology used for environmental monitoring of each subproject

- Monitoring of environmental IMPACTS on PROJECT SURROUNDINGS (ambient air, water quality and noise levels)
- Brief discussion on the basis for monitoring
- Indicate type and location of environmental parameters to be monitored
- Indicate the method of monitoring and equipment to be used
- Provide monitoring results and an analysis of results in relation to baseline data and statutory requirements

As a minimum the results should be presented as per the tables below.

Air Quality Results

Site No.	Date of Testing	Site Location	Parameters (Government Standards)		
			PM10 µg/m3	SO2 µg/m3	NO2 µg/m3

Site No.	Date of Testing	Site Location	Parameters (Monitoring Results)		
			PM10 µg/m3	SO2 µg/m3	NO2 µg/m3

Water Quality Results

Site No.	Date of Sampling	Site Location	Parameters (Government Standards)					
			pH	Conductivity µS/cm	BOD mg/L	TSS mg/L	TN mg/L	TP mg/L

Site No.	Date of Sampling	Site Location	Parameters (Monitoring Results)					
			pH	Conductivity µS/cm	BOD mg/L	TSS mg/L	TN mg/L	TP mg/L

Noise Quality Results

Site No.	Date of Testing	Site Location	LAeq (dBA) (Government Standard)	
			Day Time	Night Time

Site No.	Date of Testing	Site Location	LAeq (dBA) (Monitoring Results)	
			Day Time	Night Time

IV. SUMMARY OF KEY ISSUES AND REMEDIAL ACTIONS

Summary of follow up time-bound actions to be taken within a set timeframe.

V. APPENDIXES

Photos
Summary of consultations
Copies of environmental clearances and permits
Sample of environmental site inspection report
Others