Initial Environmental Examination

Document Stage: Final
Project Number: 39295-013
February 2017

BAN: Third Urban Governance and Infrastructure Improvement (Sector) Project – Joypurhat Water Supply Improvement Subproject (Phase 2)

Package Numbers: UGIIP-III-2/JOYP/WS/01/2016

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

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Prepared for the Local Government Engineering Department (LGED), Government of Bangladesh and for the Asian Development Bank

CURRENCY EQUIVALENTS

(as of January, 2017)

Currency Unit	=	BDT
BDT1.00	=	$0.01286
$1.00	=	BDT77.75

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 cell
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
PMO	–	project management office
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
hartal	–	nationwide strike/demonstration called by opposition parties
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	–	sub district

WEIGHTS AND MEASURES

ha	–	hectare
km	–	kilometre
m	–	meter
mm	–	millimetre

NOTES

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

PREFACE

The premises of this Initial Environmental Examination (IEE) Report are the MDS Consultant services presentation of an analysis of data and conclusions, together with its appendices.

The key elements of the IEE Report focus on: Assessment of Compliance Guidelines of Environment Safeguards according to ADB and GoB policy.

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SPECIAL THANKS
We would like to express thanks to LGED executing agency for cooperation, directions and suggestions during preparation of this Report.

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EXECUTIVE SUMMARY

1. The Government of Bangladesh (GOB) has undertaken the Third Urban Governance and Infrastructure and Improvement (Sector) Project (UGIIP-III) with financial assistance from the Asian Development Bank (ADB) ADB Loan NR-3142 BAN (SF)/1626P OFID together with co-financing from OFID to improve governance and urban service provision in selected 31 (thirty one) Pourashavas over a period of 6 years (2014 to 2020). The overall objective of the Project is the construction, rehabilitation, expansion and implementation of subprojects of essential existing infrastructure and utility facilities for the urban sector of Bangladesh; to develop a well-structured augmentation/rehabilitation program and implement according to prioritization.

2. Under the PPTA project for UGIIP-III, **Environmental Assessment and Review Framework (EARF)** was prepared and the same were endorsed by both the funding agencies and GoB to be adopted for implementation of the UGIIP-III project. The frameworks specified the screening procedures and the guidelines for identifying the APs, estimating the compensation and assistance to be paid for the losses, grievance redress mechanism, preparation of IEE and EIA and the institutional requirements for monitoring the implementation of environmental safeguard aspects of the project. The IEE for Water Supply sub-project of Joypurhat Pourashava has been prepared following the PPTA format.

3. Variety of subprojects have been undertaken under UGIIP-III, potential environmental impacts of a local nature can be expected and cover a wide spectrum. Accordingly, the criteria for selection or exclusion of sub-projects address concerns related to potential significant or irreversible negative environmental impacts.

4. Potential environmental impacts stem from poor or improper location, planning and design practice. Construction impacts in a local setting and within the local community can be significant, even though of short duration and limited extent.

5. Government of Bangladesh (GOB) law and ADB policy require that the environmental impacts of development projects be identified and assessed as part of the planning and design process and that action be taken to reduce those impacts to acceptable levels. This is done through the screening/impact assessment process, which has become an integral part of all ADB lending operations, project development and implementation.

6. The objectives of the water supply sub-project are to expand service access and improve the urban environment through a) extension and rehabilitation of transmission and distribution water supply networks; b) to augment and rehabilitate production facilities; and c) to provide equipment for metering, leak management, and operation and maintenance.

7. The Joypurhat Pourashava water supply subproject is 6 (six) components of the subproject proposed under UGIIP III. Sub-project components are (a) Installation of Test Tube wells (b) Installation of Production Tube Wells with Pump Houses and Boundary Walls c) Over head water tank d) Rehabilitation of Pump & Motor, Iron Removing Plant and Overhead Water Tank e) Construction of new water pipe line. and Construction of Service connection water meter (f) Supply of O & M tools. The Package No. is **UGIIP-III-2/JOYP/WS/01/2016**. 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. This Initial Environmental Examination (IEE) study was carried out based on the feasibility study and detailed engineering designs prepared by MDS Consultant's design section and have been finalized successful installation of test tube well with test report.

8. **Categorization:** An environmental assessment using ADB's Rapid Environmental Assessment (REA) checklist for water supply (Appendix 3) was conducted and results of the assessment show that the subproject is unlikely to cause significant adverse impacts. Joypurhat Pourashava water supply sub-project is classified as Environmental Category B

as per ADB 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.

9. The project has been classified as environment 'Category B' by criteria in the Environment Policy of the ADB and Environmental Assessment Guidelines (November 2002) as applied by the ADB Urban Development Division, South Asia Department. Category B projects are "judged to have some adverse environmental impacts, but of lesser degree and/or significance than those for category A projects." As a result "an initial environmental examination (IEE) is required to determine whether or not significant environmental impacts warranting an EIA are likely."

10. As per Government of Bangladesh Environment Conservation Act, 1995 (ECA, 1995) and Environment Conservation Rules (ECR, 1997), the subproject is categorized as "Red" and location/site clearance certificate (LCC) and environmental clearance certificate (ECC) must be obtained from the DoE.

11. DOE has issued an Environmental Clearance Certificate (ECC) for Third Urban Governance and Infrastructure Improvement (Sector) Project (UGIIP-III) vide letter DoE/Clearance/5444/2015/187 dated 02.05.2016. Accordingly, only Red Category subprojects require the Environmental Assessment process including EIA for further Environmental Clearance.

Subproject Scope: The subproject is formulated under this project to provide more accessible, reliable and climate-resilient municipal services in a holistic and integrated manner. Investments under this subproject include (i) Installation of 7 nos. Test Tube Wells of size 38mm dia. and depth 70.00m, (ii) Installation of 7 nos. PTWs of size 350mmX150mm and depth 70.00m, Construction of 5 nos. Pump house (civil, electric & sanitary) with boundary wall (iv) Mechanical works in 7 nos. Pump houses (iii) Construction of one over head tank (680 $m^{3)}$, (iv) Rehabilitation of works for 4 nos. Pump & Motor, Iron Removal Plant and one Overhead Water Tank, (v) Construction of 3500 m (225 mm Ø), 5000 m (160 mm Ø) and 27000 m (110 mm Ø) new pipe line, (viii) Supply and installation of 2500 nos. domestic water meter chamber with meter box, (ix) 2500 nos. house connection (x) Supply of 3 sets of O & M tools.

12. Considering all the above following steps were adopted by the MDS Consultant's team for Environmental Safeguard compliance –

I. Review of the available Environmental safeguard documents and categorization of the project as per ADB and GOB guidelines.
II. Separate Consultation with MDS team members, PMO staffs and PIU staffs to explain the importance of the safeguards.
III. Separate Workshop on safeguard policies for all Municipal Engineers, EE and AE of all the Pourashavas under UGIIP-III
IV. Screening and re-categorization of each and every scheme with the help of REA checklist transect walk and public consultation for individual schemes during visit to individual project scheme sites.
V. Preparation of sector subproject IEE and EIA for each sector subproject for each Pourashava.
VI. Preparation of TOR for conduction of EIA to get environmental clearance from DOE, GOB for Red category projects.

13. **Implementation Arrangements:** Local Government Engineering Department (LGED) and Department of Public Health Engineering (DPHE) are the executing agency (EA). LGED is responsible for providing support and guidance to Pourashavas concerning performance

criteria and pourashava development planning. Department of Public Health Engineering (DPHE) will provide support in water supply and sanitation schemes. Implementation activities will be overseen by a Project Management Office (PMO). The participating Pourashavas are the implementing agencies, with a Project Implementation Unit (PIU) within the Pourashava structure. Consultant teams are responsible for (i) detailed engineering design, contract documents preparation and safeguards facilitation; (ii) project management and administration support; (iii) assistance in supervising construction; (iv) strengthening of local governance, conducting required studies/surveys and (v) awareness raising on behavioral change in water, sanitation and solid waste management activities.

14. **Description of the Environment:** Subproject components are located in Joypurhat Pourashava core area or in its immediate surroundings which were converted into urban land use for recent years and there is no natural habitat left at these sites. The laying of pipeline components is located in existing road right of ways (ROWs) and government/ Pourashava owned land. There are no protected areas, cultural heritage site, wetlands, mangroves, or estuaries in or near the subproject location. There are no forest areas within or near Joypurhat Pourashava.

15. **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) grievance redress mechanism. A number of impacts and their significance were reduced through mitigation measures in the detailed design stage. The EMP will form part of the civil work bidding and contract documents.

16. Locations and sitting of the proposed infrastructures were considered to further reduce impacts. The concepts considered in design of Joypurhat Pourashava water supply subproject are: (i) locating facilities on government/pourashava owned land to avoid the need for land acquisition and relocation of people; (ii) demand for new piped water supply; (iii) maximum population coverage with pipe layout mostly in residential areas and areas of high growth rate; (iv) avoidance of water-use conflicts; (v) locating pipelines within right of way (RoW) to reduce acquisition of land; (vi) locating pipelines at least 10 meters from latrines, septic tanks and any main drains to avoid contamination; and (vii) 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. Water pipe laying works should be coordinated with road improvement works to minimize disturbance.

17. MDS design team integrate a number of measures, both structural and non structural, to mainstream climate resilience into the Joypurhat water supply subproject, including: (i) structural protection of facilities of future floods; (ii) location of components where there is no risk of flooding or other hazards; and promote more efficient use of water by reducing losses and wastage to counter increased demands due to higher temperatures. 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.

18. Key construction phase impacts identified and addressed in the IEE include (i) air, noise and vibration impacts due to construction vehicles, equipment and machinery in the vicinity of construction site and inhabited sections; (ii) management of spoils due to excavation for distribution network and civil works; (iii) safety measures during construction; (iv) traffic diversions; (v) management of sites temporarily used for construction activities, including borrow areas, construction camps, etc. and rehabilitation of the sites after completion of temporary use; (vi) impacts on community health and safety hazards posed to the public, specifically in inhabited areas.

19. In the operational phase, all facilities and infrastructure will operate with routine maintenance, which should not affect the environment. Facilities 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.

20. Mitigation measures have been developed to reduce all negative impacts to acceptable levels and will be assured through a program of environmental monitoring. The monitoring program will include observations on and off-site, document checks and interviews with workers and beneficiaries. The PMO will submit semi-annual monitoring reports to ADB which will include a detailed review of EMP implementation, including corrective actions taken.

21. **Consultation, Disclosure and Grievance Redress:** 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 Pourashava and will be disclosed to a wider audience via the ADB and LGED project 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.

22. **Monitoring and Reporting:** The PMO, PIU (Joypurhat Pourashava) and Management Design and Supervision Consultants (MDSC) will be responsible for safeguard monitoring. The MDSC will submit monthly monitoring reports to PMO, and the PMO will send semi-annual monitoring reports to ADB. ADB will post the semi-annual environmental monitoring reports on its website as part of its disclosure requirements.

23. **Conclusion and Recommendations:** The citizens of Joypurhat Pourashava will be the major beneficiaries of this subproject. With the introduction of water supply system, they will be provided with a constant supply of better quality water piped into their homes and climate-resilient municipal services. In addition to improved environmental conditions, the subproject will reduce occurrence of water-related diseases. 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. There will be no significant adverse impacts. The potential impacts that are associated with design, construction and operation can be mitigated to standard levels without difficulty through proper engineering design provided that the EMP is included in the contract document and its provisions implemented and monitored to their full extent.

24. 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

A. Purpose of the Report

25. Bangladesh has a population of approximately 162 million and has experienced increased rapid urbanization with the growth of many secondary towns over the last three decades. About 28 per cent of the total population now lives in urban areas where the population growth rate is much higher than the overall national growth rate. With the present high increase-trend in urban population, it is justifiably anticipated that by year-2020, such populace will constitute nearly 40 percent of the national aggregate. One principal cause of such rapid growth is the presence of better opportunities spanning economic, communication, education, health and other social aspects in the urban areas. It is worth noting that by one account, in countries of Bangladesh's standing, around 55-60% of a country's aggregate economic activities takes place within the urban confines.

- These municipalities include: Three (3) sample PSs are : 1) Naogaon 2) Magura and 3) Lalmonirhat
- Seven (7) non-sample priority PSs are: 4) Kishoregonj, 5) Muktagachha, 6) **Joypurhat**, 7) Sherpur, 8) Bera, 9) Charghat and 10) Rajbari.
- The remaining twenty one PSs (target PSs) are: 11) Chapai Nawabgonj, 12) Habigonj, 13) Moulvibazar, 14) Laxmipur, 15) Chhatak, 16) Joypurhat, 17) Laksam, 18) Shahjadpur 19) Rangamati, 20) Ishwardi, 21) Meherpur, 22) Nabinagar, 23) Panchagarh, 24) Jessore, 25) Bandarban, 26) Khagrachhari, 27) Kotalipara, 28) Nilphamari, 29) Chuadanga and 30) Benapole 31) Tungipara.

26. The Local Government Engineering Department (LGED) and the Department of Public Health Engineering (DPHE), both under the Local Government Division (LGD) of the Ministry of Local Government, Rural Development and Cooperatives (MLGRD&C) and having extensive experience in managing urban and water supply projects financed by ADB, will be the executing agencies of the project.

27. Joypurhat water supply improvement subproject is one of the subprojects proposed under UGIIP-III. 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).

28. **Categorization:** An environmental assessment using ADB's Rapid Environmental Assessment (REA) checklist for water supply (Appendix 3) was conducted and results of the assessment show that the project is unlikely to cause significant adverse impacts. Joypurhat water supply improvement subproject is classified as environmental category B as per ADB SPS. 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.

B. Project Types Identified for Implementation

29. Infrastructure subprojects proposed under UGIIP-III encompass a variety of types of urban infrastructure and services including those shown in Table 1.

Table 1: Subprojects and Components Proposed in UGIIP-III

Water Supply	Source Augmentation	Deep Tube Wells (Hand Pump)
		Deep Tube Wells (Production Pump
	Distribution	Piping, Valves and Fittings
	Treatment	Water Treatment (Iron and Arsenic Removal)
	Storage	Elevated Tank
	System improvement	Repair/Replacement of Lines
		Bulk Water Meters
		Domestic water meter
Sanitation	Community Facility	Community Toilets
	Public Facility	Public Toilets
	Septic tank	Vacuum Units
Solid Waste Management	Disposal/waste collection	Disposal Alternatives
		Neighbourhood Collection
	Waste transfer	Community Storage Bins
		Dump Trucks/Rickshaw
	Waste disposal	Transfer Station
		Access Road to Landfill
		Landfill Facility
		Treatment/Composting
Urban Drainage	Roadway Drainage	Roadside Drains
	Area drainage	Outfall
		Main Drain
		Secondary and Tertiary Drains
		Retention Pond
Urban Transport & communication	Roadway Provision	Bridge Replacement Drainage/Culverts
		Roadway Widening/Resurfacing
Slum	System improvement	Repair/Replacement of Lines
	Community Facility	Community Toilets
	Septic tank	Vacuum Units
Public use facilities	Municipal facilities	Market/Community Centres
		Municipal and Kitchen Markets
		Improvement of Slaughterhouses
		Bus and Truck Terminals

Potential Impacts from Activities

30. A Sector Initial Environmental Examination (SIEE) has been conducted for the overall UGIIP-III project and IEEs was prepared for each of the PS subprojects individually. The SIEE sought to identify any regional and cumulative impacts that may result from the sector intervention. Cumulative impacts were all in the social or human development sphere of the environment, and all were found to be positive. No direct cumulative or regional potential negative impact of the project activities on environmental resources and values was detected.

31. From the variety of subprojects undertaken under UGIIP-III, potential environmental impacts of a local nature can be expected and cover a wide spectrum. In general these were determined not to be significant or irreversible, and precautionary measures have been taken (and incorporated into guidance, management plans and implementation frameworks)

to avoid or reduce them. Even the criteria for selection or exclusion of subprojects address potential significant or irreversible negative environmental impacts.

32. The ADB has categorized UGIIP-III project as Category B and following its normal procedure has determined that an IEE will be conducted for each municipality subproject submission. The impacts of subprojects will be assessed according to 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.

33. UGIIP-III the impact will be improved living environment in project towns. The outcome will be improved municipal service delivery and urban governance in project towns. Project towns are pre-selected 31 towns to be supported in an integrated manner under the project. UGIIP-III will improve existing and provide new municipal infrastructures including (i) roads; (ii) drainages; (iii) water supply system; (iv) solid waste management facilities; (v) slaughterhouses; (vi) markets, community center/auditorium, bus and truck terminals and river ghats; (vii) public toilets; and (viii) others such as provision for street lighting and improvement of slums.

C. Extent of the IEE Study

34. Government of Bangladesh (GOB) law and ADB policy require that the environmental impacts of development projects are identified and assessed as part of the planning and design process, and that action is taken to reduce those impacts to acceptable levels. This is done through the environmental assessment (EA) process, which has become an integral part of lending operations and project development and implementation.

II. POICY, LEGAL AND ADMINISTRATIVE FRAMWORK

A. ADB Policy

35. 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 ADB investments.

36. **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 4(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.

37. **Environmental Mmanagement 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.

38. **Public disclosure:** ADB will post the following safeguard documents on its website. Relevant information from these documents will also be disclosed in local communities in a form and language understandable and accessible to the public.

(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 Office (PMO) during project implementation upon receipt.

B. GOB National Policy

39. 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).

40. Table 2 presents specific requirements for the Joypurhat Pourashava Water Supply subproject. Provides the environmental standards for air, surface water, groundwater, drinking water, emissions, noise and vehicular exhaust.

Table 2: Applicable Government of Bangladesh Environmental Legislations

Legislation	Requirements for the Project	Relevance
Environmental Conservation Act of 1995 and amendments in 2000, 2002 and 2010	• 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.
Environmental Conservation Rules of 1997 and amendments in 2002 and 2003	• Environmental clearances • Compliance to environmental quality standards	The subproject is Categorized as Orange-B and requires Location Clearance Certificate (LCC) and Environmental Clearance Certificate (ECC). All requisite clearances from DoE shall be obtained prior to commencement of civil works.
Forest Act of 1927 and amendments (2000)	• Clearance for any felling, extraction, and transport of forest produce	Considered in subproject preparation and implementation.
Bangladesh Climate Change Strategy and Action Plan of 2009	• Ensure existing assets 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 and implementation.
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	Considered in the EMP.

C. Government of Bangladesh Environmental Assessment Procedures

41. Under ECA, 1995 and ECR, 1997 industrial units and projects are classified into four categories according to “their site and impact on the environment” and size of investment, and each category (Green, Orange-A, Orange-B and Red) requires a different level of environmental assessment as a prerequisite for the Department of Environment (DoE) in granting the LCC and ECC that allow the project to proceed.

42. As per Schedule 1 of ECA, 1995 Joypurhat water supply subproject is likely to be classified as red category (Table 3). Thus LCC and ECC are required from the DoE prior to commencement of the subproject.

Table 3: Likely Government of Bangladesh Classification of Joypurhat Pourashava Water Supply Subproject

Subproject	Component	Equivalent in Schedule I of ECR	DoE Classification
Water Supply	Source augmentation (includes tube wells, surface water intake, overhead or ground reservoir, pumps and pump house, water treatment plant [WTP] or chlorination facility)	Engineering works (up to 10 hundred thousand Taka capital	Red as per preliminary quantity and cost estimate, Joypurhat water supply subproject is BDT 116.78 million
	Water transmission (includes pumping main, overhead reservoir, or pumps and pump houses)	Water, power and gas distribution line laying/relaying/extension.	Red
	Network installation/ improvements (include ring main, distribution/ carrier mains, bulk valves and flow meter, household connections or household meters)		
	Secondary network (includes secondary drains) and tertiary network (includes main drains and drainage outfalls)		

43. Rule 7 of the ECR, 1997 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 (ToR) for the EIA; 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).

44. DoE has 60 days to respond to receipt of the ECC application for a Red category subproject.

III. DESCRIPTION OF THE SUBPROJECTS

A. The Study Area

45. Joypurhat Pourashava is located at 25°06′N 89°02′E. Joypur was named after the name of king Joypal and there was a hat named Gopendragonj hat. During British period this hat was named Joypurhat and there was a famous railway station there. Joypurhat, during undivided Bengal, was in Panchbibi thana under Bogra district. Afterwards was created as new thana and was included in Bogra district. Considering the importance of the Thana, Joypurhat, later on was upgraded to sub-division and after independence of Bangladesh, Joypurhat Pourashava was created in 1975 as Class- C Pourashava with 20.72 sq. kilometer area. It was upgraded to Class-B Pourashava in 1987 and to Class-A Pourashava in 1991. The Pourashava is situated in Rajshahi Division at the north-west side of Bangladesh. The Pourashava is constituted with 9 wards. Total population of Pourashava is 69033 of which 35278 is male and 33755 female. Present area of the Pourashava is 20.72 square kilometer. The town is a business centre. The river Jamuna (chhoto) passes by it. The Pourashava is free from flooding due to flood protection embankment. The Pourashava is well connected with other parts of the country with roads and railways including Capital City of Dhaka. There is no land use map for the Pourashava. However, the preparation of master plan is going on under District Towns Infrastructure Development Project (DTIDP). 35% of the land area is still under cultivation, 44.79% land is being used as homestead for residential purpose. The rest area is business centre and water bodies.

46. Subproject components are located in Joypurhat Pourashava 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 Joypurhat Pourashava. The location map is shown as Figure 1.

B. Indigenous People Safeguard

47. Indigenous People Planning Framework (IPPF) is required to provide guidance and appropriate mitigation measures to the ethnic minority (advise). Out of 31 Pourashavas taken up under UGIIP-III, there is possibility of affecting indigenous people only in Bandarban, Rangamati, Khagrachari, Moulavibazar, Sherpur, Panchagarh, Muktagachha and Chapai Nawabgonj Pourashava etc. The project activities are located only within the urban areas and no ethnic communities/indigenous people's communities will be affected by the project activities. So preparation of Indigenous People Plan (IPP) document following IPPF will not be required.

C. Existing Condition and Need for the Project

48. Joypurhat Pourashava is a category – A Pourashava. The PS's Water Supply System was started jointly in 1982 under DPHE and the Pourashava. Later on the supply system was developed under Secondary Towns Water Supply and Sanitation Project (STWSSP), in the years 2012-2014 and gradually handed over to PS. Since then the Pourashava has been maintaining the water supply system.

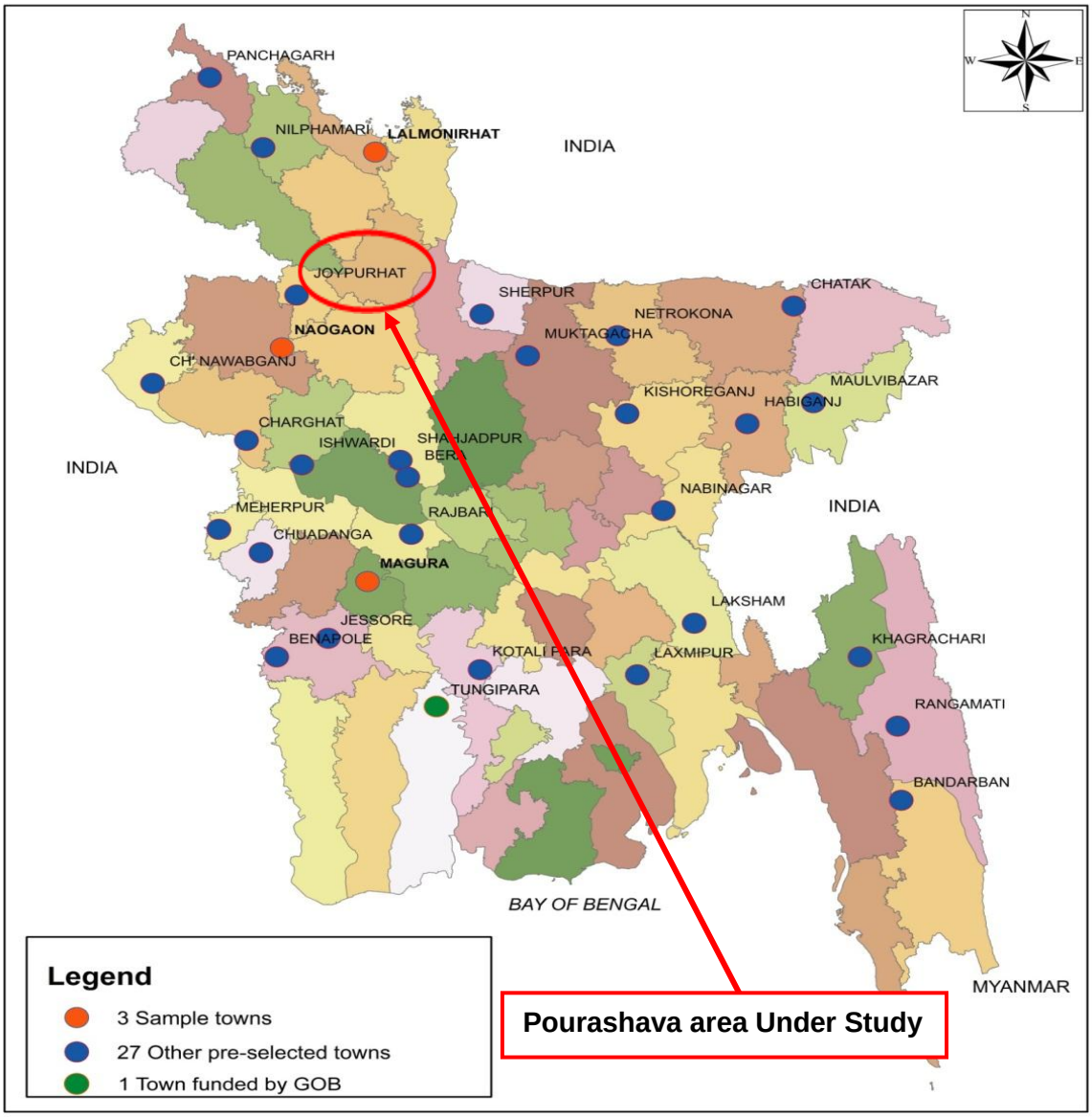


Figure 1: Pourashava under UGIIP –III

49. There were 10 nos. of PTW installed in the Pourashava. At present only 07 PTWS are functioning. Average production per day is 5,800 m^3. Average operational hour is 11 hours per day. Around 60 kilometers of total pipeline diameter ranging from 100 mm to 300 mm is available in the PS. Out of which around 14.0 km is transmission and remaining 46.0 km is distribution pipeline. Different type of service connections is exist in the Pourashava sizes ranging from 13 mm to 25 mm. Total no. of service connections are 3,900, out of which 3,679 is domestic and 221 nos. are commercial connections. Both metered and non-metered typed connections are found in the Pourashava during field visit of MDS consultants. 2,100 nos. of connections are metered and 1,800 nos connections are without meters. 3 nos. of street hydrants also exist in the Pourahava. However, 2,500 new service connection (including 1,800 connection without meter) will be constructed with meter. Efficiency of existing 04 nos. submersible pump are decreasing day by day . Filter bed sand condition of IRP is not up to the mark. Some repair and maintenance works also is required. So, Pourashava has given priority in improvement or rehabilitate of water supply component. Existing water supply system of Joypurhat Pourashava is shown in Figure 2.

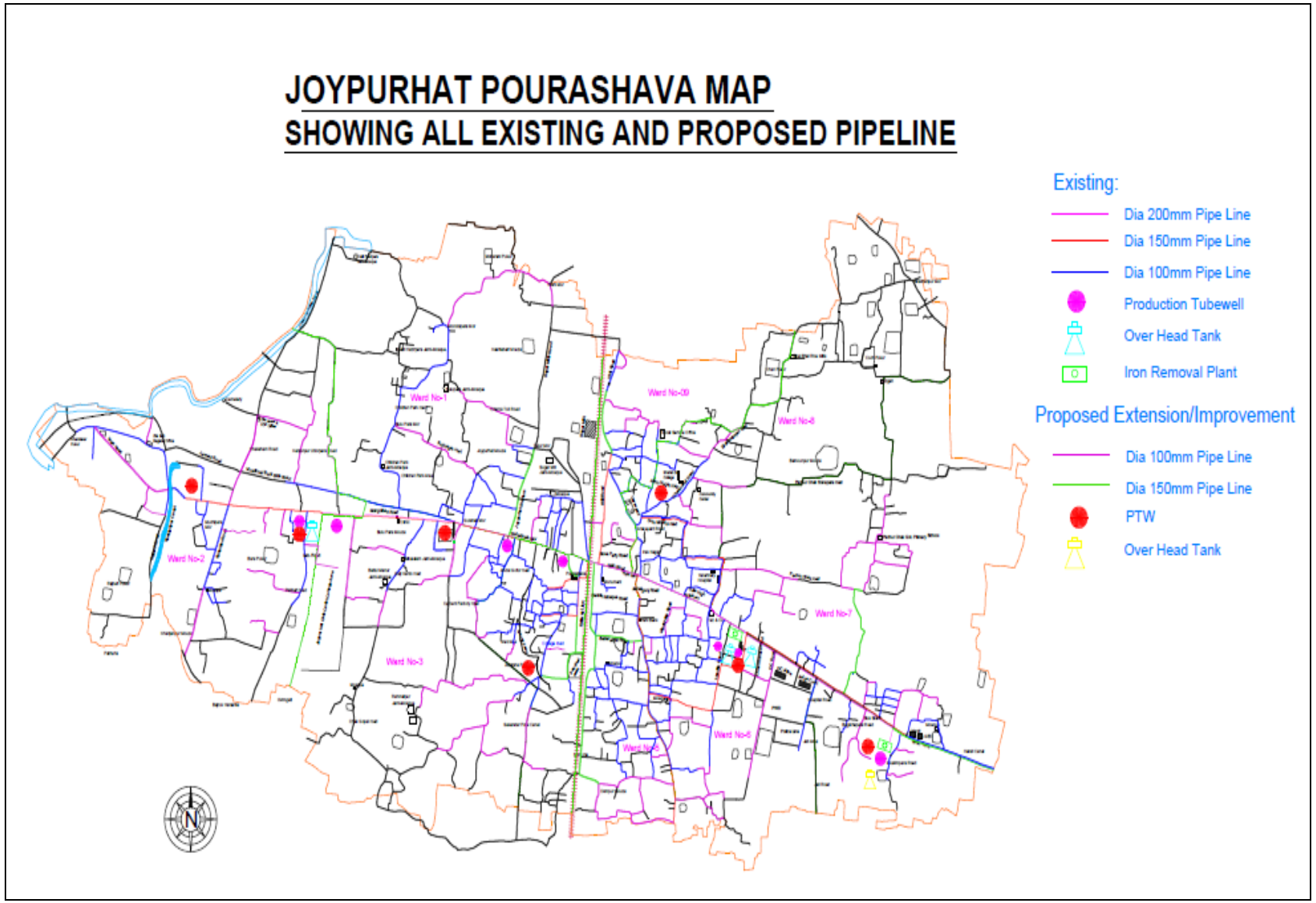


Figure 2: Existing and Proposed WS sub-project in Pourashava under UGIIP–III

50. **Area and Population**: With an area of 20.721km2, Joypurhat PS currently (2011) has a population of 69.033 (ref table below) and a density of 3,332 per km^2. It has 9 wards in the Pourashava. The projected population of the PS by 2030 will be 104,382 at assumed growth rate of 2.2%.

51. The rate of increase of population is 2.20% (BBS 2008) which is higher than the national rate of increase of 1.39% (BBS 2008). Density of population is 3332 persons per sq. kilometer and the number household is 16,555.

52. Ward-wise distribution of households, along with average size and population of Joypurhat Pourashava is presented in the following Table 4.

Table 4: Demographic Information of Joypurhat Pourashava

Ward No.	Area (Km^2)	No. HH	Popul'n	HH/ Km^2	Pop'n/ Area (per Km^2)	Ward area/ Total area	Remarks	Population of core area	Area of core area
1	3.64	2277	8,806	626	2419	0.390	Non- Core area		
2	3.63	1536	6,107	423	1682	0.389	Non- Core area		
3	2.41	1583	6,668	657	2767	0.258	Non- Core area		
4	0.94	1770	7,876	1883	8379	0.101	Core area	7,876	0.94
5	1.88	1994	9,088	1061	4834	0.201	Core area	9,088	1.88
6	1.41	1825	8,086	1294	5735	0.151	Core area	8,086	1.41
7	3.46	2242	8,759	648	2532	0.370	Non- Core area		
8	2.03	1689	6,709	832	3305	0.217	Non- Core area		
9	1.32	1639	6,934	1242	5253	0.141	Core area	6,934	1.32
Total	20.72	16555	69033		3,332	2.218		31,984	5.55

Note: Wards with HH density lower than the PS average (946 HH/km^2) has been considered to be non-core.

53. Total Non-core area: 15.17 sq km (around 74.00% of total area), total Core Area: 5.55 sq km (24.00% of total area); percentage of total population in non-core area 54 % of total population; percentage of total population in core area 46%; percentage of total HH in non-core area 56% and % of total HH in core area 44%. Ward no. -4,5,6 and 9 is under core area. (core area according to density of population). Although only 03 wards are under core area, but existing water supply coverage is 4,5 ,6 and 9 (50-70%) and 1,2 and 7 (partially). There is no piped water supply existed in the ward No. 3 and 8.

54. **Water Source:** The current source of piped water supply of Joypurhat Pourashava is based on ground water resources. Groundwater of sufficient quantity in the shallow aquifer is available within the area. The good potential abstraction rate has made the aquifer suitable as source for the town water supply. Several hydrological investigations (test boring) were carried out in Joypurhat under Secondary Towns Water Supply and Sanitation Sector Project (STWSSP) of DPHE. The investigation includes preparation and analysis of the bore logs of 04 (four) test wells at different locations (DPHE Bhaban, Bus Terminal, East Side of Khanjanpur Field and OHT Site). The borehole depths are 205ft, 228ft, 223 ft and 229 ft (within 62.5m to 70m) below ground level. From the bore logs, it is seen that aquifers of course sands are encountered at the depth between 110ft to 223ft (33.5m to 68m) below ground level. The aquifers at these stratums contain sufficient groundwater that can be harnessed through production wells for domestic water supply of the PS.

55. **Water Well and Production:** There are altogether 10 production tube wells (PTWs) in Joypurhat PS, of which 04 were constructed between 1982 – 1999, 02 PTW has been installed in 2006 and the remaining 4 have been constructed under STWSSP of DPHE in 2012. Out of previous 04 PTWs, only 02 PTWs are in running condition. All the new production wells are in good functional state except 01 PTW location is far distance from the IRP. This PTW is out of operation. 02 PTWs are not functioning due to filter damaged and housing broken. Detailed of PTWs are presented in Table 5.

Table 5: Details of Existing PTWs – Joypurhat Pourashava

Sl No.	Location of wells	Year of installation	Type of pump and motor	Well casing		Lower casing		Present condition
				Dia (mm)	Depth (m)	Length (m)	Dia (mm)	
01	Masua Bazar	1982	Turbine	350x150	40	20	150	Functioning
02	Upazila Complex	1999	Turbine	350x150	40	20	150	do
03	Upazila compound	2006			38	20		
04	Shaheb para more	2006	do	350x150	40	18	150	do
05	Bus terminal AIRP compound	2012	do	350x150	40	20	150	do
06	DPHE office Compound	2012	do	350x150	38	20	150	do
07	Khanjanpur High School field	2012	do	350x150	40	20	150	do
08	C.O. Colony IRP compound	1983	do	350x150	40	20	150	Not functioning due to filter damaged
09	DC Dormitory	1999	do	300x150	38	18	150	Not functioning due to filter broken
10	Khanjanpur High school more	2012		350x150	40	20	150	Iron concentration is high and located at far distance from IRP

56. **Water Quality:** Reiterating, groundwater is the source of water supply in Joypurhat PS. Water quality of production wells (04 newly installed) of Joypurhat PS was analyzed under Secondary Town Water Supply and Sanitation Sector Project (STWSSP); The samples were subsequently sent to the DPHE Zonal Laboratory, Rajshahi for testing. The results is given in the Table 6 below:

Table 6: Water Quality Test Results

Sl No.	Location	Parameters		
		Arsenic (Mg/l)	Iron (mg/l)	Manganese (mg/l)
1	Masua Bazar	0.01	1.3	1.4
2	Shahebpara more	0.05	0.85	0.7
3	Khanjanpur High School field	0.05	1.0	0.25
4	Bus terminal AIRP compound	0.01	0.3	0.20
5	Upazila IRP compound	0.01	0.4	0.20
Bangladesh Standard		0.05	0.3-1.0	0.1

(Source: Pourashava Data)

57. The test results shows that Iron and Manganese concentration of the tested Test TWs is little bit higher than acceptable limit for water supply. So, logically groundwater is supposed to be used as the only potential source with proper Iron treatment for water supply in the Joypurhat Pourashava. However, there are two IRPs existed in the PS. Presently water supply carried out with treatment.

58. **Storage Capacity of the Pourashava for Water Supply:** The water storage are normally needed to balance supply and demand in the long term and to provide water for meeting emergency needs. It helps storage build-up in the idle period i.e. less demand time and as well satisfies peak demand. Regarding their location, ideally OHTs are located in a way so that areas of high. Overhead Tanks (OHTs) in the serving system are provided for two primary purposes:

- Balancing storage, to balance out fluctuation in demands throughout the day, and,
- Emergency storage, to be used in case of a failure in the supply of water to the OHT.

59. There are 02 OHTs have been constructed under DPHE Projects in Upazila compound and Khanjanpur High School in the year 1998 and 2014. Capacity of OHTs are 450 m^3 and 680m3 respectively.

60. Usually requirement of the storage is 22%-40% of daily demand. Total daily demand of the PS in the year 2025 is 8,634 m3. 22% of demand=8,634X22%=1,900. Available storage is 1,130 m3. So, 01 OHT (capacity 680 m3) is proposed for the PS under this project.

61. **Pipe Network:** 30% of water supply coverage of the PS is established by 60.0 km pipeline. Both transmission and distribution pipe network is existed in the PS. Diameter of the existing pipeline ranging from 110mm to 300mm. The status and the inventory of pipeline is summarized in below in Table 7.

Table 7: Details of Existing Pipeline Network

Type:	**Diameter (nominal outside)**					
Distribution pipeline	300mm	280mm	225mm	160mm	110mm	**Total**
Length (km)	-	-	1.80	4.70	39.46	45.96
Transmission pipeline	300mm	280mm	225mm	200mm	100mm	
Length (km)	0.042	0.073	9.215	4.4	----	13.73
Total						59.69

62. **Service Connections and Tariff System:** During the field visit of the MDS Consultants, it has been found that there are total 3,900 nos. of service connections are existed in the PS. Out of which 3,679 are residential and remaining 221 are commercial. 03 street hydrants also is existed in PS. Both metered and non-metered type connections are found in the PS. Volumetric and fixed tariff system is running in the PS. The Detail of service connection presented below in the table 8.

Table 8: Details of Service Connections – Joypurhat Pourashava

Type of service connections	13mm		20mm		25mm		Grand total
	Metered	Non-metered	Metered	Non-metered	Metered	Non-metered	
Residential	1,159	1,150	762	515	55	38	3,900
Commercial	60	50	48	35	16	12	
Total	1,219	1,200	810	550	71	50	

Source: PS office

63. **Present Manpower Resources of Water Supply Section:** Water Supply unit is separated from PS office. Water Superintendent is the head of this section. Present time this position officially has been changed and named Assistant Engineer, Water Supply. Under the Assistant Engineer, Water Supply, there are another 22 persons are working in the water

supply section. They are bill clerk, computer operator, tube-well mechanic, pipeline mechanic, pump operator, night guard and MLSS. The average monthly salary cost of water supply staff for last 03 (three) fiscal years (2011-2014) is about 2.02 lakh.

64. The current manpower list of the water supply section of the PS is presented below in the Table 9.

Table 9: Manpower List of PWSS – Joypurhat Pourashava

Sl No.	Designation of the personnel	Number
01	Assistant Engineer, Water Supply (Water superintendent)	01
02	Accountant	01
03	Bill clerk	02
04	Bill distributer	04
05	Computer Operator	02
06	Tube-well mechanic	02
07	Pipeline mechanic	02
08	Pump operator	07
09	Night Guard	02
10	Peon/MLSS (Office assistant)	01
Total		**24**

Source: PS office

65. **Income and Expenditure Statements of Pourashava regarding Water Supply:** As described above that both metered and non-metered water tariff systems are available in the PS. For non-metered connections billing is based on fixed tariff rates which is depending on the diameter of the service connection. Billing is done regularly and all billing systems are computerized. No cash payment is acceptable, all consumers pay their bill in local bank. The water supply section maintains its accounts separately and revenue generated goes directly to a separate account of the water supply section.

66. Pourashava maintains their all electricity bill, salary for WS section and Operation, repair & Maintenance expenditure by this revenues.

67. It has been seen in the above table that almost 50% of total expenditure for water supply belongs to salary of WS staff. Due to increase the no. of PTW, personal cost and O & M cost also will be increased in future. Average last 03 years expenditure is lower than the average income. This is a good sign for water supply. So, for smooth functioning of the Water supply system, efficiency of revenue collection should be increased day by day. A part from that, water tariff should be adjusted based on affordability and commitment to provide better service to the consumers.

D. Proposed Components

68. The interventions to improve water supply system and increase service coverage have been proposed based on the results of field investigations, analysis and review of the status of current water supply system and water demand projection for the year 2030. The interventions proposed for improvement of existing water supply status in Joypurhat is presented in the following paragraphs:

69. For Water Supply, the design standards/practices and fundamentals of design adopted for preliminary design/or will be adopted during detail design of proposed water supply interventions is presented in Table 10.

Table 10: Design Considerations/Standards for Water Supply

Sl. No.	Key Design Consideration	Proposed Design Considerations/Standards
1	Project Horizon of the Design period	15 Years
2	Population Projection	Projected up to yr 2030 (BBS statistics and growth rate used)
3	Key Considerations for Water Demand Calculation	• Population projection 2030 • Water Supply Coverage: 70-75% of total population (by 2030) Population Served by Individual House / Service Connections: 90% • Per Capita Water Demand: 90 – 100 lpcd (liter per-capita per-day) • Non-domestic Consumption: 10% • Non-revenue Water (NRW): 40-20% (current estimate: 40% if data are not available; design target: 20% or less) • Seasonal Peak Factor: 1.15
4	Water Production	• Calculation of total water demand for projected population until 2030 • Estimation of present water production in PS • Estimation of shortage of water production • Proposal for water production units (PTW) with capacity
5	Preliminary Design	• Preliminary design of water supply system, which includes: 1. Replacement of smaller diameter pipelines 2. Locating probable washout points in the system 3. Recommendations on: carrying out cleaning, leak detection and repair activities in the system • Preliminary design entailing adaptation of service zones in the system • Identification of flaws in the production wells and recommendations on remedial measures and switching to volumetric tariff collection • Use of Un-plasticized Polyvinylchloride (UPVC) pipes • Multi-jet water meter of metrological class C as per ISO standard 4064
6	Climate-related considerations for water supply infrastructure	• Production well: 1. Upper well casing will be extended vertically by 0.75 m from highest flood level (HFL) 2. Pump-house – plinth level to be raised by 0.3 m from HFL 3. All electrical control panel will be set at least 0.75 m above HFL • OHT 1. At least 15% extra reinforcement to be provided in the structure to make it better stand the impact of cyclone and very heavy wind • Intake 1. Water intake sources will be identified ensuring the salinity level to remain within acceptable limits 2. Treatment Plant compound will be protected by embankment of which crest level will be at least 0.75 m above HFL

70. **Population and Water Demand Projection of Joypurhat Pourashava:** Using the suggested method by J. Von. Hardenberg; known as empirical (geometrical progression) method and using the census reports, the average annual population growth rate in Joypurhat PS during 1991 – 2001 and 2001 – 2011 are 1.24 and 2.2 respectively. Assumed that in the year 2030, growth rate will be 2.2%, projected population and also water demand of Joypurhat Pourashava is given below in Table 11 and Table 12.

Table 11: Population Projection Data – Joypurhat Pourashava

Population Projection (Joypurhat Pourashava)					
Growth rate= r		2.20			
W-No	Population 2011	Population 2015	Population 2020	Population 2025	Population 2030
1	8806	9,607	10,711	11,942	13,315
2	6107	6,662	7,428	8,282	9,234
3	6668	7,274	8,111	9,043	10,082
4	7876	8,592	9,580	10,681	11,909
5	9088	9,915	11,054	12,325	13,742
6	8086	8,821	9,835	10,966	12,226
7	8759	9,556	10,654	11,879	13,244
8	6709	7,319	8,160	9,099	10,144
9	6934	7,565	8,434	9,404	10,485
	69033	**75,311**	**83,968**	**93,620**	**104,382**

Table 12: Water Demand Projection – Joypurhat Pourashava

Water Demand Projection					
Growth rate	2.20				
Parameters	2011	2015	2020	2025	2030
Population	69,033	75,311	83,968	93,620	104,382
Per capita demand (lpcd)	80	85	90	90	100
Water supply service area population (% of total population)	20	30	75	75	75
Water supply service area population No.	13,807	22,593	62,976	70,215	78,286
People using the service (% of service area)	70	75	90	90	90
People using the service (No.)	9,665	16,945	56,679	63,194	70,458
Daily domestic demand .DD,m3	773	1,440	5,101	5,687	7,046
Demand other than domestic demand,NDD,m3/d (10% of domestic demand)	77	144	510	569	705
Total demand, TD (m3/d), DD+NDD	850	1,584	5,611	6,256	7,750
Leakage, wastage etc-NRW (20% of TD)	170	317	1,122	1,251	1,550
Average Daily water demand (m3/d), ADD=TD+NRW=	1,021	1,901	6,733	7,507	9,300
Seasonal peak factor	1.15	1.15	1.15	1.15	1.15
Maximum Daily Demand (m3/d)=ADD x seasonal peak factor	1,174	2,186	7,743	8,634	10,695

71. **Production Tube Well:** Existing PTWs at Old AIRP Compound and Khanjanpur bazar OHT compound has been abandoned due to damage of filter. Pourashavaha decided to install 02 (two) PTWs in these location. To fulfill the water demand, 05 more PTWs will be needed to install. 07 Test TWs also need to install to get the actual litho logy and water quality of groundwater.

72. 05 new production wells has been proposed to be constructed in the Pourashava. The location of the PTWs is (i) Bus Terminal (ii) Truck Terminal (iii) Gulshan Moar (iv) Khanjanpur Bazar High School moar (v) Notun Goruhati. Water will be abstracted by submersible pump.

73. The tentative design of the proposed PTWs is based on the results of existing test boring, water quality, physical observation and discussion with local DPHE office. The final design for the production will be completed based on proposed Test TW with acceptable test result and depth of available water source. The design for the PTW will be finalized as per instruction in BoQ and technical specification.

74. **Construction of Pump House:** Pump houses in Old AIRP Compound and Khanjanpur bazar OHT compound are found in good condition during field visit of MDS Consultants. 05 new pump houses are required to construct in the remaining sites. Other related works like boundary wall, installation of pump-motor, electrical works etc. also will be required. Pump house of size 5.05m x 3.30m or 15 Sqm. is considered for each PTW site made of RCC column based brick structure with RCC slab.

75. **Construction of New Overhead Storage Tank:** Water storage are normally needed to balance supply and demand in the long term and to provide water for meeting emergency needs. Optimum quantity of storage of water should be at least 22% of total daily demand. 02 existing OHT is constructed in the pourashava with total capacity of 1,130m^3, which is only 13% of total daily demand of the year 2025 (8,634 m^3). So, a new OHT is urgently required to be constructed for proper supply and distribution of water to the city dwellers in a fixed pressure head. An OHT (Capacity 680 m^3) is proposed under this project at Dhaka Bus Stand.

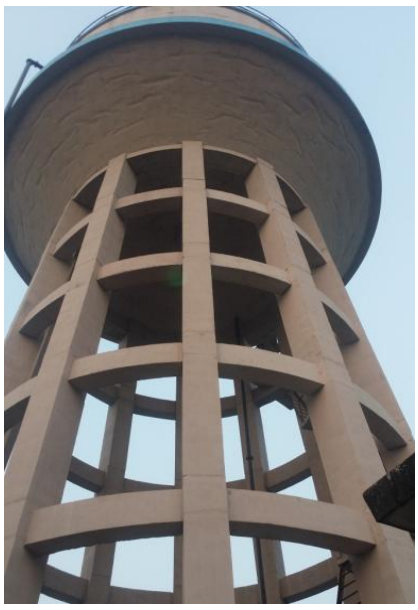


Figure 3: Existing Overhead Tank in Joypurhat Pourashava

76. **Rehabilitation Work:** There are some rehabilitation and repair work is needed to be implemented in the PS. Replacement of sand of filter bed of AIRP, supply and installation of 04 nos. submersible pumps in place of turbine and submersible pump of old PTWs including mechanical and electrical works. Repair of existing OHT also have been proposed.

77. **Expansion of Pipeline Network:** In order to increase the water supply coverage , 32km of pipeline is proposed to expand. Diameter of proposed pipeline ranging from 110mm to 160mm. 27 km pipeline is proposed with diameter 110mm and remaining 5km pipeline has been proposed with diameter 160mm. However, 3.5 km pipeline of diameter 225mm also has been proposed for inter connect the PTWs with AIRP. Arrangement/location of sluice valves, washout valves, design of sluice valve and washout chambers, pipe laying design, material type and its joint type etc. fixed up as per demand of the network and actual situation of the field. Sluice valves are arranged in such a way that water distribution could be made smoothly and without much hindrance in the system when repair or maintenance work is to be carried out in a portion of the network. Arrangement of sluice valves also

ensures the control of pressure at different nodal points satisfying the water demand of that point or zone. Washout valves are fixed in the network in such a location (mostly at the lowest point) that helps in discharging or flushing out dirty water, iron deposited waste water, chlorinated rich water during disinfection etc. Required depth and arrangement of pipeline laying for different diameter is considered to ensure safety, vertical pressure comes from road and pathways. uPVC pipe is recommended for general distribution line. Galvanized Iron (GI) or Mild Steel (MS) pipe is recommended for bridge/culvert crossing, road crossing etc.

Table 13: Summary of the Expanded Pipelines

Sl. No.	Pipe diameter (mm)	Length (m)	Material
01	110 mm (as distribution pipeline)	27,000	uPVC (PN-08)
02	160mm	5,000	uPVC (PN-08)
03	225mm (as transmission pipeline)	3,500	uPVC (PN-10)

78. **Establishment of Service Connections with Meter:** 1800 service connections of the PS are without meter now. Pourashava has decided to add meter with these existing service connections. So, 1800 service connection diameter ranging from 13 mm to 25mm is needed to be constructed with meter. Detail of existing service connections without meter is presented in Table 14.

Table 14: Existing Service Connections without Meter

Type of connection	:	Quantity		Total
		Domestic	Commercial/Institutional	
13 mm connection	:	1,150	50	**1800**
20 mm connection	:	515	35	
25mm connection	:	38	12	
Total	:	1,703	97	

79. **Construction of New Service Connections:** 700 nos. of new service connections also have been proposed for further expansion of the service connection with meter. Size of the connections ranging from 13mm to 25mm. Detailed of new service connection is presented in Table 15.

Table 15: : Details of New Service Connections

Type of connection	:	Quantity		Total
		Domestic	Commercial/Institutional	
13 mm connection	:	168	42	700
20 mm connection	:	336	84	
25 mm connection	:	56	14	
Total	:	560	140	

80. **Electro-Mechanical Works:** This describes the specifications of materials, equipment and works as shown on drawing and described in the detailed estimate. Before purchasing electrical equipment and materials, manufacturer's catalogues shall be presented to the Engineer-in-charge for his approval, in accordance with the specification and provision of contract. Unless otherwise stated or detailed in the drawing, the electrical works will generally comprise the following:

- Power supply from REB pole to energy meter inside pump house
- Pole mounted substation
- LT Switchgear/ Panel
- phase MCCB and single phase MCB
- Cabling and distribution
- Internal wiring system of pump house

- Switch board and distribution board / panel board
- Submersible pump motor set
- Motor control panel and safety relays
- Earth system
- Supply, Installation, Testing and commissioning
- Safety measures

81. **Tools & Equipments:** Routine O&M of water supply system suffers due to lack of appropriate tools and equipment. Consequently 03 sets of standard O&M tools and equipment should be provided to PWSS of the PS. A tentative list of a set of the tools and equipment is presented below:

Table 16: Tentative list of O&M tools of Water Supply System for Joypurhat Pourashava

Sl No	Description	Unit	Quantity
1	Well probe	Nos.	1
2	Chain pulley, 5-ton	No.	1
3	Chain tong, 36”	Nos.	1
4	Chain tong, 32”	Nos.	1
5	Pipe wrench, 24”	Nos.	1
6	Pipe wrench, 18”	Nos.	1
7	Pipe wrench, 14”	Nos.	1
8	Slide wrench, 18”	Nos.	1
9	Slide wrench, 12”	Nos.	1
10	Slide wrench, 10”	Nos.	1
11	Dull wrench	Set	1
12	Ring wrench	Set	1
13	Drill Machine	No.	1
14	Hammer, (1-10lbs.)	Set	1
15	Measuring wheel	Nos.	1

82. **Sub-Project:** Package (UGIIP- III-2/JOYP/WS/01/2016: Proposed Investment for Water Supply: Considering all aspects as delineated above, all sub-projects with an estimated cost has been prepared for the Water Supply in Joypurhat PS. Summary of the estimated cost is presented in Table 17.

Table 17: Proposed Water Supply Interventions and Costing – Joypurhat Pourashava

Sl No.	Description of work	Unit	Quantity	Amount
1	**Component-01**			
	Installation of Test TW Size: 38mm dia, Depth 70m	No.	7	**416,282.67**
	Sub-total for component-01			**416,282.67**
2	**Component-02**			
	PART-A: Installation of PTWs Size: 350mmx150mm , Depth-70m	No.	7	7,027,556.84
	PART–B: Pump house (Civil)	No.	5	2,394,198.66
	PART–C: Pump house (San)		5	341,379.95
	PART–D: Pump house (Boundary wall)		5	2,825,839.13
	PART–E: Mechanical		7	6,293,056.00
	PART-F: Electrical works	No.	5	3,667,635.00
	Sub-total for component-02			**22,549,665.57**
3	**Component -03: Over Head Tank (680 m3)**	No.	1	**24,645,940.66**
4	**Component-04 : Rehabilitation Works**			
	PART-A : Pump & Motor	No.	4	2,610,038.40
	PART-B : IRP	No.	LS	2,347,809.10
	PART-C :OHT	No.	1	242,710.00
	Sub-total for component-04			**5,200,557.50**
5	**Component -05: Construction of new pipe line connections with meter**			
	PART-A: Construction of new pipe line	m	**35500**	40,064,094.27
	225mm Nominal dia	m	3500	
	160mm Nominal dia	m	5000	
	110mm Nominal dia	m	27000	
	PART-B: Supply and installation of domestic water meter chamber with meter box	No.	**2500**	14,311,729.00
	PART-C: Construction of House connection	No.	**2500**	9048690.00
	13mm dia		1410	
	20mm dia		970	
	25mm dia		120	
	Sub-total for component-05			**63,424,513.27**
6	**Component -06: O & M tools**	set	3	**144,189.00**
7	**Component -07:Environmental Mitigation Enhancement works**			**400,000.00**
Total for the Pourashava				**116,781,148.67**

Source: MDS Consultant

E. Implementation Schedule

83. Implementation of UGIIP III is split up into 3 phases: (i) 1st phase = 18 months or 1.5 years; (ii) 2nd phase = 30 months or 2.5 years; and (iii) 3rd phase = 24 months or 2 years.

84. Substantial time is required spanning the continuum of subproject preparation, approval, survey, design & estimate, contract award and contract execution. Efforts needs to be made to meticulously follow the schedule should a timely implementation of work is aimed at.

85. Usually, the construction work season in Bangladesh runs from October through May (eight months). Construction works are sometimes impeded for the following reasons.

- Early floods in April/May,
- Late floods in September/October,
- Natural calamities (cyclone/tornado, excessive floods) occur in April/May and October/November.

86. Normally, the best construction period is only for 6 months a year (October to March). But construction of OHT is complex and it will take time. In these reason, total construction time is proposed for 01 year.

87. However, sometimes, based on time constraint or exigency, construction work may even need to be carried out in the monsoon. Besides, whenever possible, simultaneousness of activities can be ascertained and cashed in on and consequently, quantum of work can be maximized through efficient planning and adoption of best available practice. Summing up, over a 16-month period, execution of major works are advisable to take place between January, 2017 to November 2017. A tentative time-schedule for implementation (only as an indication) is shown overleaf.

Sub-projects Implementation schedule for Package No. UGIIP-III-2/JOYP/WS/01/2016																		
Period : June '2016-December '2017																		
Item of works	**YEAR**																	
	2016							**2017**										
	MONTH							**MONTH**										
	6	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Compliance of Sub-project and approval																		
Preparation of the bid documents																		
Tendering of the sub-project and the work order																		
Execution of physical work																		
Final inspection and complete certification																		

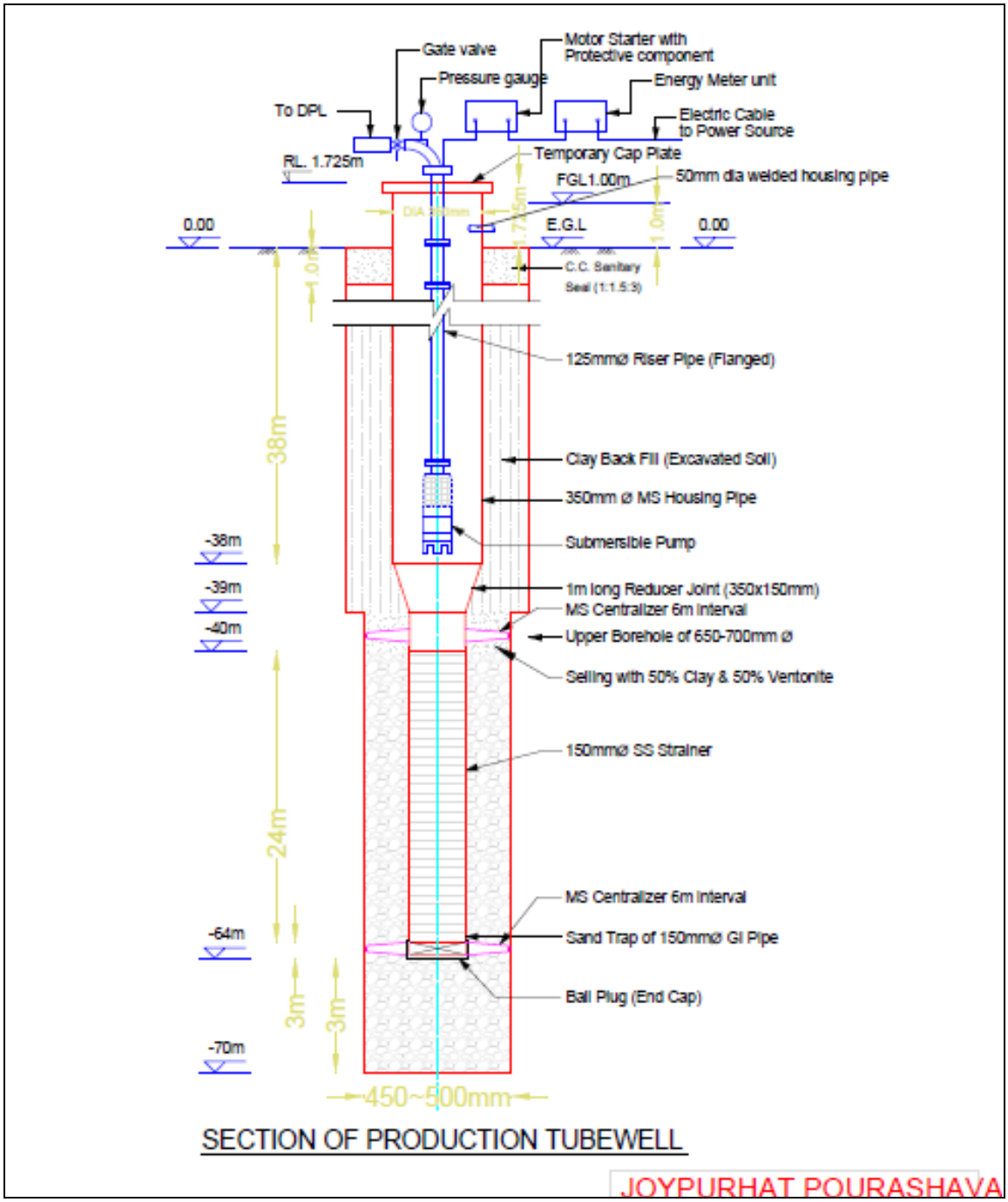
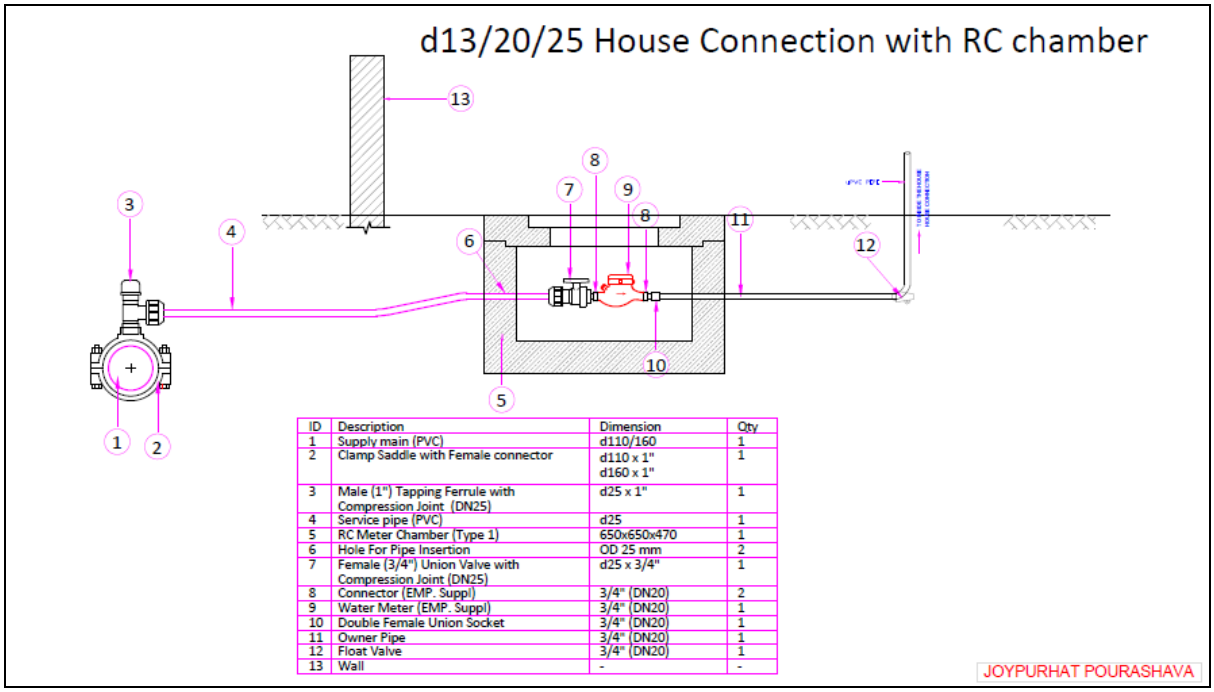


Figure 4: Typical Section of Production Tube well



ID	Description	Dimension	Qty
1	Supply main (PVC)	d110/160	1
2	Clamp Saddle with Female connector	d110 x 1" d160 x 1"	1
3	Male (1") Tapping Ferrule with Compression Joint (DN25)	d25 x 1"	1
4	Service pipe (PVC)	d25	1
5	RC Meter Chamber (Type 1)	650x650x470	1
6	Hole For Pipe Insertion	OD 25 mm	2
7	Female (3/4") Union Valve with Compression Joint (DN25)	d25 x 3/4"	1
8	Connector (EMP. Suppl)	3/4" (DN20)	2
9	Water Meter (EMP. Suppl)	3/4" (DN20)	1
10	Double Female Union Socket	3/4" (DN20)	1
11	Owner Pipe	3/4" (DN20)	1
12	Float Valve	3/4" (DN20)	1
13	Wall	-	-

Figure 5: House Connection with RC Chamber

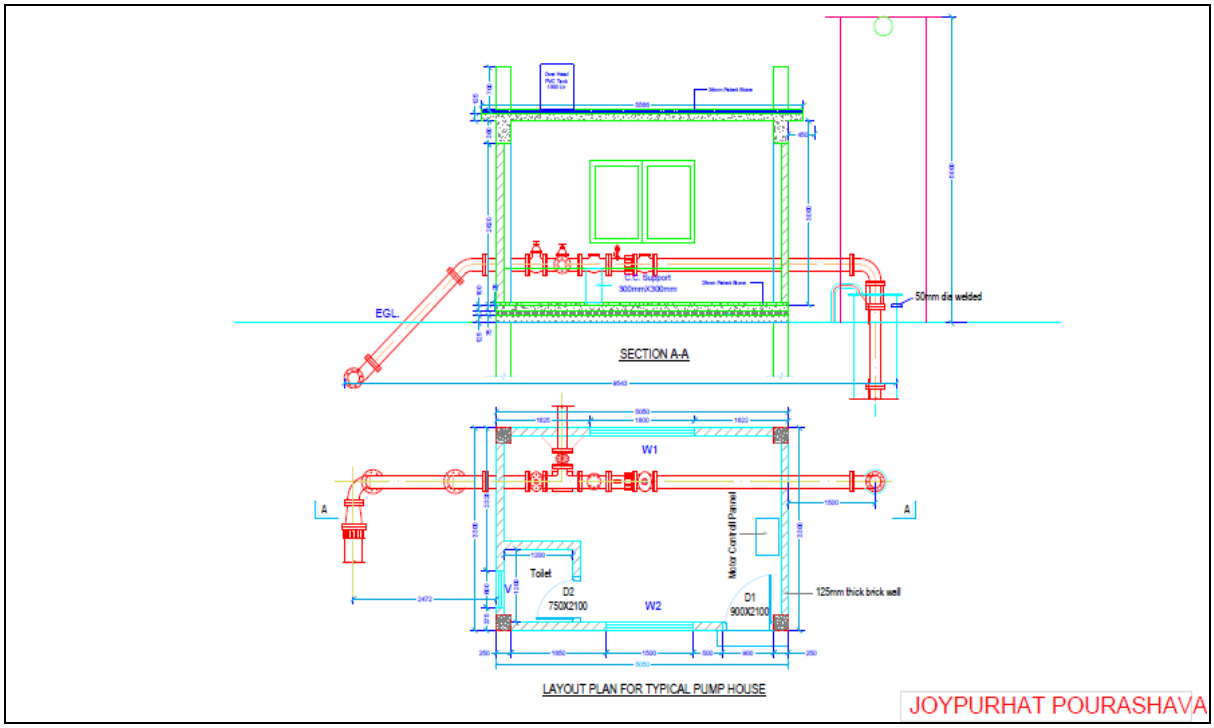


Figure 6: Typical Layout plan and Section of Pump House

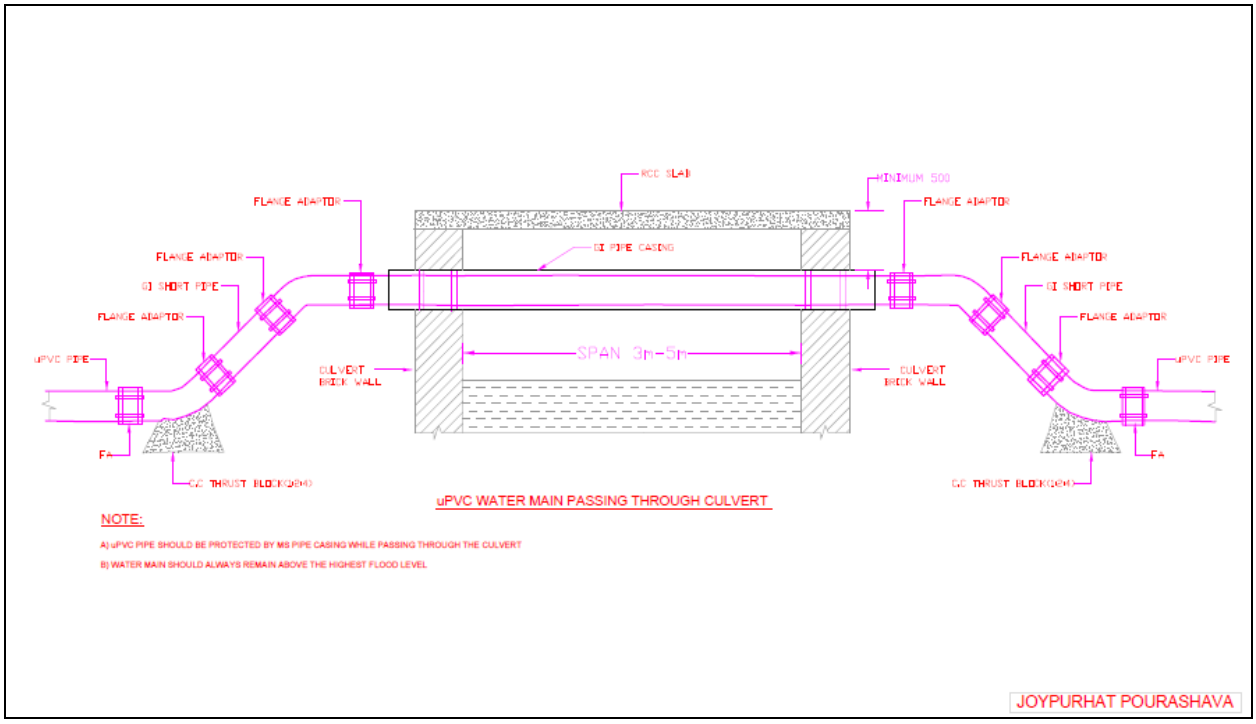


Figure 7: Water Pipe passing through Culvert (under the slab)

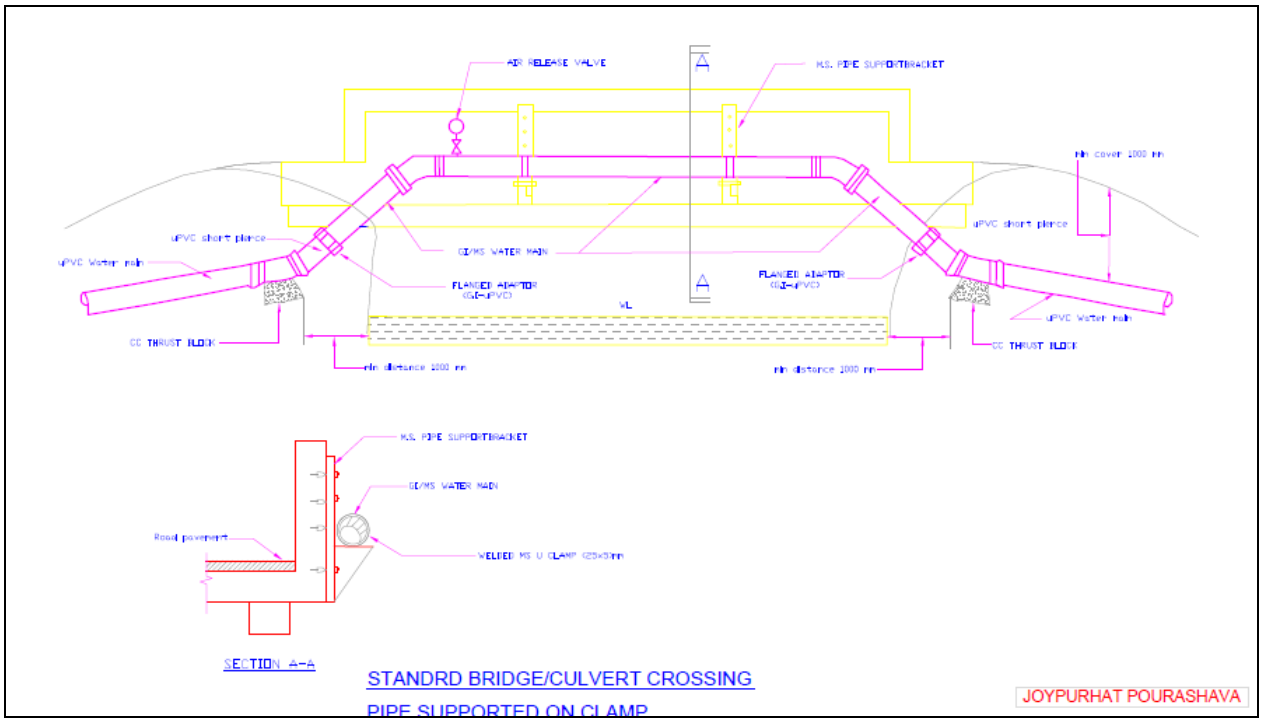


Figure 8: Water Pipe passing through Culvert (over the slab)

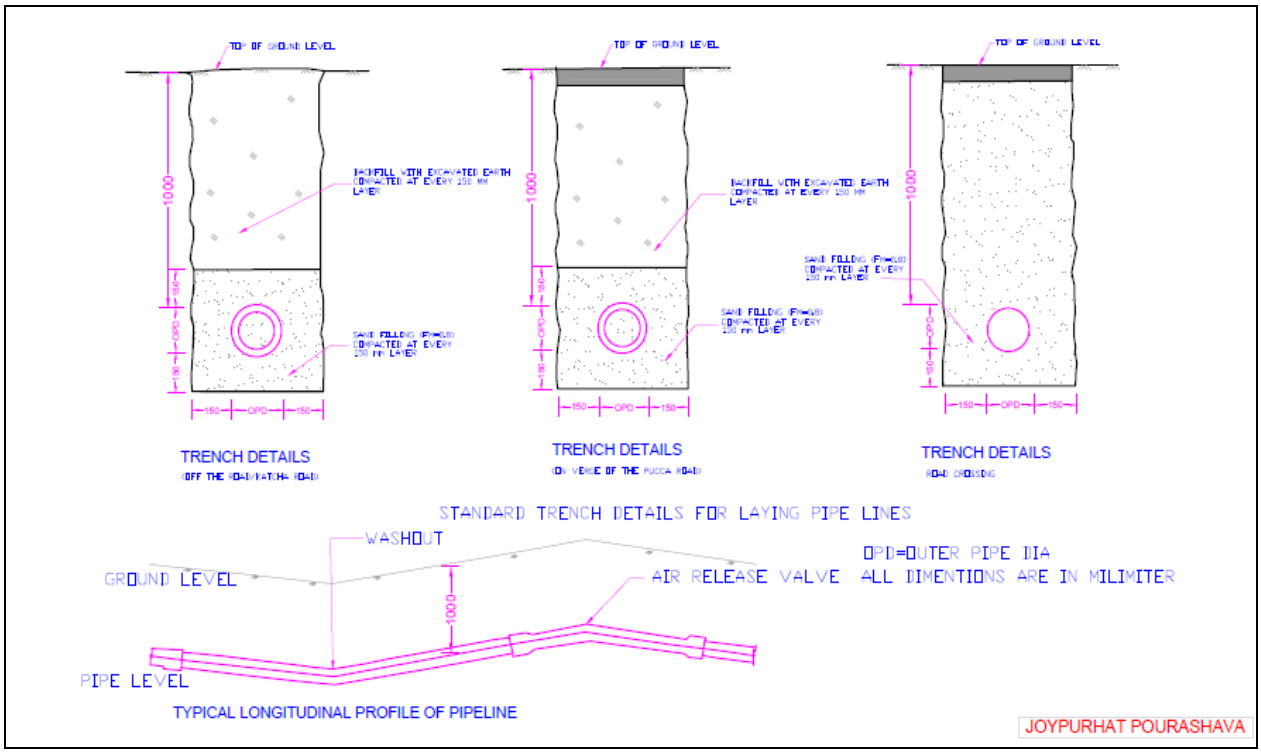
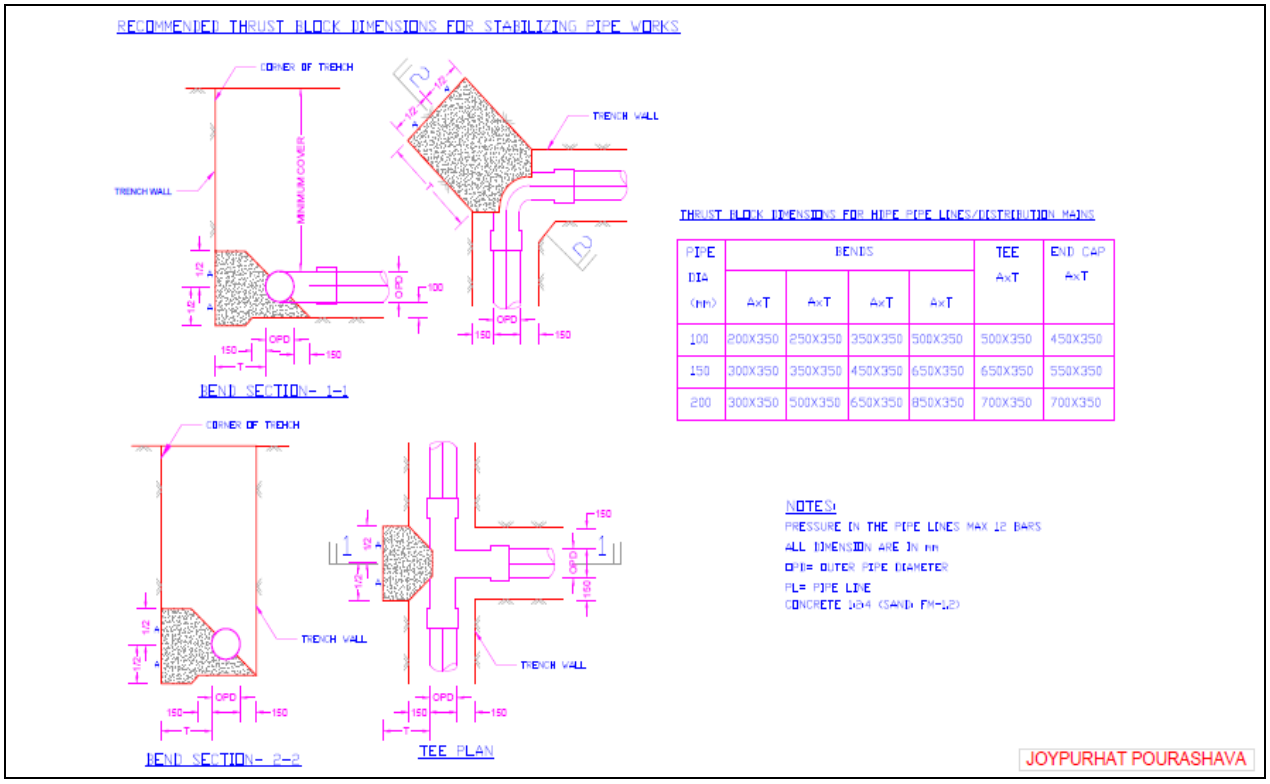


Figure 9: Typical Longitudinal Profile and Cross-Section of Pipeline



PIPE DIA (mm)	BENDS AxT	AxT	AxT	AxT	TEE AxT	END CAP AxT
100	200X350	250X350	350X350	500X350	500X350	450X350
150	300X350	350X350	450X350	650X350	650X350	550X350
200	300X350	500X350	650X350	850X350	700X350	700X350

Figure 10: Thrust block against pipe joint and bent

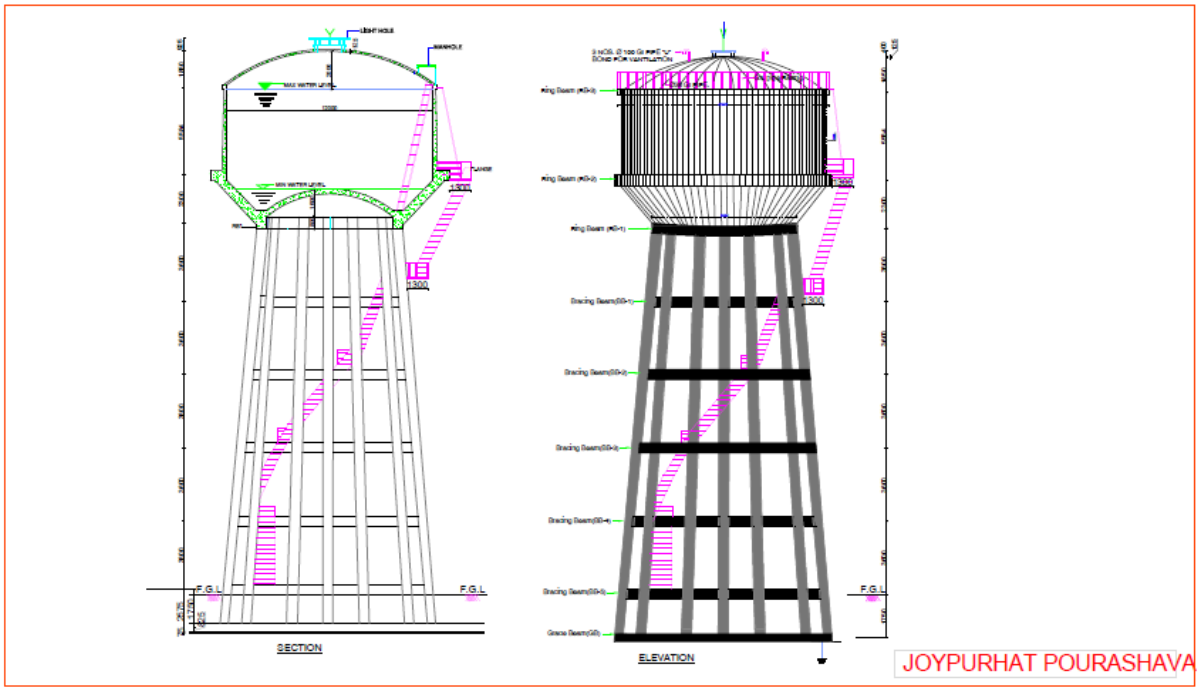


Figure 11: Overhear Tank

88.

Figure 12: Joypurhat Pourashava in Joypurhat Sadar Upazila

IV. DESCRIPTION OF THE ENVIRONMENT

A. Methodology Used for the Baseline Study

89. **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, MDS consultants, LGED and Joypurhat Pourashava;
(ii) relevant acts and extraordinary gazettes and guidelines issued by Government of Bangladesh agencies; and
(iii) literature on land use, soil, geology, hydrology, climate, socioeconomic profiles, and environmental planning documents collected from Government of Bangladesh agencies and websites.

90. Several visits to the subproject sites were made to assess the existing environment (physical, biological, and socioeconomic) and gather information with regard to the proposed sites and scale of the proposed subproject. Demographic information, archaeological and religious places, densely populated pockets, and settlements were gathering from PDP and other documents.

91. **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.

92. **Updating during detailed design phase:** The IEE including specific description of the environment and corridor of impact has been updated as necessary based on the final water supply improvement subproject design and alignments of pipeline laying.

B. Physical Characteristics

93. **Topography, soil and geology:** The topography of Joypurhat is mainly flat. The Pourashava comprises of high land with khal, small canal and water logged areas. Most depressions and canals are tectonically controlled. According to the information collected through public consultation, this area is not affected by flood, due to a flood control embankment. The elevation is around 25.00m above mean sea level. This area is composed of uplifted terraces of Pleistocene sediments called Barind tracts. Here the soil is completely covered by Barind Clay Residuum/Residual Deposits. Aquifers of these Upazilas are safe from Arsenic pollution.

94. **Climatic conditions:** The climate is tropical in Joypurhat. The summers are much rainier than the winters. The average temperature in Joypurhat is 24.4 °C, where as the maximum is 38.30 °C and the minimum is 10.80 °C. Precipitation here averages 1800.90 mm. The driest month is December. Most precipitation falls in July, with an average of 364 mm. The warmest month of the year is August with an average temperature of 28.9 °C. In January, the average temperature is 18 °C. It is the lowest average temperature of the whole year.

95. **Surface water and other bodies of water :** The Pourashava crosses large number of water bodies such as small and medium ponds, which are used for multiple purposes. The surface water in ponds is not saline but is not also suitable for drinking purposes. All the ponds are man-made and used for fishing, water supply and domestic use. Here the Jamuneswari river passed by the side of this Pourashava. Canals are mainly used for drainage and irrigation. At present these canals are carrying the domestic and industrial wastes so not suitable for domestic, commercial and industrial use. So only source of potable water for the above uses is the underground water.

96. **Air quality:** Emissions of common air contaminants and fugitive dust may be elevated in proximity to active work sites during construction phase only. These impacts will be short-term and localized to the immediate vicinity of the work sites. Greenhouse gas (GHG) emissions may increase as a result of the subproject activities (i.e., vehicle and equipment operation, concrete production, disposal of excavated material, land-filling of residual wastes). Given the subproject's relatively minor contribution to common air contaminants and GHG emissions during construction, the overall significance rating of both these potential residual effects is considered to be negligible.

97. **Acoustic environment:** Subproject components are in the built-up part of Joypurhat Pourashava with residential, commercial and institutional establishments. The volume of traffic that passes through these sections is not significant and traffic jams are frequent. However, vehicular movement can be considered as major cause of noise pollution. The baseline noise level will be measure by the subproject contractors prior to the commencement of work. The results will be provided in the updated IEE/EIA and all other measurements during implementation will be reported as part of EMP implementation.

98. **Water logged areas:** The total area of sugar mill and ward no. 6 and partial area of ward no. 4 & 7 are water logged areas. These areas encounter water logging after heavy rainfall, causing much inconvenience to the people together with a deterioration of the environment. The reasons of stagnation in the aforementioned areas are technical, social and institutional. Inundation in the said areas is caused due to inadequate drainage system due to unplanned and uncoordinated development. There is no big river in the vicinity of area, as such no annual flooding occurs.

C. Biological Characteristics

99. **Flora and fauna:** Joypurhat which partly belongs to the southern 'Barendra Bhumi' and partly belonging to the great alluvial plain formed under the influence of the Teesta and the Jamuna, is very rich in respect of varieties of flora and fauna. It has also some influence of the 'Barind Tract' of Bogra district. The district is very fairly wooded and many valuable forest trees are found in its immediate surroundings. Among them the shal (shorea robusta) tree is noteworthy.

100. In the early 19th century, mammals like tiger, buffalo, wild beers, etc. were widely found in Joypurhat. They have completely disappeared by now. Now jackal, fox etc. are widely found in this area.

101. **Protected areas:** There are no protected forests, wetlands, mangroves or estuaries in or near the subproject area. But as an archaeological heritage and relics, the Garuda Pillar at Bhimer Panti, Dargah of Nimai Pir and Baro Shibalaya tample etc are noteworthy.

D. Socioeconomic Characteristics

102. **Area and population:** Joypurhat Pourashava occupies an area of 20.72 km^2. with population of 69,033, out of which male 35,278 are male and 33,755 are female. It consists of 9 wards. Here the agricultural land is 30% and residential area is 44.79%. The summation of industrial, commercial and wet land is 20.21%. The population density is 3332 persons per km^2 and the growth rate is 2.20%.

103. **Land use:** The study of the land use pattern is based on extensive physical survey which was accomplished through GPS system. Here the main occupations are agriculture 25%, fisherman 4%, daily laborer 20%, industrial laborer 7% and service & others are 11%. Paddy, sugarcane, jute, turmeric, banana, potato, mango, jack fruit, pulses, betel leaf, tobacco, oil seeds etc are the main agricultural products.

104. **Literacy:** Joupurhat Sadar has an average literacy rate of 33.1 % (7+ years), and the national average of 32.4% literate. (BBS, 2011)

105. **Existing provisions for pedestrians and other forms of transport:** The roads (total of 135.79 km) of Joupurhat generally fall into two categories: katcha (earthen) and pucca (metalled) roads. Metalled roads are mainly of asphalt and/or CC. In a few places minor roads are of HBB. Nearly all roads are built above the existing ground level, to avoid inundation. In the rural areas sometimes it is around one meter above the ground level**.** There are no provisions of walk way or footpath, to facilitate pedestrians movement by the side of the roads. There is a bus and a truck terminal in the Pourashava.

106. **Sanitation:** The existing sanitary condition in Joupurhat is relatively poor. As pe**r** Bangladesh Bureau of Statistics data for 2011, 35.8% of the pourashava population have water sealed latrines, 31.2% have latrines that are not water-sealed, 29.6% of the population have non-sanitary facilities while the remaining 3.4% have no toilets. Joupurhat has no sewerage system and disposal/treatment facilities.

107. **Public Toilet:** There are 11 public toilets in Joupurhat. They were found in good condition. Separate provisions for women were not noted in all of them.

108. Sanitation facilities both in primary and secondary schools were found in bad condition. To uphold healthy environment in the academic institutions sanitary facilities is to be upgraded.

109. **Solid waste management:** Solid waste management in Joupurhat consists of collection, transportation and dumping of wastes. There are 104 dustbins found in different parts of the Pourashava. There are 3 trucks and 9 rickshaw vans for SWM. The Pourashava employs 141 sweeper/cleaner for waste collection. The Pourashava currently does not have its own solid waste disposal site. Wastes are dumped in vacant low lands, commonly requested by private land owners to reclaim/increase the level of the land.

110. Joupurhat generates about 90 metric tons per day computed based on 0.3 kilograms (kg) per capita per day. Segregation at source is not practiced resulting to mixed wastes from households, commercial establishments, hospitals, institutions and others. There is no regular public awareness and public relation activities in the Pourashava. Community involvement is absent. Informal sector is prominent in recyclable collection and recycling.

111. **Other existing amenities for community welfare:** The major public establishments in the PS are: one bus station, 2 railway station, 25 large industries, 10 medium enterprises and 4 small and cottage industries. The kitchen markets lack in adequate number of waste bins and do not have arrangement for waste collection. Generally, there is no arrangement for drainage within the markets. The MDS team noted Joupurhat has one well-designed and built kitchen market with 10 sheds along with a slaughterhouse however the Pourashava sparsely use the facility. The Pourashava could not provide plausible answer to their not being used.

112. There are 2 graveyard, 1 burning crematorium, 2 government hospital, 28 government primary schools, 12 high schools, 2 girls' schools, 4 Colleges, and 1 polytechnic Institute. Apart from these, there are madrasas (community based religious institutes) established with private initiatives and operated and managed privately.

E. Historical, Cultural and Archaeological Characteristics

113. **Historical Events:** Joypurhat was an area of Pala Empire & Sena dynasty from a long age. Till 16th and 17th centuries, there was no clear info about Joypurhat. In old age 'Baghabarihat' was the local name of Joypurhat It was named 'Joypurhat', after the name of the king Joipal. In the British period the railway line from Darjiling to Kolkata passed through Jaypurhat.

114. **Archaeological Heritage and Relics:** Among the archaeological heritage and relics, the remains of the palace of Raja Jaygopal, the Garuda Pillar at Bhimer Panti, Dargah of

Nimai Pir are important. Besides Bel-Amla Baro Shibaloy Mondir, Pagla Deuan Baddabhumi and Vimar Panty, Mangolbari are noteworthy.

115. **Ecological Resources:** It provides the results of an ecological survey, such as a habitat survey etc. The ecological setting is mostly with wetland, homestead and roadside vegetation, etc. Homestead vegetation has a positive effect on improvement of soil moisture through the shading and mulching process. Trees growing at homesteads also provide easy access to fuel wood, fodder and other products. A large number of multipurpose trees (fruit, timber, fodder, medicine) are grown in the area. The most common among them are jackfruit, mango, lemon, banana, etc. Some Mangrove vegetation has been noticed in the area. Two major types of fauna viz. terrestrial and aquatic fauna have been identified in and around the area.

116. **Birds, Wildlife and Wetland Habitats:** Other than common birds like crows, sparrows, shaliks, cuckoos etc. and some domestic cattle, no wild animals inhabit the area. Wildlife that fully depends on the terrestrial land throughout their whole life for shelter, food, nesting, breeding and producing offspring is called terrestrial fauna. The main types of terrestrial fauna are amphibian, reptile, bird and mammal. Aquatic habitats are common in the project area due to the numerous freshwater lowlands, ponds, wetlands and rivers coursing through the area. Fish diversity in rivers and streams is decreasing due to heavy pollution in the aquatic bodies from industrial effluent.

V. ASSESSMENT OF ENVIRONMENTAL IMPACTS AND SAFEGUARDS

A. Methodology

117. **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 as per Consultants study and potential impacts.

118. **The corridors of impact considered include:** (i) existing alignment of pipes to be replace; and (ii) existing RoWs for the new pipes. Pipe laying will require maximum of 0.5m for excavation. No additional land is required beyond the ROWs and existing facilities. Area of influence is limited within the alignments, ROWs and sites for proposed civil works. Categorization of the subproject and formulation of mitigation measures have been guided by ADB's REA Checklist for Water Supply Improvement subproject (Appendix-3) and ADB SPS, 2009.

B. Screening out Areas of No Significant Impact

119. From the detailed design and results of the rapid environmental assessment, it is clear that implementation of Joypurhat Pourashava water supply improvement subproject will not have major negative impacts because activities will be localized/site-specific and short in duration; corridors of impact during pipe laying works will be on existing public RoWs, 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 16), thus can be screened out of the assessment at this stage and will be assessed again before implementation.

Table 18: Fields in which the Subproject Components 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 trenching and excavation works will be conducted only during construction stage (short-term) and specific to PTWs sites along public ROWs.
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	Trenching and excavation, run-off from stockpiled materials and chemical contamination from fuels and lubricants may result to silt-laden runoff during rainfall which may cause siltation and reduction in the quality of adjacent bodies of water. 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 Cox, Sox, PMs, Nox and HC)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, along and near schools and areas with small-scale business. 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 be on vacant agricultural land and will follow existing ROW alignment and impact is short-term, site-specific and within a relatively small area. There are well developed methods for mitigation.

Field	Rationale
B. Biological Characteristics	
Biodiversity	Activities being located in the built-up area of Joypurhat Pourashava will not cause direct impact on biodiversity values as identified flora and fauna are those commonly found in built up areas. The construction activities do not anticipate any cutting of trees.
C. Socioeconomic Characteristics	
Land use	No alteration on land use. PTWs and OHT construction and operation will be on government/Pourashava land and will not affect the surrounding lands. Lying of pipelines will be limited to ROWs.
Type of community spread	No alternation 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 proposed subproject will follow existing ROW alignment and impact is short-term, site-specific and within a relatively small area. There are well developed methods for mitigation.
Socio-economic status	The resettlement impacts are discussed in details in the subproject's resettlement plan. Impacts are limited to economic displacement in the form of loss of land, assets, income sources and means of livelihoods as a result of involuntary resettlement. Manpower will be required during the 30-months construction stage. This can result in generation of contractual employment and increase in local revenue. Thus potential impacts are temporary and for short duration.
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 Joypurhat Pourashava where there a variety of human activities, will result in impacts to the sensitive receptors such as residents, businesses and the community in general. These anticipated impacts are temporary and for short duration.
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 sites.

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

120. Planning principles and design considerations have been reviewed and incorporated into the site planning process whenever possible. All locations for the subproject components will be on properties held by the Pourashava. Access to the subproject site is through public ROW and existing roads.

121. The concepts considered in design of Joypurhat water supply improvement subproject are: (i) locating facilities on government/Pourashava owned land to avoid the need for land acquisition and relocation of people; (ii) demand for new piped water supply; (iii) maximum population coverage with pipe layout mostly in residential areas and areas of high growth rate; (iv) avoidance of water-use conflicts; (v) locating pipelines within right of way (RoW) to reduce acquisition of land; (vi) locating pipelines at least 10 meters from latrines, septic tanks and any main drains to avoid contamination; and (vii) 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.

122. **Subproject selection criteria:** The project environmental assessment and review framework specifies environmental criteria to avoid or minimize adverse impacts during the identification and finalization of water supply improvement subproject. Table 17 summarizes criteria and design considerations as per final design.

Table 19: Site and Design Considerations to Meet EARF Environmental Criteria

Sl. No.	Components	Environmental Selection Guidelines	Remarks
1.	Overall selection guideline	i. Comply with all requirements of relevant national and local laws, rules, and guidelines.	- Requisite LCC and ECC to be obtained prior to commencement of works
		ii. Avoid/minimize where possible locations in protected areas, including notified reserved forests or biodiversity conservation hotspots (wetlands, national reserves, forest reserves, and sanctuaries).	- Not present in Joypurhat Pourashava
		iii. Avoid possible locations that will result in destruction/disturbance to historical and cultural places/values.	- Use of "chance find" procedures in the EMP that include a pre-approved management and conservation approach for materials that may be discovered during project implementation.
		iv. Avoid tree-cutting where possible. Retain mature roadside trees which are important/valuable or historically significant. If any trees have to be removed, plant two new trees for every one that is lost.	- Permit for tree-cutting to be obtained by contractor/ sprier to commencement of work - Compensatory plantation for trees lost at a rate of 2 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.
		v. Ensure all planning and design interventions and decisions are made in consultation with local communities and include women. Reflect inputs from public consultation and disclosure for site selection.	- All consultations during project preparation are documented and concerns expressed by public addressed in the IEE.
		vi. Synchronize all road improvement and pipe laying works (to extent possible) to minimize disturbance and optimize use of resources (e.g., water pipes laid prior to road improvements).	-Considered in the design
2.	Water supply	i. Utilize water sources at sustainable levels of abstraction only (i.e. without significant reductions in the quantity or quality of the source overall).	- No additional abstraction required
		ii. Avoid using water sources that may be polluted by upstream users.	- Not applicable. Water sources are existing PTWs
		iii. Avoid water-use conflicts by not abstracting water that is used for other purposes (e.g. irrigation)	- No additional abstraction required
		iv. Locate all new facilities/buildings at sites where there is low risk of flooding or other hazards that might impair functioning of, or present a risk of damage to water treatment plants, tanks/reservoirs,	- No new facilities - Design of facilities to be rehabilitated included flood protection measures

Sl. No.	Components	Environmental Selection Guidelines	Remarks
		or their environs	
		v. Avoid all usage of pipes that are manufactured from asbestos concrete and avoid disturbance to existing asbestos concrete pipes (keep in the ground).	- Considered in the preliminary design. Asbestos pipes will not be used. Any asbestos piped to be found will not be removed
		vi. Ensure water to be supplied to consumers will meet national drinking water standards at all times	- Considered in the preliminary design. Water to be supplied will be ensured to meet Bangladesh Standards for Drinking Water.
		vii. Include measures to address additional sewage/domestic wastewater due to improved/new water supply system	- Considered in the project

123. **Land acquisition and resettlement:** The existing PTWs, OHT and offices/ structures to be rehabilitated are all located in government/Pourashava owned lands. There are no encroachers or residential/commercial structures in the RoWs. Cutting of trees will not to be required as per detailed design. This will be reassessed during implementation stage and if cutting of trees will be required, compensatory plantation for trees lost at a rate of 2 tress for every tree cut will be implemented by the contractor, who will also maintain the saplings for the duration of his contract.

124. **Impacts of groundwater abstraction:** Underground water of sufficient quantity is available within the area. The water quality from all of the test result indicates that aquifer is confined and fully protected by an impermeable layer. The potential abstraction rate is considered not to adversely impact the aquifer and is not envisaged to cause land subsidence or salinity intrusion.

125. **Impacts of distribution network:** A 0.5m wide, 35.50 km-long corridor on public RoWs is proposed to accommodate the distribution network. The alignment passes through the built-up areas. There are no environmentally sensitive areas in the vicinity of the proposed alignment. Traffic management plans and spoil management plans has been prepared as part of the detailed designs.

D. Anticipated Impacts and Mitigation Measures – Construction Phase

126. 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.

127. **Construction method:** The infrastructures will be constructed manually according to design specifications. Trenches 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. Once pipes are laid these will be joined as per specification and tested for any cracks of leakages. The minimum working hours will be 8 hours daily, the total duration of each stage depends on the soil condition and other local features. Any excavated road will be reinstated.

128. 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.

129. Although construction of these project components involves quite simple techniques of civil work, the invasive nature of excavation and the project sites in built-up areas of Joypurhat 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, Joypurhat water supply improvement 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 18).

Table 20: Anticipated Impacts and Mitigation Measures – Construction Phase

Field	Impacts	Mitigation
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 relative 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	Trenching and excavation, run-off from stockpiled materials, and chemical contamination from fuels and lubricants may result to silt-laden runoff during rainfall which may cause 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 (see Appendix 4 for outline). • Prioritize re-use of excess spoils and materials in construction activities. If spoils will be disposed, consult with Joypurhat 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 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

Field	Impacts	Mitigation
		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 COx, SOx, PMs, NOx, and HCs) 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, along 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 Joypurhat 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 10m 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 not anticipate any cutting of trees but will produce excess excavated earth (spoils), excess construction materials, and solid waste such as	• Prepare a debris disposal plan. • Remove all construction and demolition wastes on a daily basis. • Coordinate with Joypurhat local authority for beneficial uses of excess excavated soils or

Field	Impacts	Mitigation
	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.	immediately dispose to designated areas. Avoid stockpiling of any excess spoils. • All vehicles delivering fine materials to the site and carrying debris for disposal shall be covered to avoid spillage. 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 Joypurhat Pourashava. There are no protected areas in or around subproject sites, and no known areas of ecological interest. Preliminary design shows there are no trees at the sites that need to be removed.	• 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. • 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. • Implement compensatory plantation for trees lost at a rate of 2 trees for every tree cut. Maintain the saplings for the duration of contract.
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 (see **Appendix 5** for sample) • 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.

Field	Impacts	Mitigation
		• 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	Manpower will be required during the 10-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 Joypurhat 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 along side the roads. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• 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 business in limited cases. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation	• 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 located at least 100m away from the nearest

Field	Impacts	Mitigation
	measures.	dwelling preferably in the downwind direction. • Consult with Joypurhat 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 trenching progress. For rock and concrete breaking, use non-explosive blasting chemicals, silent rock cracking chemicals and concrete breaking chemicals. • 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 facilities); (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 environmental management specialist's attention immediately; and (iv) taking remedial action as per environment specialist's instruction. • The contractor shall immediately take the necessary remedial action on any compliant/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 compliant/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	• 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

Field	Impacts	Mitigation
	occupational hazards which can arise from working height and excavation works. Potential impacts are negative and long term but reversible by mitigation measures.	of environmental awareness training. • Procedure 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 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 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 area; • Ensure moving equipment is outfitted with audible back-up alarms; • Mark and provide signboards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipments 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	There are no scheduled or unscheduled archaeological, paleontological or architectural sites of heritage significance listed by local and/or national authority	• Stop work immediately to allow further investigation if any finds are suspected.

Field	Impacts	Mitigation
	and/or internationally (UNESCO) within or adjacent to subproject sites. The subproject components are not located in or near and excavation works will not be conducted in the vicinities of any historical site. Thus risk for chance finds is low.	

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

130. In the operations and maintenance (O&M) phase, the water supply system will operate with routine maintenance, which should not affect the environment. The infrastructures 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. O&M will be the responsibility of Joypurhat Pourashava local authority, which will be given training by this project.

131. Routine repairs and maintenance works will be very small in scale, to conducted manually by small teams of men and works will be very short in duration thus will not cause significant physical impacts.

132. **Hazardous chemicals use and storage:** Water treatment and OHT prior to distribution may involve the use of chemicals for disinfection and water conditioning. Recommended measures to prevent, minimize and control potential environmental impacts associated with the storage, handling and use of disinfection chemicals in PTWs and OHT include (i) store sodium hypochlorite in cool, dry and dark conditions for no more than one month, and use equipment constructed of corrosion-resistant materials; (ii) store calcium hypochlorite away from any organic materials and protected from moisture; fully empty or reseal shipping containers to exclude moisture. Calcium hypochlorite can be stored for up to one year; (iii) minimize the amount of chlorination chemicals stored on site while maintaining a sufficient inventory to cover intermittent disruption in supply; (iv) develop and implement a prevention program that includes identification of potential hazards, written operating procedures, training, maintenance and accident investigation procedures; and (v) develop and implement a plan for responding to accidental releases.

133. The potential adverse impacts that are associated with O&M activities can be mitigated to acceptable levels with the following mitigation measures (Table 19).

Table 21: Anticipated Impacts and Mitigation Measures at Operations & Maintenance Phase

Field	Impacts	Mitigation Measure
A. Physical Characteristics		
Air quality	Air emissions from PTWs and OHT operations may include gaseous or volatile chemicals used for disinfection processes (e.g. chlorine).	Store sodium hypochlorite in cool, dry and dark conditions for no more than one month and use equipment constructed of corrosion-resistant materials. Store calcium hypochlorite away from any organic materials and protected from moisture; fully empty or reseal shipping containers to exclude moisture. Calcium hypochlorite can be stored for up to one year. Minimize the amount of chlorination chemicals stored on site while maintaining a sufficient inventory to cover intermittent disruption in supply. Develop and implement a prevention program that includes identification of potential hazards, written operating procedures, training, maintenance and accident investigation procedures.
Acoustic environment	Temporary increase in noise level and vibrations. The impacts are negative but short-term, site-specific within a relatively small area reversible by mitigation measures.	Plan activities in consultation with Joypurhat 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.
B. Biological Characteristics		
Biodiversity	Activities in the built-up area of Joypurhat Pourashava. There are no protected areas in or around subproject sites and no known areas of ecological interest.	No trees, shrubs or groundcover may be removed or vegetation stripped without the prior permission. Prevent workers or any other person from removing and damaging any flora (plant/vegetation) and fauna (animal).
C. Socioeconomic Characteristics		
Workers health and safety	Workers need to be mindful of the occupational hazards working with chemicals at PTWs and OHT. Potential impacts are negative and long-term but reversible by mitigation measures.	Comply with requirements of GoB Labor Law of 2006, all applicable laws and standards on workers H&S. Ensure that all site personnel have a basic level of H&S training. Produce and implement a O&M, H&S plan which include measures as: (i) excluding the public from worksites; (ii) ensuring all working are provided with and required to use PPE (reflectorized vests, footwear, gloves, goggles and masks) at all times; (iii) providing (H&S) training for all site personnel; (iv) documenting procedures to be followed for all site activities; and (iv) maintaining accident reports and records. Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances. 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; Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; 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. 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.

F. Cumulative Impact Assessment

134. 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 are reasonably foreseeable and sufficiently certain to proceed.

135. The project has identified the valued components as air quality, acoustic environment, socioeconomic and socio-community components and human health and safety. The spatial boundary of the subproject is the area along alignment of the distribution network. The temporal boundary can be considered as the whole Joypurhat pourashava.

136. Location and sitting of the proposed infrastructures were considered to reduce impacts. Detailed designs integrate a number of measures, both structural and non-structural, to mainstream climate resilience into the Joypurhat water supply improvement subproject, including (i) structural protection of facilities from future floods; (ii) standalone power backup for the PTWs and pumping stations; and (iii) promote more efficient use of water by reducing losses and wastage to counter increased demands due to higher temperatures. Residual impacts during O&M will be much less than those of the construction phase as the work will be infrequent, affecting small areas only thus considered to be negligible.

137. **Water quality:** Ground water study concluded that ground water level is sufficient in Joypurhat and present interventions will meet the current and future demands. The subproject will not cause additional abstraction rather improve distribution and non-revenue water therefore potential residual effects is considered to be negligible and cumulative impact is not significant.

138. **Socioeconomic and socio-community:** Concerns on existing provisions for pedestrians and other forms of transport will occur spatially during construction and O&M activities. Traffic movement along the pipe alignments 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 Joypurhat Pourashava. This can be considered a long-term cumulative benefit of the subproject.

139. Given the scale of the project it is likely that 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 groups.

140. Upon completion of the subproject, the socio-community will be the major beneficiaries. With the improved water supply, they will be provided with reliable and climate-resilient municipal services. In addition to improved environmental conditions, the subproject will reduce occurrence of water-related diseases and exposure to climate extremes. 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. Beyond reducing the water-borne

and water-washed diseases, providing better access to improved municipal services confers many other diverse benefits ranging from the easily identifiable and quantifiable (costs avoided, time saved) to the more intangible and difficult to measure (convenience, well-being). One set of the benefits related to health impacts that are relatively easy to quantify, are the cost-offsets (costs avoided due to less illness). 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.

141. **Community and workers health and safety:** No adverse residual effects to human health will occur as a result of construction or O&M activities, and mitigation measures are in place to ensure public and worker safety, and will be closely monitored. While exposure to elevated noise levels, fugitive dust and common air pollutants will occur in proximity to work sites, due to their short-term and localized nature, these effects are expected to be minor and insignificant with no measurable effects on human health.

142. Therefore the project will benefit the general public by contributing to the long-term improvement of municipal services and community livability in Joypurhat Pourashava.

VI. INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION

A. Public Consultation Conducted

143. 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.

144. Public consultations and focus group discussions (FGDs) were conducted by MDS team on December 9, 2016. The objective of the meetings was to appraise the stakeholders about environmental 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, discussed and suggestions accordingly incorporated in the EMP. These include speedy construction works to ensure low impacts to community during road closures and local employment

B. Future Consultation and Disclosure

145. The Project has already organized consultation training program for all staff working in UGIIP-III, consultants and Pourashava staff on safeguard policies. The aim of the consultation programme was to inform all stakeholders about the importance of the safeguard policies and their implementation at the design construction and operation stage. Field consultations were conducted with local people. Consultations by the PIU supported by the RES and the PMO include the following:

Consultation during detailed design:

- Focus-group discussions (FGD) with affected persons and other stakeholders (including women's groups, NGOs and CBOs) to hear their views and concerns, were conducted and concerns were addressed in subproject design
- Structured consultation meetings with the institutional stakeholders (government bodies and NGOs) to discuss and approve key aspects of the subproject

Consultation during construction:

- Public meetings with affected communities to discuss and plan work programs and allow issues to be raised and addressed once construction has started
- Smaller-scale meetings to discuss and plan construction work with individual communities to reduce disturbance and other impacts, and provide a mechanism through which stakeholders can participate in subproject monitoring and evaluation.

Subproject disclosure:

- Public information campaigns (via newspaper, TV and radio) to explain the subproject to the wider city population and prepare them for disruption they may experience once the construction programme is underway;
- Public disclosure meetings at key subproject stages to inform the public of progress
- Formal disclosure of completed subproject reports by making copies available at convenient locations in the study towns, informing the public of their availability, and providing a mechanism through which comments can be made.

146. For the benefit of the community, relevant information from 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.

147. 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.

VII. GRIEVANCE REDRESS MECHANISM

148. **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.

149. Pourashava-wide public awareness campaigns will ensure that awareness on grievance redress procedures is generated through the campaign. The project implementation unit (PIU) and governance improvement and capacity development consultants (GICDC) 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 PMO and management, design and supervision consultants (MDSC) to help ensure that their grievances are addressed.

150. 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. 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 office (PMO) safeguard officer will have the overall responsibility for timely grievance redress on environmental and social safeguards issues and for registration of grievances, related disclosure, and communication with the aggrieved party through the PIU designated safeguard focal person.

151. **Grievance redress process:** In case of grievances that are immediate and urgent in the perception of the complainant, the contractor and MDSC on-site personnel 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 safeguard focal person and contractors, will be posted at all construction sites at visible locations.

a. **1st Level Grievance:** The phone number of the PIU office should be made available at the construction site signboards. The contractors and PIU safeguard focal person can immediately resolve on-site in consultation with each other, and will be required to do so within 7 days of receipt of a complaint/grievance.
b. **2nd Level Grievance:** All grievances that cannot be redressed within 7 days at field/ward level will be reviewed by the grievance redress cell (GRC) headed by Panel Mayor of the pourashava with support from PIU designated safeguard focal person and MDSC regional environment and resettlement specialists. GRC will attempt to resolve them within 15 days. The PIU designated safeguard focal person will be responsible to see through the process of redress of each grievance.
c. **3rd Level Grievance:** The PIU designated safeguard focal person will refer any unresolved or major issues to the PMO safeguard officer and MDSC national environmental and resettlement specialists. The PMO in consultation with these officers/specialists will resolve them within 30 days.

152. 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.

153. 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.

154. **Record keeping:** Records 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 will be kept by PIU. The number of grievances recorded and resolved and the outcomes will be displayed/disclosed in the PMO office, Pourashava office, and on the web, as well as reported in monitoring reports submitted to ADB on a semi-annual basis.

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

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

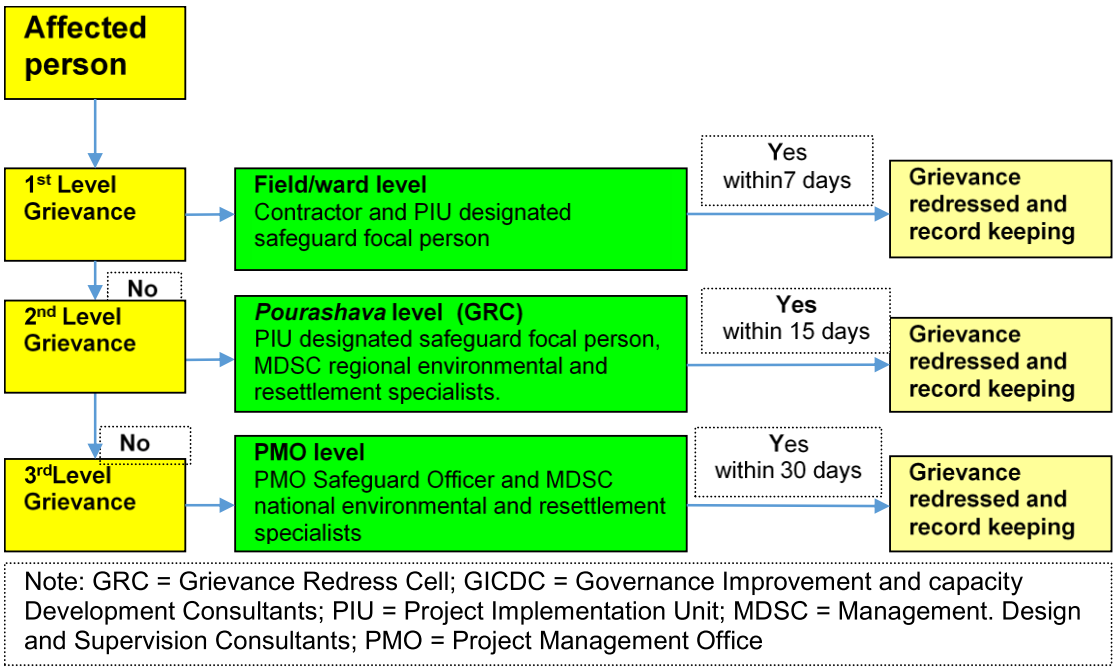


Figure 13: Project Grievance Redress Mechanism

VIII. ENVIRONMENTAL MANAGEMENT PLAN (EMP), JOYPURHAT POURASHAVA

157. 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.

158. 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.

159. 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. Institutional Arrangement

160. **Executing and implementing agencies:** The Local Government Engineering Department (LGED) and the Department of Public Health Engineering (DPHE), both under the Local Government Division (LGD) of the Ministry of Local Government, Rural Development and Cooperatives (MLGRD&C) and having extensive experience in managing urban and water supply projects financed by ADB, are the executing agencies of the project. The participating Pourashavas are the implementing agencies.

B. Safeguard Implementation Arrangement

161. **Project management office:** A PMO has been established for the overall management of the project. The PMO is headed by Project Director (PD) supported by officials including three project managers in charge of (i) municipal infrastructure (excluding water supply and sanitation), (ii) water supply and sanitation, and (iii) governance improvement and capacity development, respectively. The PMO will receive support from national environmental specialist and national resettlement specialist on the MDSC team. Key tasks and responsibilities of the PMO safeguard (environment) 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.

162. **Project implementation unit:** The participating Pourashavas have established PIUs within the pPourashava structure. The PIUs will (i) be responsible for land acquisition; (ii) take necessary action for obtaining rights of way; (iii) plan, implement and monitor public relations activities, gender mainstreaming initiatives and community participation activities at Pourashava level; (iv) disseminate information related to the project to the public and media; (v) ensure compliance with loan covenants concerning safeguards measures; and (vi) facilitate implementation of safeguards plans. The PIUs will each designate a Safeguard Officer and will receive assistance from the assigned MDSC regional environmental specialist to:

(i) update IEEs/EMPs during implementation stage and prepare new IEEs/EMPs in accordance with the EARF;
(ii) conduct environmental compliance audit of existing facilities as per Item of ADB SPS, 2009;
(iii) include IEEs/EMPs in bidding documents and civil works contracts;
(iv) comply 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 PMO,
(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.

163. **Project Management, Design and Supervision Consultants (MDSC):** MDSC has been engaged to work closely with and advise the PMO, to be involved in project supervision including monitoring during construction phase. The MDSC has one national environmental specialist and three regional environmental specialists as well as one national resettlement specialist and three regional resettlement specialists. The MDSC national environmental specialist will, but not limited to:

(i) work under the general supervision of the team leader and the deputy team leader;
(ii) review the environmental guidelines and requirement of the government of Bangladesh and ADB SPS, 2009, environmental subproject selection guidelines and EARF;
(iii) Guide the implementation of future subprojects;

(iv) provide technical support to the PMO and PIUs including review and update of EARF and guidelines for specific type of subprojects and assist in preparing terms of reference for environmental assessment;
(v) assist and guide the MDSC regional environmental specialists to provide support to environmental management functions including updating subproject IEEs in respect to EMP;
(vi) assist in preparing IEEs and in monitoring impact and mitigation measures associated with subprojects;
(vii) assist PIUs and MDSC regional environmental specialists working in the steps for preparing the EIA/IEE, capacity building and training, preparation of guidelines and procedure and subproject specific guidance;
(viii) provide support and guidance to PIUs in undertaking environmental monitoring
(ix) support PMU in submitting semi-annual environmental monitoring reports to ADB;
(x) facilitate in grievance redress and corrective actions;
(xi) train PIU officials regarding environmental requirement and issues; and
(xii) perform any other task assigned by the team leader, deputy team leader and the project director.

164. **The MDSC regional environmental specialists will, but not limited to:**

(i) work under the supervision and guidance of the team leader, deputy team leader and MDSC national environmental specialist;
(ii) assist PIUs in preparing and updating IEEs including EMPs in accordance with the EARF, and assist in monitoring impact and mitigation measures associated with subprojects including implementation of EMPs by contractors;
(iii) assist in preparation of IEEs and in the environmental review of subproject consisting of screening at Pourashava level by PIU through a committee formed with municipal mayor as chairman and representatives from DOE, LGED and other relevant district office as members;
(iv) assist PIUs in the steps for preparing EIA/IEE, capacity building and training, preparation of guidelines and procedure and subproject specific guidance;
(v) support PIU in environmental monitoring and submit monitoring reports to PMU as inputs into the semi-annual monitoring report submitted to ADB;
(vi) undertake mitigation measures and other specific measures in the construction contract;
(vii) facilitate in grievance redress and corrective actions;
(viii) follow subproject selection guidelines and EARF to ensure compliance with the environmental guidelines and requirement of the Government of Bangladesh and ADB SPS, 2009;
(ix) support PMO and MDSC national environment specialist by providing data, information and all other requested assistance;
(x) train PIU officials regarding environmental issues
(xi) perform any other task assigned by MDSC national environment specialist, team leader, deputy team leader and the project director.

165. **Civil works contracts and contractors:** EMPs are to be included in bidding and contract documents and verified by the PIUs and PMO. The contractor will be required to designate an environmental supervisor to (i) coordinate with MDSC on updating the IEE/EMP based on detailed designs, and (ii) ensure implementation of EMP during civil works. Contractors are to carry out all environmental mitigation and monitoring measures outlined in their contract.

166. **Governance Improvement and Capacity Development Consultants (GICDC):** The PMO and PIUs will require support on a range of activities related to governance

improvement and capacity development of Pourashavas. The GICDC will support PMO and PIUs in implementing urban government improvement action plan (UGIAP) by providing capacity development, community mobilization and other facilitation services. There are 4 GICDC regional offices consisting of 4 regional coordinators at each regional office. There are 2 Local Capacity Development Associates (Community Mobilization and Municipal Finance) in each project Pourashava. The regional coordinators are assisting the Pourashavas and the LCDAs in the activities related to community participation and financial development. The LCDAs have been posted at the Pourashava and (i) are working maintaining close liaison with the mayor, councilors, Pourashava staffs and communities, (ii) providing assistance and support to PIU regarding planning and implementation of citizen awareness and participation activities, urban planning, equity and inclusiveness of women and urban poor. The GICDC also have a training specialist who is responsible for identifying and coordinating capacity building activities at Pourashava level Figure 14.

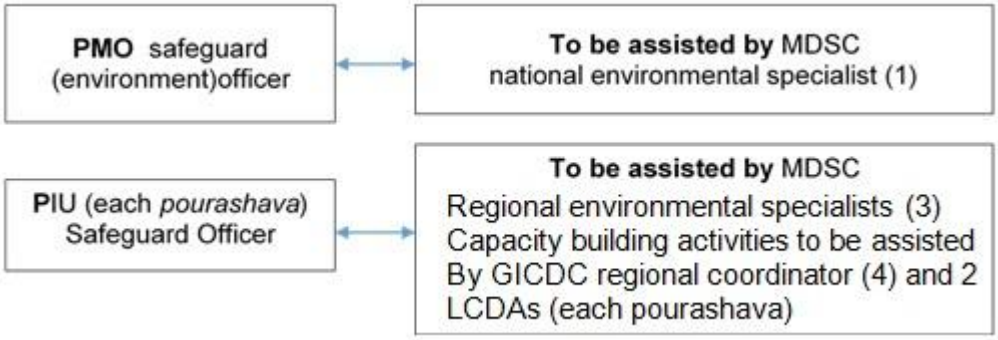


Figure 14 : Safeguards Implementation Arrangement

Table 22: Environment al Management and Monitoring Plan – Prior, During, and Post Construction Phase

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	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 (PMO), project implementing unit (PIU), Management Design Supervision Consultants (MDSC)	• 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 PMO and PIU. • Mitigation measures are included as part of TOR of PMO, PIU, MDSC
Updating of IEE based on detailed design	Site-specific impacts not identified, mitigation measures not appropriate and sufficient to address impacts	• Update IEE and EMP based on detailed design • Ensure updated EMP is provided to contractors • Relevant information disclosed	PMO	• Updated IEE and EMP reviewed, approved and disclosed	• Upon completion of detailed design	• No additional cost required
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.	PMO, PIU, MDSC, Contractors	• List of affected utilities and operators; • Bid document to include requirement for a contingency plan for service interruptions (example provision of water if	• During detailed design phase • Review of spoils management plan: Twice (once after first draft and once before final approval)	• No cost required. • Mitigation measures are included as part of TOR of PMO, PIU, MDSC. And in contract documents.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		• Require contractors to prepare spoils management plan (see Appendix 4 for outline) and traffic management plan (see Appendix 5 for sample)		disruption is more than 24 hours), spoil management plan (see Appendix 4 for outline), and traffic management plan (see Appendix 5 for sample)		
Construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.	Disruption to traffic flow and sensitive receptors	• Determine locations prior to award of construction contracts.	PMO, PIU, and MDSC	• List of selected sites for construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas. • Written consent of landowner/s (not lessee/s) for reuse of excess spoils to agricultural land	• During detailed design phase	• No cost required. • Mitigation measures are included as part of TOR of PMO, PIU, and MDSC.
Sources of Materials	Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in	• Prepare list of approved quarry sites and sources of materials	PMO, PIU, and MDSC	• List of approved quarry sites and sources of materials; • Bid document to include requirement for verification of	• During detailed design phase, as necessary with discussion with detailed design engineers and PIUs	• No cost required. • Mitigation measures are included as part of TOR of PMO, PIU, and MDSC.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	natural drainage patterns, ponding and water logging, and water pollution.			suitability of sources and permit for additional quarry sites if necessary.		
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	• Proof of completion (Safeguards Compliance Orientation) • Posting of proof of completion at worksites • 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 the responsibility of PMO 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 cause localized changes in topography and landforms. The impacts are negative but short-term, site-specific within a relatively small area and	• 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.	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 Indicator	Frequency of Monitoring	Cost and Source of Funds
	reversible by mitigation measures.					
Water quality	Trenching and excavation, run-off from stockpiled materials, and chemical contamination from fuels and lubricants may result to silt-laden runoff during rainfall which may cause 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 (see Appendix 4 for outline). • Prioritize re-use of excess spoils and materials in construction activities. If spoils will be disposed, consult with local authority on designated disposal areas. • All earthworks must be conducted during dry season to the 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 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.	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 Indicator	Frequency of Monitoring	Cost and Source of Funds
		• 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, 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-	• 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).	Construction Contractor	• Location of stockpiles; • Number of complaints from sensitive receptors; • Heavy equipment and machinery with air pollution control devices; • Certification that vehicles are compliant with air quality standards.	• 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 Indicator	Frequency of Monitoring	Cost and Source of Funds
	specific within a relatively small area and reversible by mitigation measures.	• Monitor air quality.				
Acoustic environment	Construction activities will be on settlements, along 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	• 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 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).	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 Indicator	Frequency of Monitoring	Cost and Source of Funds
	measures.	• 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 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-	• Prepare the Debris Disposal Plan • Remove all construction and demolition wastes on a daily basis. • Coordinate with 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	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	• 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 Indicator	Frequency of Monitoring	Cost and Source of Funds
	term, site-specific within a relatively small area and reversible by mitigation measures.	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;		route and worksite cleared of any dust/mud		
B. Biological Characteristics						
Biodiversity	Activities being located in the built-up area of Joypurhat Pourashava. There are no protected areas in or around subproject sites,	• 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.	Construction Contractor	• PMO and PIU to report in writing the number of trees cut and planted if tree-cutting will be required (to be	• Visual inspection by PIU and supervision consultants on monthly basis • Frequency	• Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	and no known areas of ecological interest. There are no trees at the site that need to be removed.	• If during detailed design cutting of trees will be required, compensatory plantation for trees lost at a rate of 2 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.		determined during detailed design stage) • Number of complaints from sensitive receptors on disturbance of vegetation, poaching, fishing, etc.	and sampling sites to be finalized during detailed design stage and final location of) subproject components	
C. Socioeconomic Characteristics						
Existing provisions for pedestrians and other forms of transport	Road closure is not anticipated. Hauling of construction materials and operation of	• Prepare and implement a Traffic Management Plan (see Appendix 5 for sample) • Plan transportation routes so that heavy vehicles do not use	Construction Contractor	• Traffic route during construction works including number of permanent sign	• Visual inspection by PIU and supervision consultants on monthly basis	• Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	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.	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. • 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		ages, barricades and flagmen on worksite as per Traffic Management Plan (see Appendix 5 for sample); • Number of complaints from sensitive receptors; • Number of sign ages placed at project location • Number of walkways, sign ages, and metal sheets placed at project location	• Frequency and sampling sites to be finalized during detailed design stage and final location of) subproject components	

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		businesses and institutions during construction activities, so that there is no closure of these shops or any loss of client age. • 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 ROWs thus there is no requirement for land acquisition or any resettlements. Manpower will be required during the 10 months 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.	Construction Contractor	• Employment records; • Records of sources of materials • Records of compliance to Bangladesh Labor Law of 2006 and other applicable standards	• 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.
Other existing amenities for community welfare	Although construction of subproject components involves quite simple techniques of civil work, the	• Provide safety signage at all sites visible to public • Provide safety barriers near any trenches, and cover trenches with planks during non work hours. • Obtain details from Pourashava	Construction Contractor	• Utilities Contingency Plan Number of complaints from sensitive receptors	• Visual inspection by PIU and supervision consultants on monthly basis • Frequency	• Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	invasive nature of excavation and the subproject sites being in built-up areas of Joypurhat 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.	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 Joypurhat 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			and sampling sites to be finalized during detailed design stage and final location of) subproject components	

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		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. Poor safety signage and lack of barriers at work site and trenches will create hazard to pedestrians and children.	• Provide safety signage at all sites visible to public • Provide safety barriers near any trenches, and cover trenches with planks during non work hours. • 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 located at least 100 m away from the nearest dwelling preferably in the downwind direction. • Consult with 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	Construction Contractor	• Number of permanent signages, barricades and flagmen on worksite as per Traffic Management Plan (see Appendix 5 for sample); • Number of complaints from 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.	• 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 Indicator	Frequency of Monitoring	Cost and Source of Funds
		excavators to attain faster trenching progress. For rock and concrete breaking, use non-explosive blasting chemicals, silent rock cracking chemicals, and concrete breaking chemicals at (Contractor will be source). • 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				

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		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 national/regional environmental specialist's attention immediately; and (iv) taking remedial action as per national/regional environment 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 national/regional environmental 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	• 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	Construction Contractor	• Site-specific H&S Plan • Equipped first-aid stations • Medical insurance	• Visual inspection by PIU and supervision consultants on monthly basis	• Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	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.	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 ehaviour that are unclear. • Produce and implement 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 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		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 alarms • Permanent sign boards for hazardous areas • Signage's for storage and disposal areas • Condition of sanitation facilities for workers	• Frequency and sampling sites to be finalized during detailed design stage and final location of) subproject components	

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		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				

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		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 on existing roads and in built-up areas of Joypurhat Pourashava thus risk for chance of impacts 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	• 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.
E. Others						
Submission of EMP implementation report	Unsatisfactory compliance to EMP	• Appointment of supervisor to ensure EMP implementation • Timely submission of monitoring reports including pictures	Construction contractor	• Availability and competency of appointed supervisor • Monthly report	• Monthly monitoring report to be submitted by PIU to PMO • PMO to submit semi-annual monitoring	• Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
					report to ADB	
3. Post-construction Activities						
Post-construction clean-up	Damage due to debris, spoils, excess construction materials	• Remove all spoils wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and • All excavated roads shall be reinstated to original condition. • All disrupted utilities restored • All affected structures rehabilitated/compensated • 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. • All hardened surfaces within the construction camp area shall be ripped, all imported materials removed, and the area shall be top soiled and regressed using the guidelines set out in the revegetation specification that forms part of this document. • The contractor must arrange the cancellation of all temporary services. • Request PMO/CSS to report in writing that worksites and camps have been vacated and restored to pre-project conditions before acceptance of work.	Construction Contractor	• PMO/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.

Table 23: Environmental Management and Monitoring Plan – O&M Phase

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
A. Physical Characteristics						
Water quality	Run-off from debris/sediments from repair and maintenance of road and bridge 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.	• Take all precautions to prevent run-off into streams, watercourses, or irrigation system. Install temporary silt traps or sedimentation basins along drainage leading to the water bodies. • Remove all debris/sediments immediately. • Dispose debris/sediments at a designated site such as landfill.	Joypurhat Pourashava	No. visible degradation to nearby drainages, *khals* or water bodies due to construction activities	Duration of repair works	Included in O&M cost
Air quality	Moving debris/sediments may create dusts during dry season. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	Use tarpaulins to cover soils, sand and other loose material.	Joypurhat Pourashava	No of complaints from sensitive receptors	Duration of repair works	Included in O&M cost
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 Joypurhat 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 quickly.	Joypurhat Pourashava	No complaints from sensitive receptors	Duration of repair works	Included in O&M cost
B. Biological Characteristics						
Biodiversity	Activities in the built-up	• No trees, shrubs, or groundcover	Joypurhat	No of	Duration of	Included in O&M

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	area of Joypurhat Pourashava. There are no protected areas in or around subproject sites, and no known areas of ecological interest.	may be removed or vegetation stripped without the prior permission. • Prevent workers or any other person from removing and damaging any flora (plant/vegetation) and fauna (animal).	Pourashava	complaints from sensitive receptors	repair works	cost
C. Socioeconomic Characteristics						
Existing provisions for pedestrians and other forms of transport	Road closure is not anticipated. Traffic may be interrupted temporarily. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Maintain safe passage for vehicles and pedestrians during maintenance activities. • 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 maintenance 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.	Joypurhat Pourashava	No of complaints from sensitive receptors	Duration of repair works	Included in O&M cost

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		• Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.				
Workers health and safety	Workers need to be mindful of the occupational hazards working in confined spaces such as closed drains. 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. • Produce and implement a O&M 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 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 • 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; • Ensure the visibility of workers	Joypurhat Pourashava	• No of complaints from sensitive receptors • No of complaints from workers related to O&M activities • Zero accident	Duration of repair works	Included in O&M cost

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		through their use of high visibility vests when working in or walking through heavy equipment operating areas; • 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. • Disallow worker exposure to noise level greater than 85 dBA for a 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	Joypurhat Pourashava was established in 1984.	• 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.	Joypurhat Pourashava	Records of chance finds	Duration of repair works	Included in O&M cost

C. Institutional Capacity Development Program

167. The MDSC national and regional environmental specialists are 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 22.

Table 24: Training Program for Environmental Management

Items	Pre-construction/prior to construction	Construction	
Training Title	Orientation workshop	Orientation program/ workshop for contractors and supervisory staffs	Experiences and best practices sharing
Purpose	To aware the participants of the environmental safeguard requirements of ADB and GOB and how the project will meet these requirements	To build the capacity of the staffs for effective implementation of the designed EMPs aimed at meeting the environmental safeguard compliance of ADB and GOB	To share the experiences and best practices aimed at learning lessons and improving implementation of EMP
Contents	**Module 1: Orientation** • ADB Safeguards Policy Statement • Government of Bangladesh Environmental Laws and Regulations **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	• Roles and responsibilities of officials/contractors/consultants towards protection of environment • Environmental issues during construction • Implementation of EMP • Monitoring of EMP implementation • Reporting requirements	Experiences on EMP implementation – issues and challenges Best practices followed
Duration	1 day	1 day	1 day on a regular period to be determined by PMO, PIUs, and PMSC
Participants	LGED, DPHE, PMO, and PMO staffs (technical and environmental) involved in the project implementation	PMO/ PIUs Contractors	PMO /PIUs Contractors

D. Staffing Requirement and Budget

168. 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.

169. 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 MDSC environmental management specialist assisted by the PMO environment officer. The environmental management specialist will use the IEE as necessary and perform tasks as specified in the TOR. Therefore no separate budget required for MDSC environment management specialist.

170. 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.

171. The operation phase mitigation measures are again of good operating practices, which will be the responsibility of Joypurhat pourashava. All monitoring during the operation and maintenance phase will be conducted by LGED and DPHE, therefore, there are no additional costs. The indicative costs of EMP implementation are shown in Tables 23 and 24 (by source of funds).

Table 25: 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				Civil works contract
B.	Monitoring Measures						
1.	Air quality monitoring	- Pre-construction - Construction	Per location	2	30,000	60,000	Civil works contract
2.	Noise levels monitoring	- Pre-construction - Construction	Per location	20	10,000	200,000	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 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 1 – immediately upon engagement of the MDSC environmental specialists Module 2 – prior to award of civil works contracts (twice a year for 4 years) Module 3 – prior to start of Phase 2 and upon completion of the project	lump sum		Module 1 – 150000 Module 2 – 150000 Module 3 – 150000	450,000	Covered under MDSC contract
D.	Consultants Costs						
1.	MDSC national environmental specialist (1 person)	Responsible for environmental safeguards of the project	person months (spread over entire project implementation period)	40 person months	225000 per person month	90,00000	Remuneration and budget for travel covered in the MDSC contract
2.	MDSC regional environmental specialists (3 persons)	Responsible for environmental safeguards of the project	person months (spread over entire project implementation period)	40 each = 120 person-months	152,000 per person-month	18,240,000	Remuneration and budget for travel covered in the MDSC contract
E.	Administrative Costs						
1.	Legislation, permits, and agreements	Permit for excavation, tree-cutting	Lump sum		50,000	50,000	These consents

	Particulars	Stages	Unit	Total Number	Rate (Taka)	Cost (Taka)	Cost covered by
		permits, etc					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	Pourashava 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 requirement	Lump sum		300,000	Covered under MDSC contract
2.	GRM implementation	Costs involved in resolving complaints (meetings, consultations, communication, and reporting/information dissemination)		Lump sum		450,000	PMO/PIU cost
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	Civil works contract – contractor's insurance

Table 26 : Indicative Cost of EMP Implementation – Per Source of Funding

	Particulars	Stages	Unit	Total Number	Rate (Taka)	Cost (Taka)	Cost covered by
A. Contractors							
1.	Compensatory plantation measures	Construction	Per tree				Civil works contract
2.	Air quality monitoring	- Pre-construction - Construction	Per location	2	30,000	60,000	Civil works contract
3.	Noise levels monitoring	- Pre-construction - Construction	Per location	20	10,000	200,000	Civil works contract
4.	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.
5.	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	Civil works contract – contractor's insurance
	Subtotal					310,000	
B. MDSC							
1.	Public consultations and information disclosure	Information disclosure and consultations during preconstruction and construction phase, including public awareness campaign through media	As per requirement	Lump sum		300,000	Covered under MDSC contract
2.	(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 them on EMP implementation and environmental monitoring requirements related to mitigation measures; and taking immediate action to remedy unexpected adverse impacts or ineffective	Module 1 – immediately upon engagement of the MDSC environmental specialists Module 2 – prior to award of civil works contracts (twice a year for 4 years) Module 3 – prior to start of Phase 2 and upon completion of the project	lump sum		Module 1 – 150,000 Module 2 – 150,000 Module 3 – 150,000	450,000	Covered under MDSC contract

	Particulars	Stages	Unit	Total Number	Rate (Taka)	Cost (Taka)	Cost covered by
	mitigation measures found during the course of implementation; and (iii) lessons learned information sharing						
3.	MDSC national environmental specialist (1 person)	Responsible for environmental safeguards of the project	person months (spread over entire project implementation period)	40 person months	225,000 per person month	90,00000	Remuneration and budget for travel covered in the MDSC contract
4.	MDSC regional environmental specialists (3 persons)	Responsible for environmental safeguards of the project	person months (spread over entire project implementation period)	40 each = 120 person-months	152000 per person-month	18,240,000	Remuneration and budget for travel covered in the MDSC contract
	Subtotal					27,990,000	
C. Administrative Cost (Recurring) – PMO							
1.	Legislation, permits, and agreements	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	Pourashava cost for municipal infrastructures
2.	GRM implementation	Costs involved in resolving complaints (meetings, consultations, communication, and reporting/information dissemination)		Lump sum		1,000,000	PMO/PIU cost
	Subtotal					1,100,000	

IX. MONITORING AND REPORTING

172. PMO 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 PMO, PIUs, and MDSC will undertake site inspections and document review to verify compliance with the EMP and progress toward the final outcome. Corrective actions to be taken quickly and reported in monitoring reports.

173. MDSC will submit monthly monitoring and implementation reports to PMO, who will take follow-up actions, if necessary. PMO will submit semi-annual monitoring reports to ADB. 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.

174. 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 ADB.

175. ADB will review project performance against the 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. CONCLUTION AND RECOMMENDATIONS

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

177. Planning principles and design considerations have been reviewed and incorporated into the site planning process whenever possible. Preliminary designs integrate a number of measures, both structural and non-structural, to mainstream climate resilience into the subproject. Thus environmental impacts as being due to the project design or location were not significant.

178. Most of the individual elements of the subproject are relatively small and involve straightforward construction and operation, so impacts will be mainly localized and not greatly significant. Most of the predicted impacts are associated with the construction process, and are produced because that process is invasive, involving trenching and other excavation. However, the routine nature of the impacts means that most can be easily mitigated. In the operational phase, all facilities and infrastructure will operate with routine maintenance, which should not affect the environment. Facilities 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.

179. 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.

180. 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 and LGED 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.

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

182. The EMP will assist the PMO, MDSC, 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.

183. The citizens of Joypurhat will be the major beneficiaries of this subproject. With the new water supply system, they will be provided with a constant supply of better quality water piped into their homes and climate-resilient municipal services. In addition to improved environmental conditions, the subproject will reduce occurrence of water-related diseases and exposure to climate extremes. 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.

184. Therefore the proposed subproject is unlikely to cause significant adverse impacts and net environmental benefits to citizens of Joypurhat 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

185. As 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.

186. 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).

Appendix-1 View on Photographs

PHOTOGRAPH OF JOYPURHAT POURASHAVA WATER SUPPLY

Selected Site for New Pump House

Existing Production Tube well Site

Data Collection & Visit – existing Water Supply Site

Pump House

Existing Water Supply Distribution System – Joypurhat Pourashava

Appendix-2 Environment Clearance Certificate

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

Memo No: DOE/Clearance/5444/2015/187 Date:02/05/2016

Subject: Environmental Clearance for Third Urban Governance and Infrastructure Improvement (Sector) Project (UGIIP-III)

Ref : Your application dated 08/03/2016 and 12/04/2016.

With reference to the above, I have the pleasure to convey the approval of Environmental Clearance for Third Urban Governance and Infrastructure Improvement (Sector) Project (UGIIP-III) at 31 selected Pourashava in Dhaka, Chittagong, Rajshahi, Rangpur, Khulna and Sylhet Divisions.

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

02.05.2016

(Syed Nazmul Ahsan)
Director (Environment Clearance, c.c)
Phone # 02-8181673

Project Director
Third Urban Governance and Infrastructure
Improvement (Sector) Project (UGIIP-III)
Local Government Engineering Department (LGED)
Level-12, LGED Bhaban,Sher-E-Bangla Nagar
Agargaon, Dhaka-1207.

Copy Forwarded to :

1) PS to the Secretary, Ministry of Environment and Forests, Bangladesh Secretariat, Dhaka.
2) Director, Department of Environment, Dhaka/Chittagong Regional Office, Dhaka/Chittagong.
3) Director, Department of Environment, Rajshahi/Khulna/Sylhet Divisional Office, Bogra/Khulna/Sylhet.
4) Assistant Director, Office of the Director General, Department of Environment, Head Office, Dhaka.

Appendix-3 Rapid Environmental Assessment (REA) Checklist

Rapid Environmental Assessment (REA) Checklist for Screening of Water Supply Sub–Project

Name of Pourashava : Joypurhat	
Name of Sector	**Improvement of Water Supply infrastructure**
Sub-Project /Scheme	Installation of Production Tube Well & Laying of Distribution lines

SCREENING QUESTIONS	YES	NO	Remarks
A. Project Siting: Is the project area adjacent to or within any environmentally sensitive areas?			
➢ Densely populated?	√		Joypurhat pourashava covers 20.72 km^2 and population density 3,332 persons/km^2. The area is predominantly residential.
➢ Heavy with development activities?		√	The area is predominantly residential.
Adjacent to or within any environmentally sensitive areas?			
• Cultural heritage site		√	The subproject components are not within locations in or near sensitive and valuable ecosystems, including protected areas and forests.
• Protected Area		√	
• Wetland		√	
• Mangrove		√	
• Estuarine		√	
• Buffer zone of protected area		√	
• Special area for protecting biodiversity		√	
• Bay		√	
B. Potential Environmental Impacts: Will the Sub-Project causes ……..			
➢ pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture and soil erosion runoff?		√	Not applicable. The source is groundwater. Water quality tests conducted and findings suggest no issues.
➢ impairment of historical/cultural monuments/ areas and loss/damage to these sites?		√	Not applicable.
➢ hazard of land subsidence caused by excessive ground water pumping?		√	The potential abstraction rate is considered not to adversely impact the aquifer and is not envisaged to cause land subsidence.
➢ social conflicts arising from displacement of communities?		√	The proposed production tube wells (PTWs) and pipe laying will not require acquisition of private land. There are no encroachers/ squatters residential/ commercial structures within the identified land.
➢ conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters?		√	Not anticipated. The water source in Joypurhat is groundwater, based on bore tests, there is sufficient water in the aquifers to serve as a sustainable source for future demands.
➢ unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents) ?		√	Raw water will be chlorinated prior to distribution. Water quality of treated water is will meet with the Bangladesh Standards for Drinking Water.
➢ delivery of unsafe water to distribution system?		√	The subproject will provide treated

SCREENING QUESTIONS	YES	NO	Remarks
			water through installation of new pipeline.
➢ inadequate protection of intake works or wells, leading to pollution of water supply?		√	The PTWs and pump house will be secured and accessible to only authorised persons.
➢ over pumping of ground water, leading to salinization and ground subsidence?		√	The abstraction rate is considered not to adversely impact the aquifer and is not envisaged to cause land subsidence.
➢ excessive algal growth in storage reservoir?		√	Not anticipated. Water will be supplied from the PTWs straight to the users.
➢ increase in production of sewage beyond capabilities of community facilities?		√	Sanitation improvements planned under the project including awareness building
➢ inadequate disposal of sludge from water treatment plants?		√	Not applicable.
➢ inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities ?		√	Not applicable.
➢ impairments associated with transmission lines and access roads?	√		Anticipated during construction activities. However, impacts are temporary and shorten duration. The EMP includes measures to mitigate impacts.
➢ health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals.		√	Chlorine dosing will be done through chlorinators in PTWs. Separate storage areas for the chemicals have been included in the preliminary design of the PTWs.
➢ health and safety hazards to workers from handling management of chlorine used for disinfection and other contaminants, and biological and physical hazards during project construction and operation?		√	Personal protective equipment will be provided to workers. Regular training will also be conducted to ensure that workers are aware of construction hazards and risks of chemicals during O&M.
➢ dislocation or involuntary resettlement of people		√	No displacement of communities is required in this subproject
➢ disproportionate impacts on the poor, women and children, indigenous peoples or other vulnerable groups?		√	Not applicable
➢ noise and dust from construction activities?	√		Anticipated during construction activities. However, impacts are temporary and short in duration. The EMP includes measures to mitigate impacts.
➢ increased road traffic due to interference of construction activities?	√		Anticipated during construction activities. However, impacts are temporary and short in duration. The EMP ensures measures are included to mitigate impacts. Construction contractors will be required to coordinate with local traffic police.
➢ continuing soil erosion/silt runoff from construction operations?	√		The construction areas are all flat lands; soil erosion and silt run-off are least expected except during monsoon months. The EMP includes measures to mitigate impacts. Construction contractors will be required to include

SCREENING QUESTIONS	YES	NO	Remarks
			silt traps or canalizations where required
➢ delivery of unsafe water due to poor O&M treatment processes (especially mud accumulations in filters) and inadequate chlorination due to lack of adequate monitoring of chlorine residuals in distribution systems?		√	The O&M Manuals include schedule for and appropriate chemical dosing
➢ delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals?		√	Not Anticipated. Water quality will be regularly monitored by pourashava through the mini water testing laboratory to be procured under the subproject. .
➢ accidental leakage of chlorine gas?		√	Not anticipated. Chlorine gas will not be used. Sodium or calcium hypochlorite will be used in the chlorination process
➢ excessive abstraction of water affecting downstream water users?		√	Not applicable
➢ competing uses of water?		√	Not applicable
➢ increased volume of sullage (wastewater from cooking and washing)and sludge from wastewater treatment plant	√		Joypurhat will undertake sanitation improvement subproject. No WTP to be constructed under the subproject.
➢ Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		√	Improved water supply management systems through capacity building and institutional development will ensure reduced burden on services and infrastructure.
➢ social conflicts between construction workers from other areas and community workers?		√	Priority in employment will be given to local residents.
➢ 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 applicable. Construction will not involve use of explosives and chemicals.
➢ 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 decommissioning?	√		Operational areas will be clearly demarcated and access will be controlled. Only worker and project concerned members will be allowed to visit the operational sites.
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.			
▪ Is the project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes?	√		Low lying areas of Joypurhat 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 into the Joypurhat water supply subproject, including: (i) structural protection of facilities from future floods; (ii) standalone power backup for the PTWs and pumping stations; and (iii) promote more efficient use of water by reducing losses and wastage to counter increased demands due to higher temperatures.
▪ Could changes in temperature, precipitation, or extreme events patterns over the project life span affect technical or financial sustainability (e.g., increased erosion or landslides could increase maintenance costs, permafrost melting or increased soil moisture content could affect sub-grade)?	√		

SCREENING QUESTIONS	YES	NO	Remarks
▪ 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 encouraging settlement in areas that will be more affected by floods in the future, or encouraging settlement in earthquake zones)?		√	

Appendix-4 Outline for Spoil Management Plan-Water Supply Subproject

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-5 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:

    - the safety of pedestrians, bicyclists, and motorists travelling through the Construction zone;
    - Protection of work crews from hazards associated with moving traffic;
    - mitigation of the adverse impact on road capacity and delays to the road users;
    - Maintenance of access to adjoining properties; and
    - 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.

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

3. Figure A2 to Figure A3 illustrates the operating policy for TMP for the construction of water pipes and the sewers along various types of roads.

C. Analyse 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:
    - approval from the ULB/CMC/Public Works Department (PWD) to use the local streets as detours;
    - 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;
    - determining of the maximum number of days allowed for road closure, and 3 incorporation of such provisions into the contract documents;
    - determining if additional traffic control or temporary improvements are needed along the detour route;
    - considering how access will be provided to the worksite;
    - contacting emergency service, school officials, and transit authorities to determine if there are impacts to their operations; and

- 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.

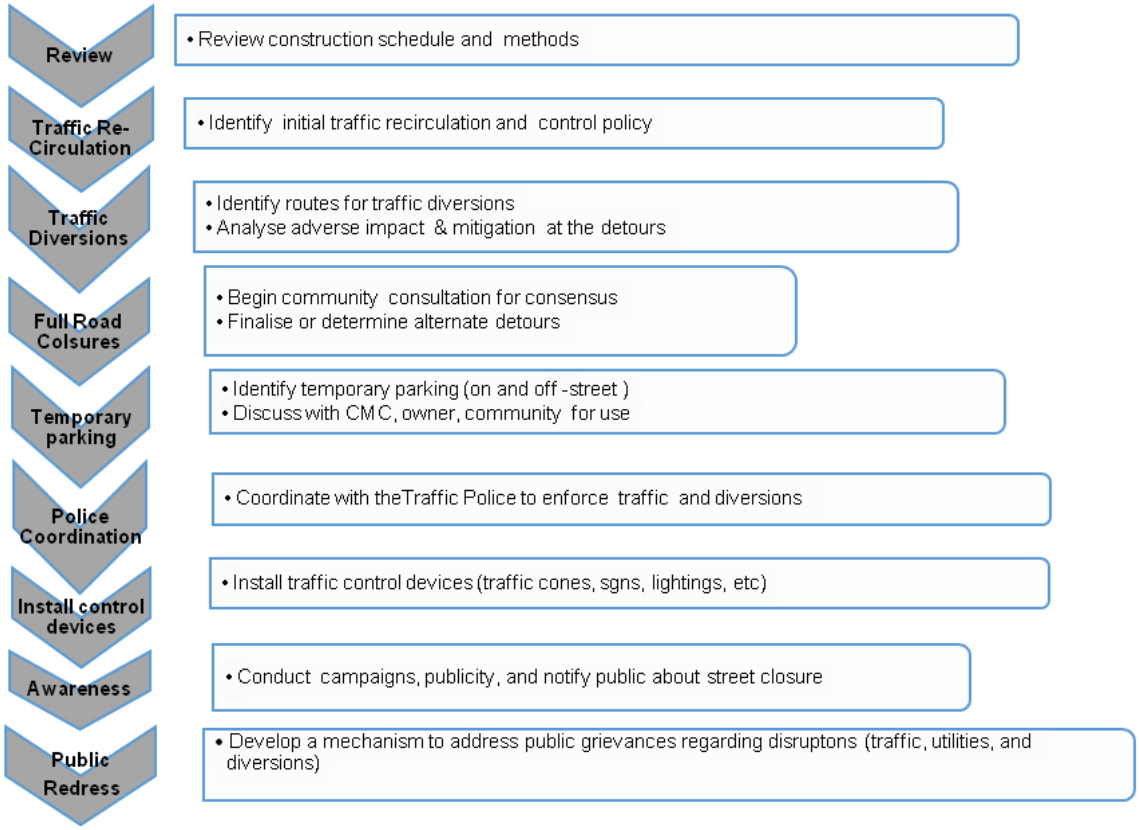


Figure A1: Policy Steps for the TMP

D. Public awareness and notifications

6. 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.

7. 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.

8. The PIU will also conduct an awareness campaign to educate the public about the following issues:
   - traffic control devices in place at the work zones (signs, traffic cones, barriers, etc.);
   - defensive driving behaviour along the work zones; and
   - reduced speeds enforced at the work zones and traffic diversions.

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

10. 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 centres. 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:
    - explain why the brochure was prepared, along with a brief description of the project;
    - advise the public to expect the unexpected;
    - educate the public about the various traffic control devices and safety measures adopted at the work zones;
    - educate the public about the safe road user behaviour to emulate at the work zones;
    - 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 indicate the office hours of relevant offices.

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

11. 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

12. 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").

13. Figure A4 to Figure A5 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

14. 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.

15. 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 LGED 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.

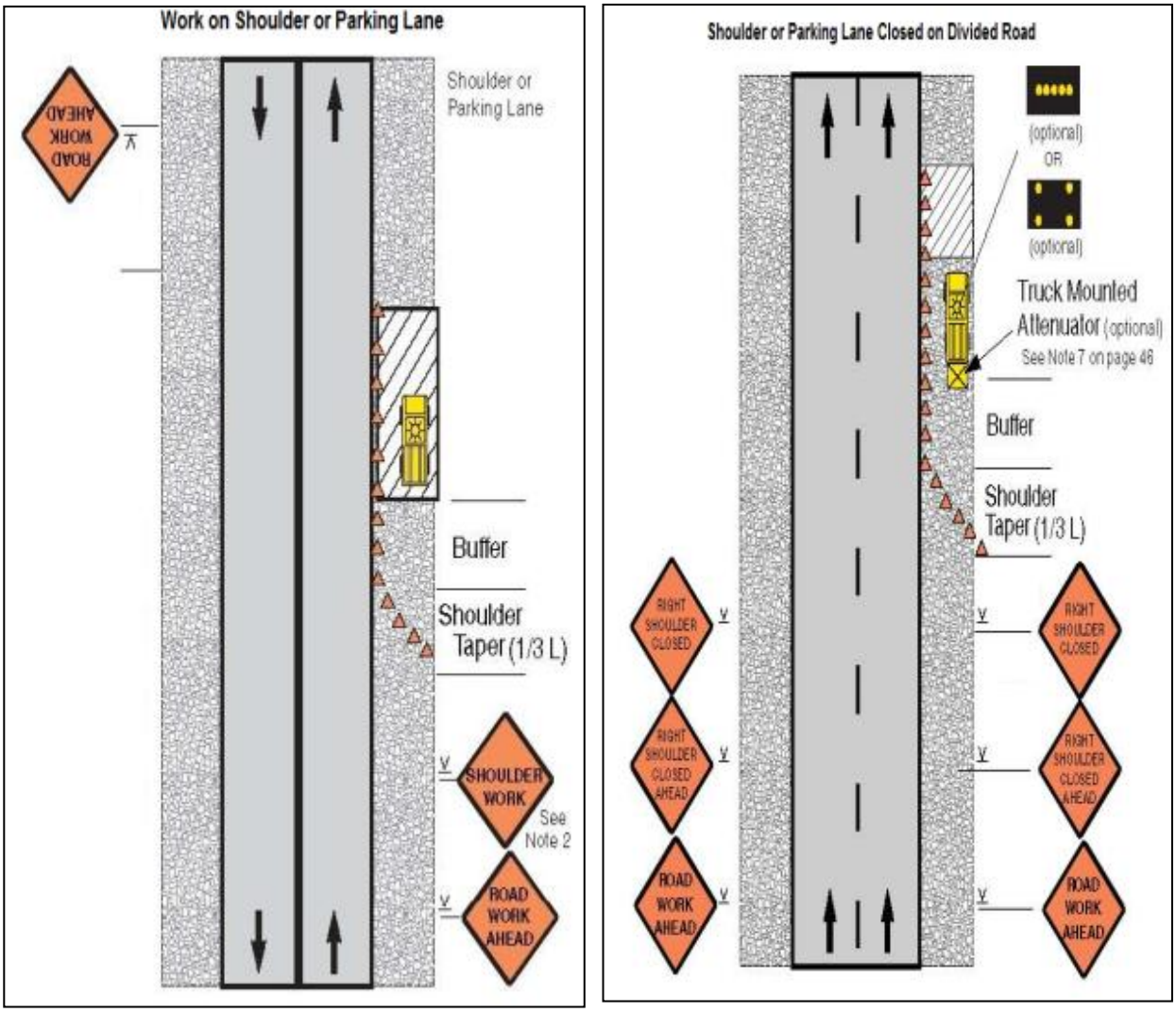


Figure A2 & A3: Work on shoulder or parking lane and shoulder or parking lane closed on divided road

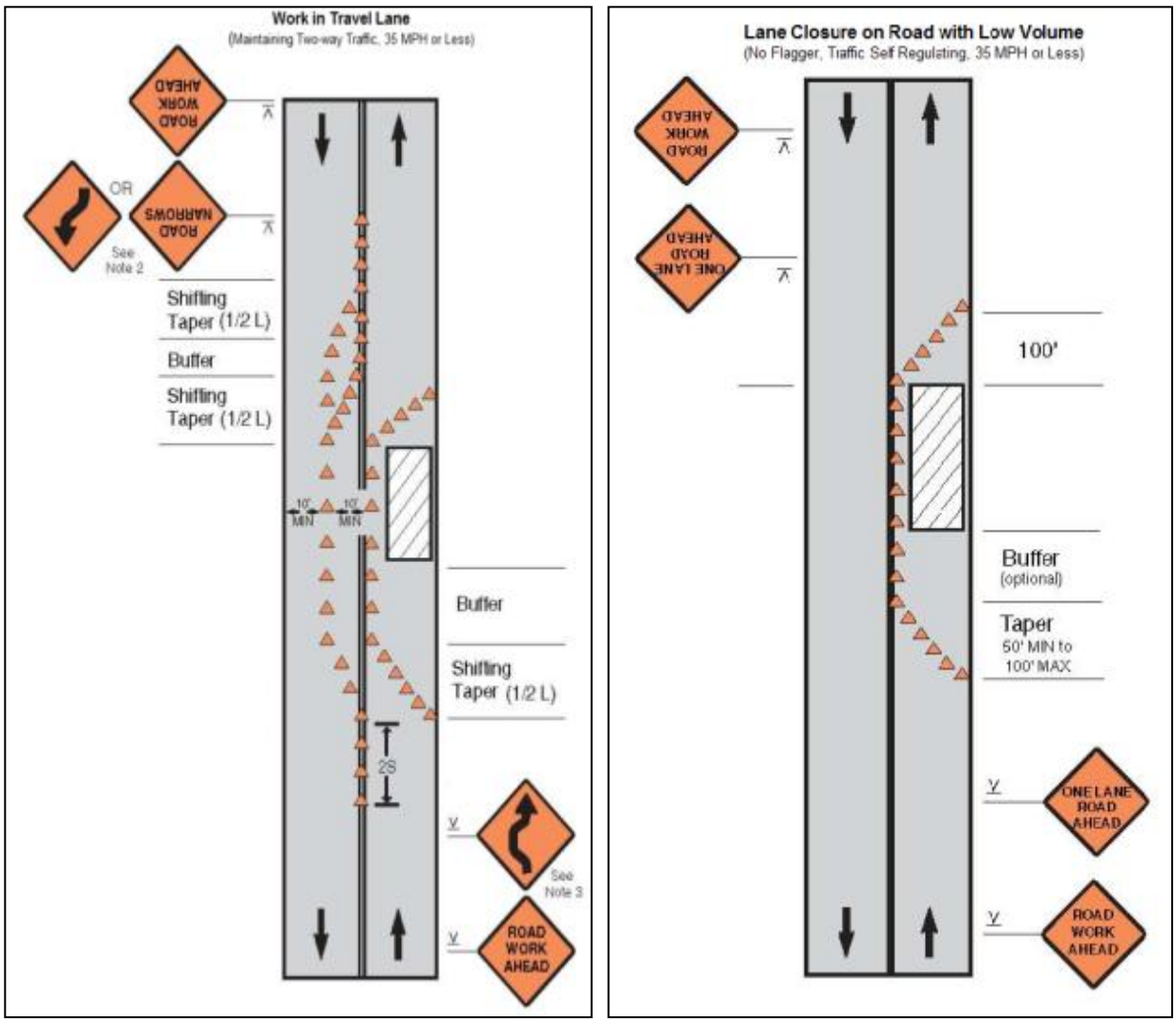


Figure A4 & A5: Work in Travel lane & Lane closure on road with low volume

Appendix-6 Records of Public Consultation

MDS Consultancy Services for
Third Urban Governance & Infrastructure Improvement Project (UGIIP-III)

PUBLIC CONSULTATION MEETING – RESETTLEMENTASSESSMENT

Name of Pourashava : JOYPURHAT.

Name of Location : Khanjanpur Production Tube well Instalation. (Ward-02)

Visit / Meeting Date : 09-12-2015 Time : 4:50 P.M.

Attendance / List of Participants:

Sl. No.	Name	Address	Occupation	Signature
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				

Public Consultation in front of a water supply site, Joypurhat Pourashava

Table: Issues of the Public Consultation- Design Phase

SI No	Key Issues/Demands	Perception of Community	Action to be Taken
01	Awareness of the project including coverage area	Yes, they are aware of the project that will be improved	No need to take action.
02	In what way they may associate with the project	They will give all types of cooperation for implementation of the project	More consultation before start of the project.
03	Presence of any forest, wildlife or any sensitive/unique environmental components nearby the project area	No such information available.	No need to take action.
04	Presence of historical/cultural/ religious sites nearby	No such information available.	No need to take action.
05	Unfavourable climatic condition	No such information available.	No need to take action.
06	Occurrence of flood	Proposed site not flooded	No need to take action.
07	Drainage and sewerage problem facing	Not facing drainage problem.	No need to take action.
08	Present drinking water problem-quantity and quality	Drinking water collected by individual deep/shallow tube well	Poura Authority should take more attention to supply drinking water to paura people
09	Present solid waste collection and distribution problem	Yes, Has solid waste collection and disposal problem	Need improved solid waste collection and disposal system. Pourashava can solve this problem.
10	Availability of labour during construction time	Yes, Local labour is available.	No need to take action.
11	Access road to project site	Yes, it is by the side of road, so it will provide access.	No need to take action.
12	Perception of villagers on tree felling and a forestation	Yes, no tree felling in this project.	No need to take action.
13	Dust and noise pollution disturbances during construction work	Yes, they know the impact will be short-term & negligible.	EMP will be prepared to minimize the impact.
14	Setting up construction camp site within the villages/project locality	Yes, no construction camp is required for this sub-project.	No camp or storage site within locality
15	Safety of residents during construction phase and plying of vehicle for construction activities	Yes, they are aware of the safety issues.	Awareness programs will be taken before start of the construction work.
16	Conflicts among beneficiaries downstream users-water supply project using of river water	No use of community water in this project.	No need to take action.
17	Requirements of enhancement of other facilities	Road improvement will enhance the facilities.	No need to take action.
18	Whether local people agreed to sacrifice their lands (cultivable or not) for beneficial project after getting proper compensation	No further land is required.	No need to take action.

Summary of Outcome: For this subproject no further land is required. People are aware of the project, they want uninterrupted piped water supply and stand points at the road crossing and in the urban residential area. They are ready to co-operate the municipality for the implementation of this subproject. It is not going to impact any tree, religions structure and water resource and heritage structure. People are aware of the short term problems but ready to manage the same for their better interest. More supply of safe drinking water in a locality

will improve the quality of life of the people in that locality and Pourashava and ultimately certain section of Bangladesh.

Appendix-7 Special Condition for Environment Code of Practice (ECOP)

Special Condition for Environment Code of Practice (ECOP) of Water Supply Sub-project of Joypurhat Pourashava

Sl. No	Issues	Management Measures	Action By
1	Excavation/ Cutting, filling and clearing of water supply alignments	During excavating / cleaning work the safety measures need to be taken by the construction crew such as wearing protective clothing, shoes, gloves and face masks. Collected earth and sand need to be cover during transportation.	Contractor
2	Dust & Cleaning	Regular sprinkling of water in the vicinity of the construction site is necessary so that dust is not re-suspended. Frequency of the sprinkling to be three times a day or more based on the extent of activity and dryness of the season; Cleaning to be done in a manner that does not generate or re-suspend dust.	Contractor
3	Site preparation for civil works	Proper notification should be provided to the public surrounding the construction site. A notice board informing the proposed work should be erected two weeks prior to actual work. An alternative road/detour route need to be constructed for temporary passing the people, rickshaw, van, car private etc.	Contractor/PIU
4	Public awareness campaign	A public awareness need to be done before start to the work. This awareness campaign may be done through making posters and sign board near the construction areas.	PIU
5	Noise	Use of ear plugs/muffs is necessary by all construction workers during operation of heavy equipment/machinery; Wherever feasible, noise absorption padding/enclosures should be used surrounding the noise-generating machinery.	Contractor
6.	Pedestrian & traffic safety	Extensive barricading of the construction zone should be provided so that pedestrians do not come into direct contact with the machines, tools, material and other accessories; Provision of barricading to be done so that these do not create traffic safety problems; Supplementary aids/tools such as signboards, reflectors and night lighting to be used to avoid possible accidents.	Contractor
7	Tree-cutting & Safeguards	Compensatory tree plantation in the ratio of 2 trees planted for every tree that had to be cut due to construction activities; Any tree saved from cutting should be barricaded and protected by the Contractor.	PIU
8	Debris/spoil management	Well-defined onsite area for storing of any debris generated; Transporting debris with proper coverage; Disposal in an approved dump yard/landfill.	Contractor
9	Worker safety	Provision of personal protection equipment (PPE) such as helmets, boots and face masks for the workers; Provision of first aid box with basic items.	Contractor
10	Transporting construction material	Transporting with adequate safety precautions, e.g. not to use under-sized trucks. Adequate covering of trucks that are used to transport material to and from the construction site.	Contractor
11	Storing construction	Well-defined area for storage with suitable containment as required. Proper labelling of different items	Contractor

Sl. No	Issues	Management Measures	Action By
	material		
12	Worker camps	Adequate disposal of sanitary waste need to be considered in order to follow best waste management practices. Basic hygiene and cleanliness in the worker camps, if any. In particular, toilet facilities should be well-maintained with basic provision of soak pits & septic tanks. Drinking water should also be provided to the workers.	Contractor
13	Monitoring	Ensuring compliance to the ECR rules in terms of ambient air and noise monitoring data.	PIU
14	ECOP for LGED	Need to campaign among the mass about the awareness of the importance of the road, not to create any obstacle on the road side drain, abstain disposal of solid waste to the road side drain etc. Ensuring compliance to the ECR rules in terms of solid waste disposal, ambient air and noise monitoring data during operational period.	PIU