REVISED INITIAL ENVIRONMENTAL EXAMINATION (IEE) for DMA 610, 611 & 613

DISTRIBUTION NETWORK IMPROVEMENT PACKAGE NO. ICB 02.7

DHAKA ENVIRONMENTALLY SUSTAINABLE WATER SUPPLY PROJECT
LOAN NO.: 3051 BAN (SF)

NOVEMBER 2017

Updated by Management and Supervision Consultants (MSC) for ICB 02.7 of Dhaka Environmentally Sustainable Water Supply Project (DESWSP) of Dhaka Water Supply and Sewerage Authority (DWASA), Government of Bangladesh (GoB) for the Asian Development Bank (ADB)

CURRENCY EQUIVALENTS

(As per contract)

Currency unit	–	Bangladeshi Taka (BDT)
BDT 1.00	=	$ 0.01275
$ 1.00	=	BDT 78.40

ABBREVIATIONS

ADB	–	Asian Development Bank
AP	–	Affected Person
DMA	–	District Metering Area
EMP	–	Environmental Management Plan
GRC	–	Grievance Redressal Committee
GRM	–	Grievance Redress Mechanism
IEE	–	Initial Environmental Examination
NRW	–	Non-Revenue Water
O&M	–	Operations And Maintenance
PMU	–	Project Management Unit
REA	–	Rapid Environmental Assessment
SPS	–	Safeguard Policy Statement
HDD		Horizontal Directional Drilling

WEIGHTS AND MEASURES

km	–	kilometer
km^2	–	square kilometer
m^2	–	square meter
mm	–	millimeter
m^3/day	–	cubic meter per day

NOTE

In this report, "$" refers to US dollars.

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EXECUTIVE SUMMARY

1. **Background**. Dhaka Environmentally Sustainable Water Supply Project (DESWSP) is the part of Water Supply Sector Development Program into Dhaka Metropoliton Area and jointly financed by Asian Development Bank (ADB) and the Government of Bangladesh (GoB). The aim of the Project is to improve the water supply network of Dhaka city by forming District Metering Areas (DMAs); rehabilitation of water lines; and replacement of service connections. The package No. ICB 02.7 is organized as a part of DESWSP and the implementation process is similarly as all contracts under Dhaka Water Supply Sector Development Project (DWSSDP).

2. **Program Description**. The project is expected as contribute to the sustained economic growth and public health improvement in urban water supply sector, particularly in Dhaka Metropolitan Area, through the improvement of living standard in the basic human needs by improving the water supply. The supply of clean water will impact on reduction in child mortality and improvement of general health, conversion to economic activity by saving time to fetch and to store water and conservation of precious natural resources the surface and ground water.

3. **Implementation Arrangements**. Dhaka Water Supply and Sewerage Authority (DWASA) is both the Executing Agency (EA) and the Implementing Agency (IA). A Project management unit (PMU) has been established for effective execution and implementation. The PMU will be assisted by Management and Supervision Consultants (MSC) in (i) construction of distribution network system and quality management; (ii) capacity building and institutional strengthening; and (iii) project management and implementation support.

4. **Project Investments**. The draft IEE was prepared during outline design for rehabilitation of distribution networks in 16 DMAs (DMA 601 to 616) as covered by Package No. ICB 02.7. This report is prepared based on the draft IEE and approved Environmental Management Plan (EMP) for 03 (three) DMAs (DMA No. 610, 611 & 613). Under the Package No. ICB 02.7, the following works were planned during outline design: (i) Survey and Documentation including Detailed Design, Specifications, Design Report and Design Control Services; (ii) Supply, Laying and Commissioning of Distribution, Transmission, and Reticulation Pipes; (iii) Rehabilitation of Service Connections; and (iv) Rehabilitation of Production Tubewells (PTWs). Package No. ICB 02.7 is expected to have the following benefits: (i) Rehabilitation of Distribution Network which will result in substantial reduction in water losses in the project area; and (ii) proper accounting for use of water and system losses by installation of metered connections. For efficient and effective execution, the package is being implemented through a design-built contract, i.e. the civil works contractors also prepare the detailed designs.

5. **Legal Framework**. The legal framework and principles adopted for addressing environmental issues in the proposed project have been guided by the existing legislation and policies of the GoB and ADB.

6. ADB requires the consideration of environmental issues in all aspects of its operations, and the requirements for environmental assessment are described in ADB's Safeguard Policy Statement (SPS), 2009. According to the SPS, Environmental Assessment (EA) is required for all projects under a program loan modality. This IEE report was prepared to meet the following objectives: to (i) assess the project's likely positive and negative direct and indirect impacts to physical, biological, socioeconomic, and physical cultural resources in the project's area of influence; (ii) identify mitigation measures and any residual negative impacts that cannot be mitigated; (iii) describe the process undertaken during project design to engage stakeholders, and the planned information disclosure measures and the process for carrying out consultation

with affected people and facilitating their participation during project implementation; (iv) describe the project's grievance redressal mechanism for resolving complaints about environmental performance; (v) present the set of mitigation measures to be undertaken to avoid, reduce, mitigate, or compensate for adverse environmental impacts; (vi) describe the monitoring measures and reporting procedures to ensure early detection of conditions that necessitate particular mitigation measures; and (vii) identify who is responsible for carrying out the mitigation and monitoring measures.

7. **Environmental Management Plan**. The project site is located in the built-up area of Dhaka City and is not within or adjacent to environmentally sensitive areas such as protected areas, wetlands, buffer zones of protected area, and special areas for protecting biodiversity.

8. Planning principles and design considerations were reviewed and incorporated into the site planning process whenever possible; thus, environmental impacts due to the project design or locations are not significant. However, the social impacts (access disruptions) due to construction activities are not avoidable, as residential and commercial establishments exist along the project corridor. Resettlement Plan (RP) of DMA 610 & 613 has been developed and RP for DMA 611 is being developed in accordance with ADB SPS, 2009 and Bangladeshi laws and regulations.

9. An environmental management plan (EMP) was developed during project preparation and the EMP has now been updated based on survey and detailed design of DMA 610, 611 & 613 to provide specific actions deemed necessary to assist in mitigating the environmental impacts, guide the environmentally-sound execution of the proposed project, and ensure efficient lines of communication between the implementing agency, project management unit, consultants, and contractors. The EMP also provides a proactive, feasible, and practical working tool to enable the measurement and monitoring performance on-site.

10. **Public Consultation**. 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. The IEE includes the activities undertaken during detailed design stage to engage the stakeholders, and planned information disclosure measures and processes for carrying out consultation with affected people and facilitating their participation during implementation stage.

11. **Grievance Redressal Mechanism**. The program's grievance redressal mechanism provides the citizens with a platform for redressal of their grievances and describes the informal and formal channels, time frame, and mechanisms for resolving complaints about environmental performance.

12. **Categorization**. As per ADB SPS 2009 the project package no. ICB-02.7 is classified as **Environmental Category B** and does not require further Environmental Impact Assessment (EIA). As per Bangladeshi laws, the proposed project requires a Location Clearance Certificate and an Environmental Clearance Certificate (ECC) from the Department of Environment (DoE).

1. INTRODUCTION

A. Purpose of the Report

13. The ongoing Dhaka Water Supply Sector Development Project (DWSSDP) covers approximately 80% of the area and 70% of the population of Dhaka City and is jointly financed by Asian Development Bank (ADB) and the Government of Bangladesh (GoB). The aim of the Project is to improve the water supply network of Dhaka City by dividing the network into approximately 100 District Metering Areas (DMAs);[1] rehabilitation or replacement of water lines between diameter 75 mm to 560 mm; construction / rehabilitation of 39 overhead reservoirs; and replacement of approximately 175,000 connections serving more than 8 million people.

14. The project will contribute to sustained economic growth and public health improvement, in urban water supply sector, particularly in Dhaka Metropolitan Area, through the improvement of living standard in the basic human needs by improving the water supply. The supply of clean water will impact on reduction in child mortality and improvement of general health, conversion to economic activity by saving time to fetch and to store water and conservation of precious natural resources the surface and ground water.

15. Dhaka Water Supply and Sewerage Authority (DWASA) will be designated as the both Executing Agency (EA) and the Implementing Agency (IA). The project will implement network rehabilitation in Zones-2 and Zone-6 covering 31 hydraulic areas (DMAs). Dhaka Environmentally Sustainable Water Supply Project (DESWSP) was formed as a part of DWSSDP and the implementation process of all contacts are similar. The implementation contracts (packages) under DESWSP will approximately take about 30 to 36 months, with for Package No. ICB 02.7 about 36 months.

16. DWSSDP has been classified by ADB as **Environment Category B** (some negative impacts but less significant than category A). The IEE was prepared similarly as to previous IEEs under DWSSDP. The environmental impacts of the investments under Package No. ICB 02.7 were identified and assessed as part of the planning and design process, and actions will be taken to reduce those impacts to acceptable levels. An environmental assessment using ADB's Rapid Environmental Assessment (REA) Checklist for Water Supply (Appendix 1) was conducted and results of the assessment show that the project is unlikely to cause significant adverse impacts. Thus, this IEE was prepared in accordance with ADB SPS's requirements for environment **Category B** projects.

17. The activities under the Package No. ICB 02.7 includes (i) survey and documentation including detailed design, specifications, preparation of quality assurance and design report, and design control services (ii) supply, laying and commissioning of distribution, transmission, and reticulation pipes; (iii) rehabilitation of service connections; and (iv) rehabilitation of production tubewells (PTWs) headworks. The proposed project is expected to have the following benefits: (i) rehabilitation of distribution network which will result in substantial reduction in water losses in the project area; and (ii) proper accounting for use of water and system losses by installation of metered connections.

[1] A DMA is defined as a geographical area served by water distribution network which can be isolated hydraulically from neighboring areas.

2. POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK

A. ADB Policy

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

19. **Screening and categorization.** The nature of the environmental assessment required for a project depends on the significance of its environmental impacts, which are related to the type and location of the project; the sensitivity, scale, nature, and magnitude of its potential impacts; and the availability of cost-effective mitigation measures. Projects are screened for their expected environmental impacts, and are assigned to one of the following four categories:

(i) **Category A.** Projects could have significant adverse environmental impacts. An EIA is required to address significant impacts.

(ii) **Category B.** Projects could have some adverse environmental impacts, but of lesser degree or significance than those in category A. An IEE is required to determine whether significant environmental impacts warranting an EIA are likely. If an EIA is not needed, the IEE is regarded as the final environmental assessment report.

(iii) **Category C.** Projects are unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are reviewed.

(iv) **Category FI.** Projects involve a credit line through a financial intermediary or an equity investment in a financial intermediary. The financial intermediary must apply an environmental management system, unless all projects will result in insignificant impacts.

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

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

(i) For environmental category A projects, draft EIA report at least 120 days before Board consideration;

(ii) Final or updated EIA and/or IEE upon receipt; and

(iii) Environmental monitoring reports submitted by the Project Management Unit (PMU) during project implementation upon receipt.

22. This project, as explained above has been classified by ADB as Category B, because it is not expected to have major negative environmental impacts. Under ADB procedures such projects require an IEE to identify and mitigate the impacts and to determine whether further study or a more detailed EIA may be required.

B. National Laws

23. The implementation of the projects will be governed by Government of Bangladesh environmental acts, rules, regulations, and standards. These regulations impose restrictions on the activities to minimize/mitigate likely impacts on the environment. It is the responsibility of DWASA to ensure projects are consistent with the legal framework, whether national, state, or municipal/local. Compliance is required in all stages of the project, including design, construction, and operation and maintenance.

24. The main provisions for environmental protection and pollution control in Bangladesh are contained in the Environmental Conservation Rules (ECR) 1997. This legislation also provides the principal mechanism for assessing and mitigating the environmental impacts of projects, both existing and proposed. Projects are classified as **Green**, **Orange** and **Red** depending on their location and environmental impacts, and Schedule 1 of the law indicates that "water, power and gas distribution line laying/relaying/extension" are considered as **Red Category** activities.

25. Rule 7 states that the proponent of such projects must obtain a Location Clearance Certificate and an Environmental Clearance Certificate (ECC) from the DoE. For proposed Red Category projects this requires submission to the relevant DoE Divisional Officer of the following:

(i) Completed application for ECC, and the appropriate fee, shown in Schedule 13 of the Rules;

(ii) Report on the feasibility of the project;

(iii) Report on the IEE for the project, Terms of Reference (TOR) for an EIA of the project, and its process flow diagram; or an EIA prepared from a previously approved TOR, layout plan, process flow diagram, and design and time schedule;

(iv) No Objection Certificate (NOC) from the local authority;

(v) Emergency plan relating adverse environmental impact and plan for mitigation of the effect of pollution; and

(vi) Outline of the relocation and rehabilitation plan (where applicable).

26. Discussions with DoE in August 2006 suggested that the IEE, Resettlement Framework and other study reports prepared during DWSSDP preparation in 2006 should fulfill a substantial proportion of the national EIA requirements. Upon submission of the necessary documents including draft IEE for ICB 02.7, Environmental Clearance Certificate is obtained and is available at Project Management Unit (PMU) office.

3. DESCRIPTION OF THE PROJECT

A. Existing Condition and Need for the Project

27. At present DWASA provides around 2.0 million cubic meters of water per day to the population of Dhaka. Approximately 85% of this water comes from over 600 deep tube wells (production tube wells) spread throughout the city area. The aggregate transmission and distribution network length is around 3,000 km with over 250,000 service connections. The project is needed because DWASA presently provides an inadequate water supply service to

the residents of Dhaka, which has insufficient pressure, suffers significant losses, is rapidly depleting the groundwater resource, and delivers insufficient cost recovery to the government. The project will address all of these issues by refurbishing the existing network to repair leaks, increase capacity and pressure, remove illegal connections and provide a new system of metering to streamline leak detection and aid cost recovery.

28. In the Package No. 02.7 of Dhaka Environmentally Sustainable Water Supply Project (DWSWSP) area are dividing into 16 DMAs (DMA 601 - 616), which is characterized by high population density, narrow roads, and high traffic congestion at most times of the day. Among these the DMA-610, 611 & 613 are designated as densely populated with high water demand. The water supply situation is characterized by the deep tube wells, inadequately sized, leaking and low-quality pipes, low workmanship, low operating pressures, inaccurate and inadequate data about location of pipes and service connections, and inaccurate and inadequate data about location of other utility lines.

29. The network in the 03 DMAs (DMA-610, 611 & 613) is currently supplied by limited surface water and ground water from deep tubewells. There is no clear distinction between transmission mains and distribution mains which mean laterals and reticulation are often connected to large diameter pipes resulting in loss of pressure and increased leakage. The pipes are mainly buried towards the centre of roads and streets, with larger diameter pipes (>150 mm) generally located in main roads and smaller pipes in minor roads. The pipes are built from a range of asbestos cement (AC), ductile iron (DI), steel (MS) and polyvinyl chloride (PVC) pipe. The majority of newer pipe is PVC.

B. Proposed Components

30. Package No. ICB 02.7 includes (i) rehabilitation and extension of 376-km (as per outline design) distribution network in 16 DMAs (DMA 601 to 616); (ii) replacement of all fitting of all production tube wells;[2] (iii) service connections including installations of meter chamber, domestic meters and floating valve; and (iv) installations of valves, bulk meters and loggers, etc. For efficient and effective execution the package will be implemented through a design-built contract, i.e. the civil works contractors will also prepare the detail designs. The package is being implemented in groups containing 3-4 DMAs in each group. Appendix 7 shows an implementation plan of package ICB 02.7 where DMA 610, 611 & 613 are considered as 4th Group. The main activities (the works) of the contract is expected, as a minimum, to comprise the following steps:

(i) Survey;[3]

(ii) Resettlement plan implementation;[4]

(iii) Design comprising of (a) detailed survey of area (location of water pipes, service connections, valves, tube wells, bulk meters, and other utility lines); (b) detailed

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[2] The Contractor will be responsible to replace all fittings from existing tube well head to the delivery main, e.g. 200/250 mm diameter pipe, non-return valve, pressure meter, flow meter, gate valve, washout pipe with valve, air release valve, bends, flange adapter, support, among others as indicated in the detailed design and drawings for production tube wells.

[3] To establish (i) location of existing water and other utility infrastructure; (ii) location of service connections; and (iii) location of existing valves, meters, and production tube wells

[4] The Contractor will be responsible in implementing the Resettlement Plan (RP) prepared by DWASA and/or resettlement NGO. No civil works will be allowed to begin until all compensation to affected persons is paid.

network modeling of areas and updating of basic model (outline design) with additional information obtained from survey; and (c) submission of detailed design package of area including design drawings (1:2000) and expected work methodologies for each DMA;

(iv) Pipe works comprising of (a) disconnection of cross connections between DMAs; (b) installation of bulk meters and valves at all needed cross connections between DMAs; (c) repair/rehabilitation or replacement of existing pipes according to outline design;[5] (d) extension of network to areas not adequately served;[6] and (e) pressure testing of each section of rehabilitated/replaced or new laid pipe.

(v) Service connections[7] comprising of (a) installing a meter chamber for each existing connection; (b) connecting the meter chamber with the water pipes, using new materials; (c) installing water meter in meter chamber; (d) pressure testing of each service connection; and (e) installing float valves at the first reservoir of the household.

(vi) Other works such as (a) repair of roads according to given requirements wherever needed; (b) repair of other utility lines in case they are damaged during the work; and (c) provision of alternative sources of water for people while being disconnected from water supply system during the implementation.

31. Due to the significant pressure on the transport network in Dhaka, it is foreseen that any open trenching in or near roads, particularly in the larger roads, will only be permitted during the night. For this reason and to minimize public disturbance, it is expected that trenchless techniques[8] will be used for replacement and rehabilitation as well as network extension and service connections. In situations where the contractors prefer the traditional trenching technology,[9] the case must be justified and approved by the Project Manager.

32. Table 1 summarizes the components of DMA 610, 611 & 613 of Package No. ICB 02.7.

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[5] The term “pipe replacement” means that the existing pipe will be replaced, either by the traditional open trench method, where the existing pipe will be abandoned and a new pipe will be installed or by pipe bursting, where the existing pipe will be used as a host pipe which will be cut open, expanded and a new pipe will be installed inside the old pipe.

[6] The term “pipe extension” means the laying of a new pipe where no distribution pipes previously existed. Laying pipes in un-served and underserved area and replacing spaghetti lines (bunch of small diameter coil pipes) with new reticulation pipe lines will be considered as extension work. Areas which have recently been developed on an ad-hoc basis are considered partly served, as the secondary or tertiary water lines do not reach all houses. In these areas water supply is often supplied through long coil pipes laid by the owner of the house on the side of the road.

[7] The term “service connection” means the pipe between the water distribution network, the distribution or reticulation pipe, and the water meter installed in the meter chamber inside the boundary of the consumer/ customer. It is assumed that all existing service connections need to be replaced. This is due to the long tradition of the use of substandard quality materials and low-quality workmanship when connecting customers to the water network.

[8] This involves the use of horizontal direction drilling (HDD) which involves a hydraulic machinery to drill a horizontal tunnel for a new pipe or to insert a flexible plastic lining inside an existing pipe, so no trenches are dug, and excavation is limited to the entry and exit points.

[9] The size of trenches will depend on the diameter of the pipe, but most will be 0.3 to 0.7 m in width and 1.4 to 1.8 m deep.

Table 1: Summary of DMA 610, 611 & 613

Item	Description	Remark	Unit	Quantity
1.	Installation of distribution pipes through open trench, pipe bursting, and horizontal directional drilling (HDD) method including installation of buried gate valves and wash out upto 200 mm dia, data loggers (dls), non-return valves as required and approved, but excluding valves and dls for production tube wells (PTWs) & interconnection chambers for isolation of DMAs	- Diameter of pipes between 110 & 560 mm - Designed to distribute water within a DMA. - Number of service connections shall be a maximum 80 to 100 per km for pipes of 200 mm diameter or less. In general, connections to pipes above 200mm diameter shall not be made. - Pipe diameter of 315 mm or more to be designed to transfer water from one area to another, one DMA to another, or between major facilities of a water supply system such as from a PTW or WTP to storage tank or distribution area. - No service connections allowed directly from 315 mm or above dia pipes.	m	22991.5
2.	Installation of reticulation pipes through open trench and HDD method including installation of buried Gate Valves, Wash Out	- Pipe diameter: 75 mm - Reticulation lines may be installed parallel to distribution mains or in tertiary roads to provide service connections. - Reticulation pipelines are laid to minimize road crossing of the service connections; reduce the length of the service connection lines and to reduce the number of connections at a single point on the main pipe line.	m	15560.7
3.	Rehabilitation of service connections of length as required including supply of saddles, Ferrule, transition coupler, gate valves, float valves, meter chamber incl. required fittings for the meter to be placed within 0.6 meter from ground level all complete (water meters are of Employer's Supply)	- Pipe diameter: 20 to 50 mm. - A service connection is identified as the connection from the distribution pipes or reticulation pipeline to a customer's water meter. The distribution network (including tertiary pipes) shall be designed in a manner where the length of the service connections will be about ±15meter. - There will be service connections for domestic, commercial, industrial, institutional, public standpipes and yard or community connection for community/slum dwellers.	nos.	8501
4.	Upgrading of Tube Wells delivery pipes including replacement of Gate Valves, Non-Return Valve, Air Release Valve, Bulk Water Meter, supply and fabrication of MS Pipe, Wash Out arrangement with valve, Tee, Bend, standard fire hydrant outlet, flange etc, supports, fittings and accessories (where necessary) all complete as per drawing (valves and meters are of Employer's supply)	- Upgrade of pump facilities of the existing production tube wells are beyond the scope of this contract. The contractor shall however be responsible to replace all fittings from the existing tube well head to the delivery main, e.g. 200 / 250 mm dia. pipe, etc.	nos.	24

Item	Description	Remark	Unit	Quantity
5.	Construction of Gate Valve Chamber, Interconnection Chamber and Interconnection with transmission main of approved design including necessary fittings and fixtures, excavation and back filling all complete (valves, meters and data loggers are of Employer's Supply)	- Each interconnection point will be controlled by a bulk meter (monitored by a flow logger) and a valve which may, in the future, be controlled and operated by a SCADA system.		
5a.	Construction of RCC Gate Valve Chamber for pipeline of 315 mm dia and above.		nos.	77
5b.	Construction of RCC Interconnection chamber for isolation of DMA where required including installation of Pressure Sustaining Valves, Pressure Reducing Valves, Air Release Valves, Non-Return Valves, Bulk Water Meters and Data Loggers with all fittings, fixtures all complete as per approved design, drawing and direction of project manager		nos.	3
5c.	Interconnection with the existing water transmission main from 300 mm to 600 mm diameter where required including supply of Tee, Reducer with fittings, fixtures all complete as per approved design, drawing and direction of project manager.		nos.	11
5d.	Construction of RCC Air Release Valve Chamber for pipeline including installation of data loggers with necessary fittings, fixtures all complete as per approved design, drawing and direction of project manager.		nos.	10
6.	Testing, repair, replacement, cleaning and disinfection of Existing Pipelines all complete	- The completion of rehabilitation or replacement and/or extension of the pipe laying works in a section will be followed by pressure testing. The leakage tests shall be conducted at the same time as the pressure test. After pressure testing, the pipeline shall be washed out and disinfected.	m	1

C. Implementation Schedule

33. The project ICB 02.7 is to be implemented over a period of more than 03 years. The detailed design stage has to be completed in 18 months, and the construction will cover 30 months.

4. DESCRIPTION OF THE ENVIRONMENT

A. Methodology Used for the Baseline Study

34. **Data collection and stakeholder consultations.** Data for this study has been collected through detailed survey, discussion with stakeholder agencies, and field visits to the proposed subproject sites.

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

B. Physical Characteristics

36. **Location.** The service areas of DMA 610, 611 & 613 of Package no. ICB 02.7 is under the jurisdiction of Dhaka North City Corporation (DNCC) and Dhaka South City Corporation (DSCC) lying in DWASA operation Zone 6.

DMA-610: The location of DMA-610 is confined within area locally known as West Rampura under Rampura Thana in Dhaka City. The DMA is bounded by Hatir Jheel at the North and West, DMA 611 at the South and DMA 601 & 609 at the East, covers a total area 0.910 km^2.

DMA-611: The location of the working area is confined within DMA 611 locally known as Mogbazar area under Ramna Thana in Dhaka City. This working area is bounded by DMA 610 at the North, DMA-614 at the South & West, DMA-612 & 613 at the East, covers a total area 1.664 km^2.

DMA-613: The location of the working area is locally known as Gulbag & Shahjahanpur area under Shahjahanpur Thana in Dhaka City. This DMA area is bounded by DMA 615 at the North, DMA 612 at South, DMA 611 & 614 at the East, DMA 608 at the west, covers a total area of 1.120 km^2.

37. **Topography and Soil.** The project area is at the northern edge of the delta in the centre of the country, between the confluences of the rivers and the project area is flat and low lying particularly around the delta, which floods extensively in the rainy season. The influence of the rivers is evident in the soils, which are almost entirely alluvial, and generally fertile, with a predominantly loam and silt consistency.

38. **Climate.** The climate of Dhaka is humid-tropical, with a typical three season pattern. Dhaka is within the monsoon climate zone, with temperature ranging of 21°C to 37°C during summer season and 10°C to 31°C in winter season. About 80% of the average annual rainfall of 1850 mm occurs in May-September as hot air rises over the Indian subcontinent, creating low pressure areas into which rush the cooler moisture-laden winds from the Indian Ocean and the Bay of Bengal. The rain is often accompanied by strong winds, sometimes exceeding 100 kilometers per hour. Temperature and rainfall both decline post-monsoon, returning rapidly to the winter lows.

39. **Air Quality.** The main causes of the poor air quality in the project area are: (i) poor roads and traffic management leading to severe traffic congestion; (ii) use of high sulphur diesel by buses and trucks, and inadequate control of emissions; (iii) heavy industrialization, and use of cheaper high-sulphur fuels (coal, wood, and tires) by smaller industries like brick kilns; and (iv) poor solid waste management, so burning is the common method of treating garbage.

40. **Geology and Seismology**. According to the National Seismic Zoning Map produced by the Geological Survey of Bangladesh (GSB), Dhaka lies at the end of the Dauki fault in an area of medium seismic risk. This means that shocks of moderate intensity are possible, with a probable maximum magnitude of 6.5-7 on the Richter scale. Seismic events in Bangladesh are relatively infrequent but historically have been severe, such as the earthquakes of 1930 and 1950 that caused widespread damage throughout the country, and the earthquake in 2004 that damaged large parts of Dhaka City.

C. Ecological Resources

41. **Rivers.** Dhaka City, where the 16 DMAs are located, is enclosed between the Turag-Buriganga River in the west and the Balu-Sitalakhya River in the east, both of which drain into the Meghna in the south, along with the Dhaleswari, old Brahmaputra and other rivers outside the city limits. The Ministry of Environment and Forests estimates that 80% of the sewage produced by the 15 million people in Dhaka and surrounding areas enters the rivers untreated, and most of the 7,000 industries dispose of their waste to drainage ditches and rivers without treatment (Dhaka Environment Program, 2005). It is not surprising that the ecology of the rivers has deteriorated under such pressure, and declining fish catches (26,476 tons in 1983 to 84 to 6,095 tons in 1996 to 97 in North Central Region) are just one indicator of the malaise.

42. **Other Aquatic Habitats.** There are a variety of other aquatic habitats in the city, including man-made lakes in residential areas (e.g. Gulshan), permanent and ephemeral pools in natural lowlands (known as bheels), and flooded borrow pits excavated for building material. These are of little ecological value as the water is frequently polluted, and these areas are often characterized by dense growths of the water hyacinth Echicornica crassipes, which out-competes other plants through its rapid growth, although species such as water chestnut and lotus can be seen in places.

43. **Terrestrial Ecology.** There are few natural terrestrial habitats in the subproject areas as in other parts of Dhaka city, because of the seasonal flooding and the urbanization of the city, and agricultural development in the outlying areas, which destroyed the natural habitats many years ago. Terrestrial plants are now mainly limited to trees, shrubs and flowers grown alongside roads and in parks and gardens in the city, and the crops and fruit trees planted in agricultural areas. The terrestrial fauna is very limited as a result, and mainly consists of animals able to live close to man, such as lizards and geckoes, scavenging birds like house sparrows and crows, and mice, rats and other rodents. There are more animals in the farming areas, but even these are species commonly found close to man, such as cattle egrets.

44. **Protected Areas and Endangered Species.** There are no areas in or around the DMAs 610, 611 & 613 that are designated and protected for nature conservation, and no rare or endangered species. This is because as explained above terrestrial habitats have been destroyed to provide land for urbanization, and aquatic habitats are damaged and degraded by water pollution, infilling, and other anthropogenic activities.

D. Economic Development

45. **Industry.** Manufacturing is the most important activity, and because of the low cost of labor, many factories have links with major companies in Europe, to which they supply low cost garments and other products. The main industries are leather tanneries, and textile production; but there are factories manufacturing a wide range of other products including fertilizers, pesticides, chemicals, pharmaceuticals, rubber, plastics, cement, and foodstuffs including salt, sugar, and rice. There are also heavier industries including iron and steel mills, ship repair yards, power plants, oil refineries, and pulp and paper mills.

46. **Water supply.** The main features of the existing water supply system are as follows:

(i) Around 100% of the water supply is from groundwater via 23 Production Tube Wells (PTWs) in DMA 610, 611 & 613;

(ii) This water is treated by injection of liquid chlorine, but not at all PTWs;

(iii) Water is distributed network of underground pipes in the city (dia. 100-450 mm), mainly buried in roads;

(iv) Water pressure in the area supplied is good near the ring main but poor near the extremities;

(v) Water is treated to Bangladesh drinking water standards, but leaking pipes, low pressure and inadequate treatment/disposal of wastewater often cause contamination; and

(vi) As indicated above, other problems are loss of water through leaks and illegal house connections, a rapidly reducing groundwater table, and inadequate cost recovery.

47. **Sanitation.** Most of the area of the Dhaka city is not connected to the sewerage system, and most of the people are using water-operated toilets. This area is not operating as soak ways because of the high level of water table, and the contents discharge into natural drains and low ground, causing unsightly areas, health risks, and water pollution; People living in the slums and other poor areas, use pit latrines, open latrines or other unsanitary methods.

48. **Drainage**. The drainage system of Dhaka city consists of surface and underground elements, maintained by Dhaka North City Corporation (DNCC), Dhaka South City Corporation (DSCC) and Dhaka Water Supply and Sewerage Authority (DWASA) respectively. Surface drains are mainly brick and concrete channels (covered and uncovered), built by the Roads and Highways Department (RHD) alongside roads, and the Rajdhani Unnoyan Kortripokkho (RAJUK) Planning Authority in residential areas. Underground drains are brick-sided tunnels or AC pipes, built by DWASA. The system covers most of the area of the city but does not facilitate properly because drains are blocked with refuse & building rubble and the design is inadequate to cope with the volume of wet season flows.

49. **Solid waste.** Solid waste management is the responsibility of DNCC and DSCC, who are providing a system through vans operation by Non-Government Organization (NGO). It is the process of collecting refuse from houses and business places each day, and depositing at the designated points throughout the city. DNCC and DSCC takes the collected refuses from these designated points and transported to dumpsites. However, the sites are not engineered or selected carefully and often simply areas of open ground around the city, where the refuse creates an unsightly appearance, hygiene problems and health hazard. Dumping areas may be covered with sand and soil when full, but this creates a further hazard as these areas may then be built upon and there is a risk of subsidence as the refuse decomposes, and liberated gases can explode if ignited.

50. **Road Network.** The project areas are heavily congested throughout of the day, because roads are not engineered and insufficient for the volume of traffic, and problems are exacerbated by driver indiscipline and ineffective policing of traffic laws. There are a multitude of smaller cross-linking roads, many of which are narrow and suitable for only one or two vehicle widths, which also become congested as drivers seek alternative routes. The problem is compounded by the very large population of Dhaka, which creates a large volume of pedestrian traffic, and the vast array of public and private transport vehicles seeking customers. These include large numbers of buses, taxis, auto rickshaws, private cars, and bicycle rickshaws. These operate throughout the city at both regulated and unregulated stops, and the buses and taxis provide links to surrounding districts and also long routed.

DMA-610: Total road length in this DMA was measured 25.427 km through survey. Most of the roads in DMA 610 are Cement Concrete (CC); some are Kacha and Bituminous Carpeting (BC) types. The majority of the roads are secondary & tertiary and few are main roads with varying widths ranging from 0.7m - 22.7m. Most of the roads are poorly maintained. Medium level traffic congestions are seen during the rush hours. There are some underground sewerage networks and storm/surface drainage networks in this DMA area. The survey report of DMA-610 also informs that the existing water supply system is consisted of 100, 150, 200 & 450 mm of PVC (17.98km) mostly and a few of Ductile Iron (DI) (1.18km). Total length of existing pipe network is 19.168 km.

DMA-611: Total road length in this DMA was measured 41.778 km during survey. Most of the roads in DMA 611 are Cement Concrete (CC), Bituminous Carpeting (BC) some are Kacha and Brick Macadam types. The majority of the roads are secondary & tertiary and few are main roads with varying widths ranging from 0.8m – 29.32m. Most of the roads are improperly maintained. Typical traffic congestions are seen during the rush hours. There are some underground sewerage networks and storm/surface drainage networks in this DMA area. The survey report of DMA-611 also explains that the existing water supply system is consisted of 100, 150, 200, 300, 400 & 1400 mm of uPVC (28.74 km) mostly and a small number of Asbestos Cement (AC) (307.4m) Ductile Iron (DI) (6.93 km) MS (1.8 km). Total length of existing pipe network is 37.774 km.

DMA-613: Total road length in this DMA was measured 30.067 km throughout survey. Most of the roads in DMA 613 are Cement Concrete (CC) some are Bituminous Carpeting (BC), Herring-Bone-Bond (HBB) and Kacha types. The majority of the roads are secondary and few are tertiary & main roads with varying widths ranging from 0.8m – 31.70m. Most of the roads are indecently maintained. Usual traffic congestions are seen during the rush hours. There are some underground sewerage networks and storm/surface drainage networks in this DMA area. The survey report of DMA-613 also illustrates that the existing water supply system is consisted of 100, 150, 200, 250, 300, 450, 600 & 1400 mm of PVC (20.9km) mostly and a few of Ductile Iron (DI) (3.3km). Total length of existing pipe network is 24.2 km.

51. **Classification of roads by size and by surface type.**[10] There is no standard classification of roads based on traffic volume, tonnage, location and function they have to perform. However, depending on use the roads are classified as VIP Roads, Main Roads and other roads. For road restoration purposes the roads are also classified as Asphalt/Bituminous Road, Reinforced Concrete Cement (RCC) / Concrete Cement (CC) road, Brick Pavement, Macadam and Earthen road depending on construction and surface type.

52. As there is no control on movement of heavy traffic, DWASA considers all types of roads as heavy-duty road for design purpose. Dhaka city roads are with foot paths, underground/surface drainage, sewer line, gas, electricity, telephone and other utility services. In order to be systematic and for convenience of work the roads are classified based on width and are defined as Table 2 below.

[10] Categories of roads as per surface types are important for road restoration purposes. The pavement restoration, where required, will be carried out by Dhaka City Cooperations (DNCC/DSCC) when all backfill has been settled for 6 weeks. For this purpose, DNCC/DSCC will have to be paid as per surface types of the roads. DWASA will apply for the road cutting permission and the contractor must pay therefore. The road cutting plans necessary for the application must be prepared by the contractor.

Table 2: Road Classification in Dhaka City

	Road Classification	Description
A.	**By Width**	
1.	< 2-meter width	The tertiary roads in unplanned areas are usually narrow and mostly less than 2 m, where no vehicles or only one car can pass at a time. These categories of roads will be treated as tertiary roads / lane / access road. The tertiary roads may be of earth, brick pavement, macadam or RCC / CC type. These types of roads have no footpath; have no proper drains and normally a limited number of other utility services beneath.
2.	4-meter width	The internal roads of a planned area and the branch of main roads are within 2-4 m width and are classified as secondary roads. The secondary roads are usually of bituminous surfacing, although RCC / CC and Brick Pavement and Macadam type may constitute a secondary road. These roads may be with or without foot path and in most have all types of utility services beneath.
3.	> 4-meter width	The main roads and VIP roads of Dhaka city are larger than 4 m and are of Asphalt / Bituminous surfacing. These are heavy tonnage roads; traffic volume is large and traffic congestion is a common feature with these categories of roads. These roads are always with foot path and all other utility services beneath.
4.	Major roads	Main roads are the major roads of Dhaka city allowing all types of traffic including three-wheeler rickshaws and heavy truck/lorries.
5.	VIP roads	These are also the main roads of Dhaka city allowing all types of traffic including heavy truck/lorries except the three-wheeler rickshaws and pushcart.
B.	**By Surface Type**	
1.	Asphalt and Bituminous Road	Major roads of Dhaka city are of asphalt/bituminous flexible pavement consisting of wearing course, base course, sub-base and sub-grade. The pavement structure of roads >4 m (main and VIP) have all these elements, however, narrower roads depending on site and traffic conditions may not have the same design.
2.	RCC / CC	Special and access roads are of rigid pavement type and are made of RCC / CC. Usually a rich mixture of cement, sand and course aggregate is laid in a single layer for this type of roads.
3.	Macadam / Brick Pavement	Areas less important and under developed have macadam and brick pavement (200 mm) without base and sub-base course and usually designed for light traffic.
4.	Earth / Kacha Road	There is also earth / kacha roads in areas newly developed and sometimes concrete rubbish is used for surfacing.

53. **Land Use.** Present land use is mainly urban in the centre however other land uses as well, including residential units between and above shops in the increasing numbers of tall buildings and some industry.

54. **Power Sources and Transmission.** Power in the subproject areas is provided by Dhaka Electric Supply Authority (DESA) and Dhaka Electric Supply Company (DESCO) through a network of electricity pylons and poles, mainly located beside roadways. This provides connections to individual houses, and revenue collection is by individual household meters. The supply is erratic and power cuts are frequent, generally lasting 1-2 hours each day. Hotels, businesses and the wealthier residents increasingly use their own generators to augment the DESA/DESCO supply.

55. **Other Economic Development.** There are few other economic activities in the city, other than those already described. There are no exploitable mineral resources, although mining of sand from river beds to raise the level of land for building is a major activity in floodplain areas. There is also little tourism, because the poor infrastructure and widespread flooding in the months of the northern summer discourage visitors from Europe and elsewhere. As a result, tourism is mainly limited to domestic activity, or Bangladeshi's living abroad who returns for short-term visits.

E. Social and Cultural Resources

56. **Population and Communities.** Dhaka is the capital and largest city in Bangladesh and one of the most densely populated cities in the world (approx. 29000 people per sq. km). As per recent censuses, the population has grown dramatically over the years in the city. According to Bangladesh Bureau of Statistics (BBS), the population amounted to about 6.5 million in 1991, 6.7 million in 2001 and 14.5 million in 2011. This is one of the fastest rates (annually 4.7%) of population increase seen anywhere in the world and if growth continues at the same rate, by 2025 the city will accommodate over 25 million people. At present it is estimated that 54.4% of the population is male and 45.6% female, significantly different from the natural 1:1 ratio. There are around 3 million households in the Dhaka city, so average household size is 4.83 persons for each household as per census 2011.

DMA-610: The area of the DMA is 0.910 km^2 having population of 7.95 million with the water demand of 214 L/s and House Connection of 2043 nos as surveyed (2013). The estimated demand of water as per 2030 scenario is 383 L/s according to the detailed design of the DMA.

DMA-611: The area of the DMA is 1.664 km^2 having population of 16.48 million with the water demand of 424 L/s and House Connection of 3944 nos as surveyed (2013). The estimated demand of water as per 2030 scenario is 689 L/s according to the detailed design of the DMA.

DMA-613: The area of the DMA is 1.12 km^2 having population of 16.54 million with the water demand of 406 L/s and House Connection of 2514 nos as surveyed (2013). The estimated demand of water as per 2030 scenario is 532 L/s according to the detailed design of the DMA.

57. Bangladesh is inhabited predominantly by a single ethnic group, Bengali, who constitute more than 98% of the population of the country. According to the 2011 census over 90% of the country is Muslim. Other religions are Hindu (9.2%), Buddhist (0.7%) and Christian (0.3%).

58. **Health Facilities.** Citizens of Dhaka suffer many of the diseases associated with poor sanitation, including dysentery, diarrhea, whooping cough, gastro-enteritis, and tuberculosis. There are a variety of medical facilities, both public and private-sector, covering general health care and specialized services (including cardiac and cholera hospitals, and eye hospitals). There are 16 public hospitals with more than 5,000 beds, and although patients are required to pay for the service, charges are significantly less than in the private sector, and some services are provided free to the poor.

59. **Educational Facilities.** Dhaka provides a large number of educational institutions, run by the public and private sectors. There are over 12,000 primary and secondary schools, several hundred colleges and technical institutes, and 52 Universities (nine state-funded and 45

in the private sector). Generally, boys and girls are educated together, and there are no major differences in enrolment between the genders in schools, although boys outnumber girls in higher education. Current figures indicate that there are more than 5 million students studying in the Dhaka city.

60. **Physical and Cultural Heritage.** There are several sites of cultural interest in Dhaka dating from various periods of the city's history. Most of the older sites are in the old part of the city and include:

(i) The 12th century Dhakeshwari temple, which is the oldest Hindu temple in the City and is believed to be the origin of the name of Dhaka;

(ii) Three sites from the Mughal period: the ruins of Bara Katra (enclosed quadrangle building) built on the banks of the Buriganga River in 1644; the smaller Chota Katra (palace), built nearby in 1663; and the three-storied Lalbagh Fort, built in 1678;

(iii) The 18th century Star Mosque, which has many interesting architectural features including a three domed (Mughal style) structure, mosaic floors and decorated walls; and

(iv) Other mosques such as: The Baitul Mukarram, the largest mosque in the city; the Chawkbazar Masjid built in 1676; the seven-domed Mughal Satgambuj mosque built in the17th century; and Begum Bazar mosque built in 1701.

61. **Indigenous Peoples.** There are no indigenous people in the mentioned DMAs.

F. Site Specific Existing Condition of DMAs in the Project Area

62. Table 3 provides description of the 16 DMAs (DMA-601 to DMA-616) under ICB 02.7.

Table 3: Description of Existing Condition of DMAs in the Project Area

Sl.	DMA	Existing Conditions
Construction Batch-1		
1.	602	The area is low lying and has been substantially developed since the satellite imagery presented in the preliminary design. The contractor shall not, initially, rehabilitate the area, which should be subject of detailed leak detection Programe as detailed in these requirements.
2.	603	The area is a fragmented and unplanned area with significant levels of informal slum housing. There area is also very low lying which results in large areas of water surrounding the developed areas
3.	604	The area is well developed with low lying areas to the East. The area is well structured and consists predominantly of long straight pipelines.
Construction Batch-2		
4.	606	This is a large area of unplanned residential housing and basic industrial units.
5	609	The area is generally unplanned multi-storey housing with some informal slum settlements to the south.
6.	612	DMA 612 is a formally planned area with significant residential housing as well government buildings. There is little informal settlement. To the north is an area of reclaimed land which has begun to be developed.

Sl.	DMA	Existing Conditions
Construction Batch-3		
7.	601	DMA 601 is located to the south of a water course which forms the northerly boundary. The area comprises newly built residential blocks in orderly developments. There is little industry and only low-level commerce. The area has been in filled in recent years and is low lying, especially to the south. Sub surface water may be present as a result. There are 6 production tube wells in the area which is well served.
8.	605	This area is in the south-eastern part of the zone which is largely peri-urban in nature. The network serves some outlying districts. Some informal settlements are present in the area.
9.	607	The area is just beside DMA 603 and unplanned area with significant levels of informal slum housing. It is also very low lying which results in large areas of water surrounding the developed areas.
10.	608	This is a planned but very densely developed area There are small slum areas to the north and east.
Construction Batch-4		
11.	610	This is a planned but very densely developed area
12.	611	This is a large DMA. The area is a densely developed mix of planned and unplanned housing with informal slum settlements at many road sides, near Noor Masjid and on the west periphery bordering the water course / low lying land.
13.	613	This is a mixed area with government buildings to the south east and residential buildings in the remaining. The development of the area is unplanned and includes several areas of informal slum settlement. Any work close to the lines may require additional permission of the rail authorities.
Construction Batch-5		
14.	614	This is a mixed-use DMA with residential housing in the east, north and west and park areas which include government buildings and a hospital in the south. There are small areas of slum along the railway to the north and along the main north south road.
15.	615	This area is mixed use with little residential housing. The areas to the east are government, military of other official buildings which are not currently served by DWASA. To the west is Ramna park which also includes officers' clubs, cathedral and other public buildings not served by DWASA.
16	616	This area is not residential but houses many official offices as well as Dhaka University. Most public buildings are not served by the DWASA network and the area is largely a network of transmission mains to export water to other DMAs.

5. ANTICIPATED IMPACTS AND MITIGATION MEASURES

A. Magnitude and Significance of Impacts

63. The implementation of the project will affect most of the city as branches of the distribution network are located in most roads and streets and the construction process will continue for more than 03 years. However, the construction work is in fact expected to cause insignificant negative impacts; Because of:

(i) Most network construction will be conducted by small teams working on short lengths at a time so most of the impacts will be localized within short duration; and

(ii) Large population and overcrowded conditions in much of the city, the environment of Dhaka is heavily degraded, and contains few sensitive features.

64. **Methodology.** 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 project; (iii) site visit and professional assessment by environment specialist engaged by the implementing agency; and (iv) evaluation of proposed design scope and potential impacts based on the environment specialist's past experience. Categorization of the project and formulation of mitigation measures have been guided by ADB's REA Checklist for Water Supply (Appendix 1) and ADB SPS 2009.

B. Planning and Design Phase

65. Outline design of ICB 02.7 was done by Design and Management Consultants in 2010. Based on the on-going packages and DWASA experience in implementing similar projects, planning principles and design considerations have been reviewed and incorporated into the site planning process whenever possible (salient design features are presented in Table 4). The outline design of DMA 610, 611 & 613 has been updated incorporating information gathered through detailed survey. The updated models were checked for performance of the system for existing and future (2030) scenario. Considering the rapidly depleting groundwater level and keeping consistency with future water supply plan of DWASA, surface water from transmission main was considered for future water source. To overcome the possible risks and uncertainties, at least one Inter-DMA connection chamber with valves is considered as contingency plans to satisfy consumer needs in the event of key facility fails. To ensure the robustness of the models' risk analysis, sensitivity analysis, surge analysis etc. were carried out and optimized the models until satisfactory. As a result, some measures, design consideration and criteria are needed to be included in the detailed design of DMA-610, 611 & 613. This means that some impacts and their significances are reduced and/or controlled by the integration of measures and considerations. To minimize traffic disturbance and public life hazards, trenchless technologies is being used wherever possible for laying pipes during implementation of these DMAs. The introduction of trenchless technologies requires the use of High-Density Polyethylene (HDPE) pipe which satisfies project requirement as pipe material, design life, tensile strength, joint strength etc.

66. The construction of DMA-610, 611 & 613 is being implemented through a design-built contract, i.e. the civil works contractors also prepare the detail designs. Thus, the contractor conducts detailed survey of the DMA areas, update the model designs with additional information obtained from survey; and submit the detailed design and expected work methodologies for these DMAs.

Table 4: Environment-Related Design Features of the Package

Activity	Design Consideration
Contractor's responsibility	The contractors shall: – Be familiar with the present traffic congestion of Dhaka city, rules and regulation of Dhaka City Corporations (DNCC/DSCC) & other concerning authorities *i.e.* Housing society, RAJUK etc. for preparation of road cutting plans before execution of works; – Arrange for temporary water supply to every household as and when their water supply is disconnected or disrupted; – Protect all underground and overground utility services viz. telephone, electricity, gas, sewer, drainage, etc. from damage during execution of the contract.

Activity	Design Consideration
Pipe replacement rehabilitation,[11] and network extension[12]	– In all cases, Asbestos Cement (AC) pipes shall be replaced. Existing AC pipes, where intact, shall be left in-situ and not disturbed. Where the AC pipe is damaged and where there is a risk of asbestos particles becoming airborne, the contractor shall follow the AC Pipe Handling Protocol[13], all necessary procedures, guidelines and laws as laid out locally to contain and remove hazardous material. – The network expansion into different residential / industrial areas will be through trenchless or conventional trenching methods whereby the pipelines will be laid with a minimum cover depth of 1.0 meters.
Working hours and times	– All work in major and minor roads that are heavily used by traffic will only be permitted at night between 7:00 PM and 7:00 AM. – All the minor roads and alley with less traffic may be considered for both day and night working provided alternative passageway can be maintained.
Road cutting[14]	– Unnecessary road cutting should be avoided. – The contractor has to take all necessary safeguards to avoid incidents at site, prevent loss/damage to all existing utilities like pipelines, telephone, gas, electric cables, poles etc. & any government or private property during construction period. – DWASA will apply for the road cutting permission and the contractor shall give full effort and cost for collection of road cutting permission for required days after preparing the road cutting plans necessary works and documents by the contractor. – No temporary or permanent works must proceed before the design and drawings are approved by the Project Manager and road cutting permission obtained from DCC by PMU – The contractor shall prepare a traffic management scheme (road closure program or diversions) and incorporate detail of traffic diversions and pedestrian routes, all traffic signs (for the regulation and for information) and road markings shall be ensured prior to start of road cutting.
Road excavation	– All excavations shall be done to the minimum dimension as required for safety and working facility. – The excavation must be carried out in the most expeditious and efficient manner. – The excavation shall be executed in such manner, that the contractor does not damage or interfere with existing services or structures. If damage or interference is so caused the contractor shall make arrangements with the supply and/or building owner to execute the repairs at the contractor's own cost. – All trench and pit excavations and other work shall be carried out during night time and within the limits of any existing road area shall be completed as rapidly as possible and, in the case of roads capable of carrying two or more lanes of traffic, not more than one half of the width of the carriage way shall be obstructed at any one time. In single lane roads, the contractor shall Programe his work in such a manner that the minimum inconvenience is caused to those persons who have reasonable grounds for using the road. – Road drains and channels shall be kept free from obstructions at all times. – In case of excavation in VIP and other large roads, the trenches and pits maybe need to be covered by steel plates to allow traffic to pass during non-working periods. The contractor must liaise with the DNCC/DSCC or concerning authorities and the responsible police to familiarize and adhere to such rules. All costs

[11] The term pipe replacement is understood to mean that the existing pipe will be replaced, either by the traditional open trench method, where the existing pipe will be abandoned and a new pipe will be installed or by pipe bursting, where the existing pipe will be used as a host pipe which will be cut open, expanded and a new pipe will be installed inside the old pipe.

[12] The term pipe extension is understood to mean the laying of a new pipe where no distribution pipes previously existed. Laying pipes in un-served and underserved area and replacing spaghetti lines (bunch of small diameter coil pipes) with new reticulation pipe lines will be considered as extension work.

[13] Asbestos Cement (AC) Pipe Handling Protocol is the guideline which are needed to be followed during execution of existing AC pipe. The AC Pipe Handling Protocol is available in the IEE of Batch-3 (DMA-601, 605, 607 & 608).

[14] Most of the roads are owned and maintained by DNCC/DSCC. Some narrow roads having width even less than 2 m are privately-owned.

Activity	Design Consideration
	involved to adhere to such rules shall be borne by the contractor. – Pits and trenches not backfilled at end of a night shift, the excavation must be covered with steel plates and in alleys with wooden plates. – It is preferable that trench excavation along roads be located in footpaths or verges adjacent to the road rather than in the carriage way itself. Trench excavation shall wherever practicable be carried out in such a way that every part of the excavation is at least 0.5m clear of existing edges of the carriage way. – Where trench excavation or any other part of the works obstructs any footpath or right-of-way, the contractor shall provide, at his own cost, a temporary footpath around the obstruction to the satisfaction of the Project Manager. – The contractor shall have particular regard to the safety of pedestrian, livestock, and shall ensure that all open excavation, access routes and steep or loose slopes arising from the contractor's operations are adequately fenced and protected.
Trenchless pipe installation	– Pipes shall be installed by the Horizontal Directional Drilling (HDD) methods where required. If the indicated survey information and/or the method is not feasible; the contractor shall inform the Project Manager and gain prior approval for an alternative method or for Open Trench (OT) method. – Excavation material shall be removed from the conduit as the work progresses. No accumulation of excavated material within the conduit will be permitted. – The contractor shall provide sediment and erosion control measures in accordance with local environmental legislation. – The contractor shall supply portable mud tanks or construct temporary mud pits to contain excess drill fluids during construction. Spent drilling fluids and cuttings shall be confined to the entrance and exit pits. – The contractor shall take all necessary precautions to minimize the damage to the adjacent properties. Any drilling fluid that enters the pipe shall be removed by flushing or other suitable methods. – The contractor shall be responsible for cleanup and restoration – Pits excavated to permit connection of bored pipe shall be backfilled, and disturbed areas shall be restored to their original state or better. Sections of sidewalks, curbs, and gutters or other permanent improvements damaged during HDD operations shall be repaired or replaced at the contractor’s expense.
Resettlement plan	The contractor shall: – Implement Resettlement Plans, prepared by the Management and Supervision Consultants (MSC). No civil works will begin until all compensation to Affected Persons (AP) is paid.
Preparation of catalogues, installation and O&M manuals	– The contractor shall supply catalogues and installation manuals for each type of pipes, valves etc. to DWASA at the time of submission the Operation and Maintenance manuals. – All catalogues and manuals shall be printed in the English language or accompanied by an English translation.

C. Construction Phase

67. **Construction method.** Existing pipes are buried within roads in Dhaka City, and this practice will be continued by this project. Larger pipes (200 mm and above) are normally located in main roads, and smaller pipes (<200 mm) are in minor roads, and in most cases the pipeline is situated near the centre of the road.

68. All work in major roads and on minor roads that are heavily used by traffic will only be permitted at night between 7:00 PM and 7:00 AM. All the minor roads and alley with less traffic may be considered for both day and night working provided alternative passageway can be maintained. In all cases the contractor shall take prior permission from DNCC/DSCC. Contractors in Dhaka are required to obtain permission from the police for construction work in roads. The work has to be conducted in amounts that can be completed in a single night, and the surface is reinstated for use in the morning.

69. Most of the pipe replacement/rehabilitation will be carried out by trenchless technology,[15] where a flexible plastic tube is inserted into an existing pipe and inflated to seal the inner surface. Small chambers are due to open two ends of a pipe and a wire is inserted to pull through the plastic tube, which is expanded by air pressure and adheres to the inside of the pipe. The only excavation is hand digging to build two small chambers (roughly 1.5 m^3) per length, and the machinery is also small, involving a rotating drum for the wire and plastic liner, and an air compressor and water pump. This approach can also be used to install new pipes by drilling a horizontal tunnel and inserting the pipe, or by installing a tube inside a faulty pipe and inflating until the pipe bursts below ground, leaving a new pipe with a larger diameter and capacity. At some locations trenches will be built to remove leaking pipes and install replacements, and this will be done using backhoe diggers, supplemented by manual labor where necessary. Excavated materials will be loaded onto trucks and taken offsite for dumping within 12-24 hours of excavations, and sand for infilling will be brought in on covered trucks and stored on sites/stores. Pipes are normally covered by 1.2 m of soil, and a clearance of at least 100 mm is left between the pipe and each side of the trench to allow backfilling, so trenches will be relatively small, between 0.3 and 0.7 m wide and 1.4 and 1.8 m deep. DNCC/DSCC and/or concerning authorities are responsible for re-applying the final asphalt surface to metalled roads, and this will be done after approximately 6 weeks, to allow settling of the compacted material.

70. Pipes will be of High Density Polyethylene HDPE (100-250 mm) and brought to site from stores with tightly plugged on trucks, offloaded manually or by crane, and positioned in the trench by crane or via a pipe-rig. After pipes have been joined, the trench will be backfilled with specified sand applied with a warning tape layer (150mm above pipe top) to the surface layer and compacted the backfilling materials by hand-operated vibrating compactor.

71. Chambers for network valves for diameter 250mm and above and all bulk meters will be built in the trenches that are dug to install new pipes or at the entry and exit points for the trenchless work, so no separate excavation will be needed. Most chambers will be around 1.5 m^3 with concrete floors and brick sides, which will be built by hand by masons. Valves will be put in place by hand or via small cranes and will be attached to the pipe flanges, and each chamber will be closed by a removable steel manhole cover.

72. House connections will be provided when work is conducted on the distribution pipe in the vicinity, and short trenches will be dug between the pipe and each residence, and a short length of small-diameter High Density Polyethylene (HDPE) pipe will be attached. This will terminate at the boundary of the property with a meter and a small valve.

73. **Impacts on Physical Resources.** The excavated materials, sand handling, dust emission, unpleasant noise (>70dB-A) etc. are the key impacts on physical resources due to pipeline installation works. The total pipe installation work of 43332.6 m out of total 116066.8m (37.33%) in the DMA-610, 611 & 613 will be completed using trenchless methods (HDD, PB) according to detailed design where in DMA-610, 8436.5m out of 27615.2m (30.55%); in DMA-611, 16473.5m out of 48370.6m (34.06%) and in DMA-613, 18422.6m out of 40081m (45.96%) pipe will be laid using trenchless methods. Using and/or practicing of trenchless technology will be reduced the indicated impacts mostly on physical resources except the ground disturbance

[15] This applies to all network construction in main roads, and an estimated 25% of the work in minor roads.

due to various chamber excavation for the entry and exit of the tunneling machinery and pipes. The use of this technology will generate waste material but since the contractor will be required to remove it quickly and dispose appropriately, this work will also not have major physical effects. The difficulties to increase the trenchless technology are found the narrower width in secondary and tertiary roads created machineries entrance, congestions, risk on other utility services and health risks to city dwellers.

74. There will however be much greater physical disturbance from the installation of the remainder of the pipes, as this will require the construction of 72,734.4 m by Open Trench (OT) method (DMA 610 = 19,178.8 m, DMA 611 = 31,897.1 m and DMA = 21,658.5 m). If average trench dimensions are considered 0.5x1.6m, then this work will excavate almost 58,187.5 m^3 of excavated materials in DMA 610, 611 & 613 areas. After excavation of trench, approximately 25% of the trench will be occupied by the pipe, 60% by backfilled sand and 15% by excavated soil replaced on top layer of roads. This means, over the areas as a whole, about 34,912.5 m^3 of sand will be brought to site for backfilling, 8,728.13 m^3 of soil will be replaced in the trenches, and 43640.6 m^3 of waste soil and stone will be left over.

75. This presents a significant waste management issue, as this is a very large quantity of waste, which could not be dumped without causing physical impacts (on air quality, topography, soil quality, etc.) at the disposal site. There will also be quite large physical changes as a result of trench construction; and as the work will almost certainly be conducted in the dry season, there is also a lot of potential for the creation of dust (during excavation, storage and transportation of soil, and the importation of sand for infilling). Although most actions will be the responsibility of the contractors appointed to conduct this work, DWASA will also need to discuss the waste management issue in detail with DNCC/DSCC, to explore ways of reducing the amount of material to be dumped, by finding alternative beneficial uses.

76. The source of sand for the infilling will be determined by the contractors, and it is likely that this will be purchased from vendors who dredge sediment from the rivers for use in building and as infill in the floodplains to raise the level of building land. This is a major operation that has been underway for some considerable time, and removes very large quantities of sand from the river, without any apparent ill effects. This is probably because of the enormous amounts of sediment that are carried by the rivers and deposited in the delta region, and it could be that the mining activity improves the flood retention capacity of the river and helps protect parts of the city from flooding. The 35,000 m^3 of sand that are required by these DMA represents a small fraction of the amount that is excavated annually, and therefore insignificant additional impacts will be taken places on the river beyond those operations.

77. Another physical impact that is commonly associated with large-scale excavation is the effect on local drainage patterns if surfacewater and groundwater collects in voids as they are being dug. This should however not be a problem in this case, given the relatively deep water table in Dhaka city, and the fact that the contractor will almost certainly conduct the excavation in the dry season to avoid difficult working conditions in the monsoon.

78. In overall terms, although a large volume of material will be removed during trench construction, a large volume of sand will be brought to the working sites, and a relatively large area will be affected, physical impacts are not expected to be significant. This is because:

(i) The method of working, whereby small teams work on short lengths of the pipeline for a few days and complete the work before moving on to the next site, means that at each site the effects will be mainly localized and short in duration;

(ii) Physical impacts will be mainly temporary as trenches will be refilled and compacted after pipes are installed; and
(iii) The design criteria and mitigation measures described in the Environmental Management Plan (EMP) will reduce those impacts with more wide-ranging implications to acceptable levels.

79. **Impacts on Ecological Resources.** As most trenches and chambers for the trenchless works will be dug within roads, then there will not be any direct ecological impacts from construction of the network improvements. Contractors will however be required to ensure that no roadside trees are damaged or removed in the course of the work; and to mitigate any accidental losses, contractors will be required to plant and maintain two trees of the same species for every one that is removed.

80. The use of river sand for construction work can have ecological impacts by removing benthic invertebrates that provide food for fish, birds and other organisms, and destroying their habitats. However, these impacts will not be significant in this case because:

(i) The amount of sediment removed for this project is a very small proportion of the total dredging operation;

(ii) The large volumes of sediment carried by the river and the wide seasonal variations in flow mean that the river is a very dynamic ecosystem in which sediment erosion and accretion are part of the natural cycle, to which the invertebrate populations must adapt to survive;

(iii) Sediments are a sink for many contaminants discharged into water bodies, so the dredging operation may provide some ecological benefit by reducing the overall pollution load.

81. **Impacts on Socio-Economic Resources.** The network improvement works will involve about 116 km of pipe installation works in DMA-610, DMA-611 & DMA-613 in the streets of Dhaka city, which house very large numbers of shops, businesses, industries, and other economic activities. As the network is located in roadways, people and activities will undoubtedly be disturbed about 3-4 months for each DMA during the construction period. The time of construction will be subjected to the availability of Road Cutting permission from concerning authorities. However, it is not expected that this will result in major impacts on the economy of the city, or on the income of its businesses and citizens. This is because:

(i) the installation of distribution pipes and reticulation pipes will be conducted by trenchless methods as much as possible, which require small-scale excavation at access points only, and will thus result in minimal disruption;
(ii) of the pipes that will require trenching, local by-laws require that works in roads are conducted at night, when most businesses are closed;
(iii) work will mainly be carried out on individual short lengths of the network, so each location will be affected for only a short time (an average of 5-7 days as previously experienced of another DMAs of ICB-02.7).

82. As all work will be conducted in existing roads and Right-of-Ways (ROWs), there will be no need to acquire any land from private owners for the improvement of distribution network for DMA-610, 611 and 613, so there will be no resulting impacts on the income and assets of landowners or their tenants.

83. There can be economic impacts however if roads have to be closed for short periods and customers are unable to gain access to shops, or if trenches are constructed near the sides of roads, and customers are impeded by the presence of trenches, excavated material, workers and machinery. Although resulting losses in income will be small and short-lived, they can still be significant for small traders and other businesses that exist on low profit margins. A separate Resettlement Plan has been prepared for DMA-610, 611 & 613 to examine the social and economic issues in more detail and provide appropriate mitigation where necessary. This establishes that, in addition to the mitigation measures in this IEE, owners and tenants of affected businesses will also be compensated to reduce the economic impact due to construction works.

84. Trenches will inevitably restrict traffic flows to an extent and roads may have to be closed on occasion. Although works in roads will be conducted at night, and individual streets will be affected for relatively short periods only, traffic impacts can still be significant, given the congestion problem that exists in Dhaka already. DWASA and the design consultants have planned the work carefully by including in the design and specifications requiring the contractors to submit a traffic management plan for approval of the Project Manager.

85. **Impacts on Social and Cultural Resources.** When construction is conducted in residential areas, people may be disturbed by the noise of the construction activities and by dust during dry and windy weather, and trenches may impede access to houses for residents and their vehicles. In this case the fact that work will be conducted at night creates another potential problem as people may be disturbed by on-site lighting, and their sleep may be disrupted by noise. However, these impacts will not be greatly significant because:

(i) Disturbance at most locations will last for a few days only;
(ii) Background noise in much of Dhaka is high, even at night, so residents are adapted to a relatively high noise environment;
(iii) People will be more willing to tolerate short-term temporary disturbance if they are aware of the benefits they will gain from an improved water supply.

86. DWASA will inform residents fully about the work, its duration and impacts, the mitigation measures, and the benefits of the completed scheme. In addition, officials in charge of facilities of social and cultural importance (e.g. schools, hospitals, mosques, museums, etc.) will be involved in stakeholder meetings so that they can be informed about the work in advance, and can bring specific concerns and issues to the attention of DWASA, if necessary.

87. A potentially more significant impact is the effect on people and communities if water supplies are closed down for extended periods when work is conducted on the network. This would be inconvenient in the short term, and there could be health risks if the water supply was unavailable for several successive days or longer. The package design and specifications require the contractors to plan the construction program to keep the cessation of water supplies to the minimum possible (in both area and duration), provide alternative potable water to affected households and businesses for the duration of the shut-down, liaise with affected persons to inform them of any cessation well in advance, and to ensure that they are provided with an alternative supply.

88. There is inevitably a safety risk when substantial construction such as this is conducted in an urban area, and strict precautions are needed to ensure the safety of both workers and citizens. Contractors will be required to produce and implement site Health and Safety Plan.

89. An additional, particularly acute health risk presented by this work derives from the fact that some parts of the existing water supply system including Asbestos Cement (AC) pipes, a material that can be carcinogenic if fibers are inhaled. There is therefore a significant health risk for workers and the public if these pipes are uncovered and damaged or cut accidentally, or deliberately to conduct the necessary pipeline refurbishment. This is in fact not such a major problem as might be expected, because:

(i) There are only a small number of AC pipes in the existing water supply system in DMA-610, 611 & 613 (307.4m).

(ii) These pipes are all in the old part of the city and their location is well known and marked on maps prepared by DWASA;

(iii) The design of the project involves the replacement of these pipes and this can be done without removing or disturbing them, so all AC pipes will be left in situ.

90. Given the dangerous nature of this material, additional measures will still be established to protect the health of all parties in the event (however unlikely) that AC pipes are encountered in the course of the work. During the detailed design phase, the Management and Supervision Consultants (MSC) have developed a protocol to be applied in any instance that AC pipes are found, to ensure that appropriate action is taken. The protocol is based on the approach recommended by some internationally recognized organizations. The AC pipe protocol is attached in Appendix 9.

91. Given the scale of the project it is likely that large numbers of local people will obtain at least temporary socio-economic benefits, by gaining employment in the construction workforce, and thus raising their levels of income. These benefits can bring wider social gains if they are directed at vulnerable[16] groups. Contractors will therefore be given targets for the numbers of women and other vulnerable persons they should employ in their workforces, and DWASA will ensure that vulnerable persons are represented as legitimate project stakeholders in the various consultation forums and administrative committees established by the project. Creating a workforce from mainly local people will bring additional benefits by avoiding problems that can occur if workers are imported; including social difficulties in host communities and issues of health and sanitation in poorly serviced temporary camps.

D. Operations and Maintenance Phase

92. The main operations and maintenance (O&M) activities of the rehabilitated pipes will be detection and repair of leaks and pipe bursts. The generally flat topography and the usage of good quality pipes should mean that pipeline breaks are very rare, and that leaks are mainly limited to joints between pipes and areas where residents continue to attach their own illegal house connections. Leak repair work will be similar to the pipe-laying work as earlier explained. Trenches will be dug to reveal the leaking area and the faulty connection will be refitted, or the pipe will be removed and replaced if necessary.

[16] Vulnerable groups as those without legal title to land and other assets; households headed by single earner females, the elderly or disabled; indigenous peoples (based on ADB OM); and households with incomes that are below the poverty line

93. The bulk meters will allow automatic computerized monitoring of amounts of water flowing through individual parts of the network, which will pinpoint areas where there are leaks and/or where water is being taken out of the system illegally. DWASA will visit such areas with audio devices to locate individual leaks, which will then be repaired in essentially the same way that the pipes were installed. Trenches will be dug to reveal the leaking area and the faulty connection will be re-fitted, or the pipe will be removed and replaced if necessary. If illegal connections are found these will be removed and the pipe will be re-sealed, or a new properly fitted connection with a meter will be provided.

94. **Impacts on Physical Resources.** Generally, the main risk to the physical environment of operating an improved water supply system is that increased abstraction of surface or groundwater will deplete the water resource. However, that will not be the case here, as there will be no additional abstraction. The increase in supply will be obtained from the refurbishment of the distribution network (which will significantly reduce system losses from leakage), and the installation of a new metering system (which will improve leak detection and cost recovery). This is expected to both improve the supply of water to the consumer and reduce the decline in groundwater from over-abstraction.

95. If trenches are dug to locate and repair leaks or remove and replace lengths of pipe or illegal house connections, the work will follow the same procedure that occurred when the infrastructure was improved. In this case soil and backfilled sand will be removed to expose the leaking junction or pipe, and if necessary a new pipe will be brought to site and replaced. The trench will then be refilled and re-compacted properly. This work should be very infrequent, and will affect individual small locations for short periods only (an average of a few hours for most repairs). Physical impacts will therefore be negligible. Work will not be conducted during rainfall so there will be no effect on drainage, and the removed material will be replaced in the trench so there will be no waste. There should also be no need to cover excavated material to prevent dust as it will have been wetted by the leaking water.

96. **Impacts on Ecological Resources.** The distribution network is located within roads, so any repairs will have no ecological impacts.

97. **Impacts on Socio-Economic Resources.** If network repairs are conducted in areas where there are shops or other commercial activities, these could lose some business while the repairs are conducted if access is difficult for customers. However, these will not be significant and will not need to be compensated, because repairs will be much smaller in scale than the original trenching works and much shorter in duration, so any losses will be at the level of normal day-to-day fluctuations in business income.

98. **Impacts on Social and Cultural Resources.** If network repairs are conducted in residential areas people may be disturbed by construction noise, and there could be some interruption of access to houses and locations of social and cultural importance (such as mosques, schools and hospitals) by the trenches and excavated soil. However, these impacts should also not be significant because of the short-term and infrequent nature of the works.

99. DWASA (and the contractors during the defects liability period) will operate the same kinds of Health and Safety procedures as used in the construction phase to protect workers and the public. This will include application of the asbestos protocol if any AC pipes are encountered, and prohibition of the use of AC pipes for any repair and maintenance work.

100. The citizens of the city will be the major beneficiaries of the improved water supply, as they will be provided with a constant supply of better quality water, piped into their homes. This should produce major improvements in the social capital of the city, and significant improvements in individual and community health and well-being. To augment these benefits, DWASA will conduct a public education and information campaign to raise awareness of the health risks of contaminated water and the continuing need to boil municipal water before consumption. Then diseases of poor sanitation, such as diarrhea and dysentery, will be greatly reduced.

101. People will then spend less on healthcare and lose fewer working days due to illness, so the economic conditions of individuals and the community as a whole should improve. There should be fewer deaths in infancy and at other stages of life, so the structure and well-being of families should also improve. The cultural resources of the city may also benefit, because if people are healthier and have more income, they should also have more time and money to spend on cultural pursuits.

E. Mitigation Measures

102. There are no impacts that are significant or complex in nature, or that need an in-depth study to assess the impact. Thus, the project is will not cause significant adverse impacts. In addition to the mitigation measures and specifications already considered in the package design, the potential adverse impacts that are associated with construction and O&M can be mitigated to acceptable levels with the specific mitigation measures discussed in the EMP.

F. Cumulative Impact Assessment

103. The cumulative impact assessment (CIA) examined the interaction between the project'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 (VCs) 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 project; and
(iv) future developments that is reasonably foreseeable and sufficiently certain to proceed.

104. The project has identified the VCs as water quality, noise, traffic management, socio-economic and socio-community components, and human health. There are no foreseeable projects that will overlap with the project. The spatial boundary of the project is the area along the pipe alignment, existing right of ways, and building sites. The temporal boundary can be considered as the whole Dhaka City.

105. Given the water supply requirement in Dhaka will be met and the sources considered adequate, there are no significant cumulative impacts expected on the future water supply.

106. Air quality effects will occur during construction. Consequently, although emissions of common air contaminants and fugitive dust may be elevated in proximity to active work sites, this impact will be short-term and localized to the immediate vicinity of the alignment. Greenhouse Gas (GHG) emissions may increase as a result of project activities (i.e., vehicle and equipment operation, concrete production, disposal of excavated material, landfilling of residual wastes). Given the project'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.

107. Noise levels during construction in the immediate proximity of most work sites are expected to increase. The duration of this exposure will be relatively brief. This exposure represents a temporary, localized, adverse residual effect of low to moderate significance for affected receptors. While building damage due to ground vibrations is unlikely, there may be annoyance to spatially located receptors during construction. Noise levels associated with the project O&M will be largely imperceptible, as the buildings are located in relatively small sites within the city proper.

108. Land use/traffic management concerns will occur spatially during construction. Site-specific mitigation measures will be implemented to address temporary disruptions to land use and access, traffic delays and detours, parking modifications, and increased volumes of construction-related traffic. Traffic movement along the alignment will be improved once construction is completed. Since the project will be the rehabilitation of existing pipelines and a building to be constructed adjacent to existing water supply facilities, it 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 the project area. This can be considered a long-term cumulative benefit of the project.

109. Upon completion of the project, the socio-community will benefit from improved water supply system. This is considered a long-term cumulative benefit.

110. No adverse residual effects to human health will occur as a result of project construction or operation. While exposure to elevated noise levels and fugitive dust and common air pollutants will occur in proximity to project work sites during construction, due to their short-term, localized nature, these effects are expected to be minor and insignificant with no measurable effects on human health.

111. Therefore, the project will benefit the general public by contributing to the long-term improvement of water supply system and community livability in Dhaka city.

6. INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION

112. To ensure awareness and gain support from local community people towards project interventions, intensive population campaigns were conducted at different levels and category of people. The following methodologies were used for carrying out public information campaign and consultations in the DMA areas. The Resettlement Plans (RPs) for DMA 610 is approved, RP for DMA-613 is submitted and in under review process, RP for DMA 611 is being prepared.

A. Public Consultation Conducted (Planning and Design Stage)

113. 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.

114. The following methodologies have been used for carrying out public consultation: Local communities, individuals, and owners and employees of commercial establishments who are directly or indirectly affected were given priority while conducting public consultation.

(i) Walk-through informal group consultations were held in the proposed project area.
(ii) The local communities were informed through public consultation, with briefing on project interventions, including its benefits.
(iii) The environmental concerns and suggestions made by the participants were listed, and discussed, and incorporated in the EMP.
(iv) Various forms of informal public consultations (consultation through adhoc discussion-site) have been used to discuss the project activities.

115. The discussion has been carried out in the public consultation meeting for information disclouser and awareness about anticipated issues can be raised during construction period of the project. A question and answer session has made for the conversation and information about the project. The participants, purpose, key issue interrogated etc. are briefly illustrated in the Table 5.

Table 5: Details of Conducted Public Consultations for Information and Awareness

SL No	DMA No.	Address	Participants Type	Purpose of Consultation	Key Issue Discussed	Interrogation on Design & Resettlement Plan
1	610	Quality Learners High School	Teachers, House Owners, MSC & WASA Representative, Local Elites, Local Leader, Contractors & NGO Personnel etc.	Project Information Dissemination; Support Seeking from UP bodies and Construction Work Procedure & Ready to get House Connection.	Project Description, Support seeking for contractors and keeping ready by showing house connection papers, Environmental and Social Safeguard Issues.	Entitlement of APs; Implementation arrangement and Grievance Redress Mechanism incorporated in the RP based on the discussion.
2	610	Motherland School & College	Teachers, Retired Govt. Officials, House Owner's, Guardians, MSC & WASA Representatives, Contractors Personnel NGO Personnel etc.	Awareness Rising, Information Dissemination, Problem Solving, Conflict management, Support seeking for the Contractor.	Awareness Rising Indicator's, Grievance Raising Procedure, House Connection Process and problem solution process for Contractors Support.	Implementation arrangement and Grievance Redress Mechanism incorporated in the RP based on the discussion
3	610	Rampura Ekramunnesa Boys High School	Teachers, Officials, House Owner's, Guardians, WASA Representative, MSC Representative, Contractors Personnel and NGO Personnel etc.	Support Contractors, Managing Water Crisis, Gender Issues and Environmental and Safeguard Issues etc.	Project Implementation procedure and HH Connection & Pipe line Distribution issues, Environmental Issues and safeguard compliance.	Entitlement of APs; Implementation arrangement and Grievance Redress Mechanism incorporated in the RP based on the discussion.
4	610	Mohanagar Abashik Samaj Kallyan Samitee	House Owners, businessman, Retired Govt. Officials, MSC & WASA Representative, Local Elites, Local Leader, Contractors & NGO Personnel etc.	Resettlement Plan disclosing Project Information Dissemination, Support Seeking for construction work, Grievance Redressing, Road Repair & maintenance and compensation for AP.	Background of the Project, Resettlement Plan, Entitlement, Institutional Arrangement, Grievance Redress Mechanism, Open Discussion and Support Seeking Areas.	Entitlement of APs; Implementation arrangement and Grievance Redress Mechanism incorporated in the RP based on the discussion.

SL No	DMA No.	Address	Participants Type	Purpose of Consultation	Key Issue Discussed	Interrogation on Design & Resettlement Plan
5	610	Quality Learners High School	Teachers, House Owners, MSC & WASA Representative, Local Elites, Local Leader, Contractors & NGO Personnel etc.	Project Information Dissemination; Support Seeking from UP bodies and Construction Work Procedure & Ready to get House Connection.	Project Description, Support seeking for contractors and keeping ready by showing house connection papers, Environmental and Social Safeguard Issues.	Entitlement of APs; Implementation arrangement and Grievance Redress Mechanism incorporated in the RP based on the discussion.
6	611	Monpura School and College	Teachers, Officials, House Owner's, Guardians, WASA Representative, MSC Representative, Contractors Personnel and NGO Personnel etc.	Project Information Dissemination; Support Seeking from UP bodies and Construction Work Procedure & Ready to get House Connection.	Project Description, Support seeking for contractors and keeping ready by showing house connection papers, Environmental and Social Safeguard Issues.	Implementation arrangement and Grievance Redress Mechanism incorporated in the RP based on the discussion
7	611	Genius Islamic School & College	Teachers, House Owners, MSC & WASA Representative, Local Elites, Contractors & NGO Personnel etc.	Project Information Dissemination; Support Seeking from UP bodies and Construction Work Procedure & Ready to get House Connection.	Project Description, Support seeking for contractors and keeping ready by showing house connection papers, Environmental and Social Safeguard Issues.	Implementation arrangement and Grievance Redress Mechanism incorporated in the RP based on the discussion
6	613	Shahid Faruk Iqbal Girls School	Teachers, House Owners, Businessman, MSC & WASA Representative, Local Elites, Local Leader, Contractors & NGO Personnel etc.	Project Information Dissemination; Support Seeking from UP bodies and Construction Work Procedure, House Connection & Environmental Aspects.	Project Description, Support seeking for contractors and keeping ready to show house connection legal papers, Environmental and Social Safeguard Issues.	Entitlement of APs; Implementation arrangement and Grievance Redress Mechanism incorporated in the RP based on the discussion.
7	613	Shantibag High School	Teachers, Businessman, Retired Govt. Officials, House Owner's, Guardians, MSC & WASA Representatives, Contractors Personnel NGO Personnel etc.	Awareness Rising, Information Dissemination, Problem Solving, Conflict management, Support seeking for the Contractor.	Awareness Rising Indicator's, Grievance Raising Procedure, House Connection Process and problem solution process for Contractors Support.	Implementation arrangement and Grievance Redress Mechanism incorporated in the RP based on the discussion

SL No	DMA No.	Address	Participants Type	Purpose of Consultation	Key Issue Discussed	Interrogation on Design & Resettlement Plan
8	613	Deep shikha High School	Teachers, House Owner's, Guardians, WASA Representative, Contractors Personnel and NGO Personnel etc.	Support seeking for the Contractors, Managing Water Crisis, Gender Issues and Environmental and Safeguard Issues etc.	Project Implementation procedure and HH Connection & Pipe line Distribution issues, Environmental Issues and safeguard compliance.	Entitlement of APs; Implementation arrangement and Grievance Redress Mechanism incorporated in the RP based on the discussion.
9	613	Prime Pre Cadet School	House Owners, Guardians, Teachers, Businessman, Local Leader, Contractors & NGO Personnel etc.	Project Information Dissemination, Support Seeking for contractors, on construction work, Road Repair & maintenance and compensation for AP.	Background of the Project, Resettlement Plan, Entitlement, Institutional Arrangement, Grievance Redress Mechanism, Open Discussion and Support Seeking Areas.	Entitlement of APs; Implementation arrangement and Grievance Redress Mechanism incorporated in the RP based on the discussion.

116. Stakeholder consultation meeting on Project Information Disclosure and Awarness in DMA 610, 611 & 613 were held at different locations to cover all the area of these DMAs. House Owner's, PMU Officials, Businessmen, Local Elites, Civil Society Personnel, Contractor's Personnel, MSC representatives and the NGO Representatives were present in the Meeting. The proceedings, pictures and list of participants of the stackholder consultation meetings are attached in Appendix-3.

117. Key respondents included project-affected persons in DMA-610, DMA-611 & DMA-613 who only include owners of houses/residences and commercial shops/establishments who will suffer temporary access disruptions during project implementation due to the laying of pipelines, shopkeepers/businessmen, and daily commuters consulted randomly. In addition to a number of informal consultations conducted regularly in the project corridor, house to house information dissemination, community level project information disclosure meeting on Resettlement Awareness and Support LIC's were conducted.

B. Future Consultation and Disclosure

118. This IEE and other relevant documents will be made available at public locations in the city and posted on the DWASA and ADB websites. The consultation process will be continued and expanded during the project implementation through a Non-Government Organization (NGO), to ensure stakeholders participate fully in project execution, as well as to implement comprehensive information, education, and communication plan.

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

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

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

120. For the benefit of the community, the summary of this IEE will be translated in the local language and made available at (i) DWASA office, (ii) Project offices, and (iii) contractor's offices/campsites. It will be ensured that the hard copies of IEE are kept at places which are conveniently accessible to citizens, 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 DWASA and the ADB website after approval of the IEE by ADB.

C. Involvement of Non-Government Organization (NGO)

121. The appointed Non-Government Organization (NGO), SAMAHAR, is responsible for ensuring that the required fieldwork and training associated with resettlement works are undertaken to a standard approved by the PMU in consultation with the Management and Supervision Consultant (MSC). The NGO is being worked under the guidance of MSC. The scopes of the work mainly include:

(i) Liaisons with and advise the MSC and contractor on and before starting of any resettlement works.

(ii) Providing suitably qualified teams of field staff including women to undertake all field-work activities related to resettlement works of the DMAs

(iii) Managing the workload of field-workers accordingly in time and effective manner.

(iv) Planning the work to be undertaken in conjunction with the MSC and contractor.

(v) Advising residents and take mitigating measures on possible disturbances and measures to be undertaken during project implementation.

(vi) Advising Affected Persons (APs) on the availability of grievance procedure to be followed under the project ICB-02.7

(vii) Assisting the contractor to disseminate the information about the road closures and the alternative arrangements made for the same.

(viii) Preparing the list of the potential APs of the project who are likely to be affected by the project work before, during and after implementation to the actual work and issue ID card for each AP considered entitled for compensation for being affected by the project works.

(ix) Developing and keeping updated a sex-disaggregated database recording the APs and status of compensation payment.

(x) Ensuring video-graph of the project roads/alignments preferably one month ahead of the actual project implementation works which will be considered as cut-off date of the project.

(xi) Preparing the entitlement of the APs in the – of the road which will be blocked temporarily for not more than 05 days.

(xii) Ensuring compensation payment by the PMU to each AP before physical works.

(xiii) Keeping informed the consultant (MSC) and PMU about all the activities pursued under the resettlement activates of the package ICB-02.7.

(xiv) Coordinating all field workers, activities in conducting community level information dissemination and meetings.

(xv) Mobilizing APs to be supportive during construction times and construction created inconveniences, which may be brought about by the implementation of the rehabilitation Project.

(xvi) Adopting participatory approaches at all stages of service delivery, ensuring the views of women and vulnerable groups are equally represented in project committees and other decision making bodies.

(xvii) Submitting the regular monitoring and monthly and quarterly progress reports on the resettlement works from time to time to the consultant (MSC) and PMU office.

(xviii) Caring out any other related task as may be assigned by the project Director.

7. GRIEVANCE REDRESS MECHANISM

122. A project-specific Grievance Redress Mechanism (GRM) has been established to receive, evaluate, and facilitate the resolution of Affected Persons (APs) concerns, complaints, and grievances about the social and environmental performance at the level of the project. The GRM is deliberated to provide a time-bound and transparent mechanism to voice and resolve social and environmental concerns linked to the project.

123. DWASA has its own Grievance Redress Procedure (GRP), which it operates to address any dissatisfaction and complaints by residents regarding its activities. This is set out in the DWASA Resettlement Policy Framework (RPF), developed with World Bank assistance in January – March 2006 and approved by GoB in April 2006. This procedure will be applied to address any complaints or grievances during implementation of the DESWSP.

124. DWASA policy as set out in its RPF is to try to resolve complaints at project level through negotiations with community leaders and representatives of Affected Persons (AP). For this program these discussions will be conducted by the PIU, and will involve the AP and members of the relevant Zonal Level Coordination Committee (ZLCC), plus the Site Manager and Chief Engineer of the Construction Contractor if necessary. If a case cannot be resolved in this way it will be submitted to a Grievance Resolution Committee (GRC), led by the PMU Director, with two other members who are (i) a representative of the residents of the project area who is known to be a person of integrity and good judgment who commands respect, and (ii) a representative of a local NGO or CBO (in this case the NGO implementing the Resettlement Plan).

125. The GRC for DMA 610, 611 & 613 under ICB Package 02.7 of MODs Zone 6 is formed as per following format.

Table 6: Grievance Resolution Committee (GRC)

#	Name	Designation at GRC	Institution	Designation
1	Executive Engineer, DESWSP	Convener	DWASA	EE, DESWSP
2	Md. Moktarul Alam	Member	NGO	Team Leader
3	Resettlement & Awareness Expert	Member	MSC	Resettlement & Awareness Expert
4	Assistant Engineer	Member	DESWSP, DWASA	AE DESWSP
5	Safe Guard officer (Social and Gender)	Member Secretary	DESWSP, DWASA	Safe Guard Officer (S&G) DESWSP

126. The Project Coordinator convenes a meeting of the GRC in the project area, and conducts proceedings informally to reach an amicable settlement between the parties. The report of the committee is recorded in writing, and attested copies are provided to the parties involved. For this program the GRC will be required to meet and reach a decision within 14 days of receiving a complaint (verbally or in writing) from an AP or his representative. There will also be an appeals procedure where, if a person is dissatisfied with the ruling of the GRC, he or his representative may attend their next meeting to re-present the case. The committee will then re-

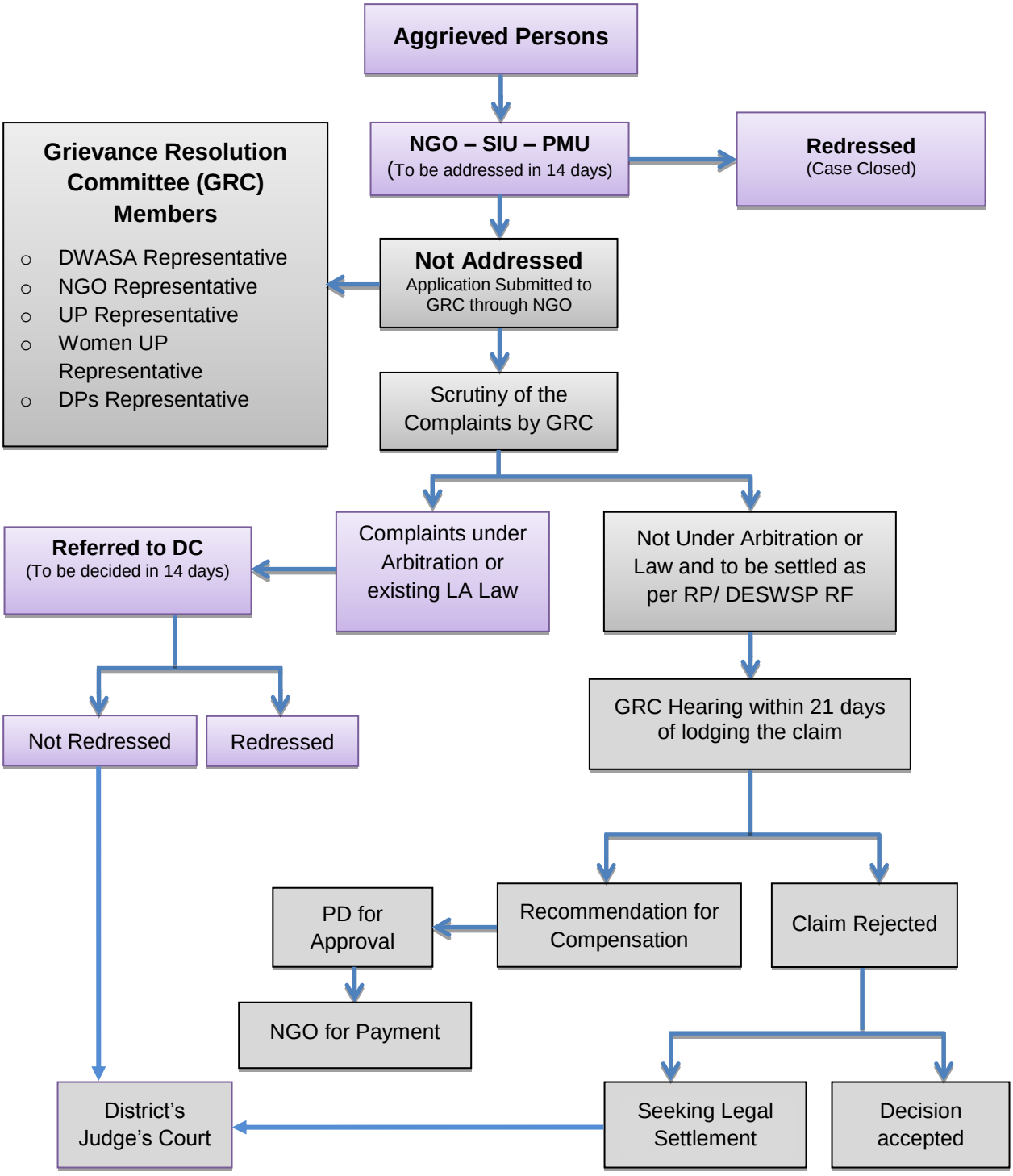
consider the case in private, after which their decision is final. If the appellant is still not satisfied, he has the right to take his case to the public courts.

127. The PMU Resettlement Specialist will keep a record of all grievance cases and will examine these for recurring complaints and solutions and action to address these will be incorporated in subsequent RPs and IEEs. APs will be made aware of the GRM via the public consultation meetings, and will be informed of the outcome of cases at subsequent meetings. DWASA will also publish the outcome of cases on public notice-boards in each hydraulic area. If the aggrieved AP is not satisfied with the decision of the GRC, he/she has the right to refer his/her petition to the court of law.

128. All costs involved in resolving the complaints (meetings, consultations, communication, and information dissemination) will be borne by the PMU; cost estimates for grievance redress are included in resettlement cost estimates.

129. In the foreseeable event of GRM is not in a position to resolve the issue, the affected person can also 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.

130. Flow Chart of Grievance Redress Mechanism (GRM) for ICB 02.7.



Source: Resettlement Plan (RP)

8. ENVIRONMENTAL MANAGEMENT PLAN

131. 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.

132. The draft IEE was prepared during project outline design and now it is being updated based on the Detailed Designs, Environmental Features of areas, Baseline Survey and Environmental Management Plan (EMP) prepared by contractor for the designated DMAs (DMA-610, 611 & 613). The updated IEE report will be submitted to DWASA for review and forwarded to ADB for further review, approval, and disclosure prior to commencement of works. A copy of the EMP must be kept on work sites at all times. 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.

A. Implementation Arrangement

133. The project is being implemented through the Local Government Division (LGD) of the Ministry of Local Government, Rural Development and Cooperatives (MLGRDC). DWASA is both the Executing Agency (EA) responsible for the management, coordination and overall technical supervision of the program, and the Implementing Agency (IA) responsible for supervising construction of the infrastructure and conducting the non-infrastructure elements.

134. DWASA has established a Project Management Unit (PMU), responsible for day-to-day management of the program, including tendering and selection of contractors, construction supervision, monitoring and evaluation, and compliance with safeguards policies. The PMU is headed by a full-time Project Director (PD) in the rank of DMD or Chief Engineer (CE). In addition, there are 2 (two) dedicated Deputy Project Directors (DPDs).

135. The PMU is being assisted by the Management and Supervision Consultants (MSC), who is for tendering management of contractors and supervision of the construction works; and NGOs, who is for the conducting public awareness campaigns. The PMU is already appointed individual construction contractors to build the infrastructure of the hydraulic zones (DMAs). The contractor is being managed by the relevant Project Coordination Unit (PCU) and construction is being supervised by the MSC.

136. A PCU has been established in each of the four DWASA administrative (MODS) zones. Headed by the Zonal Executive Engineer and staffed by PWSS personnel, the PCU is responsible for coordinating all activities at the local level in the zone, and engaging civil society.

137. DWASA is being be assisted by an inter-ministerial Project Steering Committee (PSC), to provide policy guidance and coordination in the implementation of the program. The PSC meeting is being convened by LGD. Its membership will include the Managing Director, DWASA; Project Director of PMU; representative from Dhaka City Corporation; representative from the Economic Relations Division and the Finance Division of MoF; the Planning

Commission; the Planning Monitoring and Evaluation Division; RAJUK (Capital Development Authority); LGED, Ministry of Environment and Forestry; and ADB representative as observer.

138. A Zonal Level Coordination Committee (ZLCC) will monitor implementation of the program at local level in each zone, and will report to the PSC.

139. Environmental issues are being coordinated by the Environmental unit of MSC (now, consisting by Environmental Inspector only and who is also acting as Environmental Expert). The responsibilities of the Environmental Unit of MSC include: (i) carrying out and/or updating IEE in accordance with the government rules and regulations and with the ADB requirements; (ii) carring out environmental assessment of alternative sites; (iii) establishing systems for implementation of EMP to ensure compliance with ADB SPS and rules of the Government of Bangladesh; and (iii) disclosure of environmental information and interaction with stakeholders. The Environmental unit of MSC working closely with other specialist to ensure that guidelines specified in the EMP are reflected in project contracts and to prepare reports on environmental safeguard monitoring activities periodically.

140. Resettlement issues are being coordinated by the Resettlement and Awareness Expert of MSC, who prepares resettlement plans for each hydraulic zone (DMA) as guided in ADB SPS, following the Resettlement Framework established during program preparation. This specialist also coordinates the allocation of compensation and other entitlements, which is being distributed by PMU in each zone. The PMU is being assisted by the Resettlement and Awareness Expert of MSC. The Resettlement Plan (RP) of DMA 610 has been prepared and got approval from PMU. The RP of DMA-613 is submitted to PMU and in review process; RP of DMA-611 is being prepared.

141. The working areas are planned and mostly covered by residential buildings where shops and hawkers are permitted to establish and run businesses. According to the project policy, the road width is found 10m and above, will not come under consideration of resettlement compensation. Resettlement Awareness Team (RAT) of NGO has completed the road measurement survey and joint verification survey of DMA 610, 611 & 613 and it has been found that most of the road widths are below 10 meters. However, so far, 104 Affected Persons (APs) have been identified in roads where the width is within 10 meters in these 3 DMAs. NGO has collected information by interviewing each Vendors/Hawkers as per prescribed form of ADB and identified 35 persons in DMA-610, 23 persons in DMA-611 so far, 46 persons in DMA-613 for compensation. As per detailed survey report NGO recommended a list of 104 (One Hundred Four) APs assessing compensation amount of their business loss or income loss. It is assessed that compensation on the basis of their daily average profit and proposed compensation for five days. In consequence NGO proposed to allocate BDT 81,000 (Eighty-One Thousand) only for DMA-610; BDT 93,500 (Ninety-Three Thousand Five Hundred) only for DMA-613 as compensation against their 5 (five) days average profit or income. The proposed compostable amount is being prepared for DMA-611.

142. **Contractor.** The contractor has an environment supervisor to (i) coordinate with MSC on updating the IEE/EMP based on detailed designs, and (ii) and ensure implementation of EMP during civil works.

143. Organizational procedures/institutional roles and responsibilities for the safeguards implementation are described in Table 7.

Table 7: Institutional Roles and Responsibilities for Safeguards Implementation

Activities	Agency Responsible
Disclosure of proposed project and anticipated social and environmental impacts on website	ADB PMU
Disclosure of proposed project, social/environmental impacts, proposed entitlements/mitigation measures in local languages	PMU
Disclosure of grievance redress mechanism/process	PMU, MSC PCU, ZLCC, NGO
Finalization of sites and alignments	PMU, MSC, Contractors
Identification of roads for closure, existing utilities, road conditions	PMU, MSC, Contractors
Updating of safeguard documents (IEE and RP) based on detailed design	MSC with assistance from contractors & NGO
Review of updated RP/IEE and send to ADB for approval prior to contract award	PMU
Clearance and disclosure of updated safeguard documents	ADB, PMU
Conducting transect walks through road stretches to identify extent of impacts	MSC, Contractor, NGO
Conducting meetings at community/household level with affected persons (APs)	MSC, Contractor, NGO
Design/implementation of detailed measurement survey (DMS)[17] on roads identified for full/partial closure; identification of poor and vulnerable APs	MSC, NGO
Computation of entitlements	PMU, MSC
Categorization of APs for finalizing entitlements	MSC, NGO
Conducting focus group discussions/meetings/consultations/workshops during DMS survey and updating safeguards documents	PMU, MSC, NGO
Finalizing entitlements and rehabilitation packages for all APs	PMU, MSC, NGO
Disclosure of final entitlements and rehabilitation packages	PMU, MSC, NGO
Delivery of entitlements/award of checks	PMU
Implementation of mitigation and rehabilitation measures	PMU, MSC, Contractor
Consultations with APs during rehabilitation activities	MSC, Contractor, NGO
Grievance redressal	PMU, MSC, NGO, Contractor
Internal monitoring	PMU, MSC

B. Capacity Building

144. A training program has been developed to build the capability of PMU. This is being conducted by the Consultant.

145. PMU & MSC will be organized induction courses for the training of contractors, preparing them on: (i) EMP implementation, including environmental monitoring requirements related to mitigation measures; and (ii) taking immediate actions to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation. The contractor will be required to conduct environmental awareness and orientation of workers prior to deployment to work sites. The suggested outline of the training program is presented in Table 8.

[17]Detailed measurement survey to be carried out during detailed design, to record and quantify resettlement impacts and entitled persons.

Table 8: Capacity Building and Training Program

Description	Contents	Schedule	Participants	Remarks
Program 1 Orientation workshop	**Module 1 – Orientation** ADB Safeguards Policy Statement Bangladeshi Environmental Laws and Regulations **Module 2 – Environmental Assessment Process** ADB environmental process, identification of impacts and mitigation measures, formulation of an Environmental Management Plan (EMP), implementation, and monitoring requirements Review of environmental assessment report to comply with ADB requirements Incorporation of EMP into the project design and contracts	1 day	DWASA officials involved in the project implementation PMU MSC Contractors NGOs	An orientation workshop was conducted on ADB SPS by Environmental Specialist and Social Safeguard Specialist of ADB on 15th November, 2015 during an ADB team visited Bangladesh. A demonstration of implementation procedure was conducted during their field visit to project location in Dhaka. The key issues regarding EMP implementation and Resettlement observed by the team in the field were discussed in the workshop. A capacity building workshop on ADB & GoB Environmental Safeguard Requirement was conducted by MSC on 26th June, 2016.
Program 2 Orientation program/ workshop for contractors and supervisory staffs	Environmental issues during construction Implementation of EMP Monitoring of EMP implementation Reporting requirements	1 day	PMU Contractors	Conducted by MSC on 9th November, 2016.
Program 3 Experiences and best practices sharing	Experiences on EMP implementation – issues and challenges Best practices followed	1 day on a regular period to be determined by PMU & MSC	PMU MSC Contractors NGOs	To be conducted in January 2018.

C. Environmental Management Action Plan

146. The EMP will guide the environmentally-sound construction of the project and ensure efficient lines of communication between the PMU, MSC, and contractors. The EMP identifies activities according to the following three phases: (i) Pre-Construction/Planning phase: site establishment and preliminary activities, including finalizing EMP and IEE; (ii) Construction phase: installation of pipe network as per detailed design with implementation of EMP; and (iii) Post-Construction/Operational phase. Table 9 outlines the mitigation measures and responsible organization(s) for implementation and monitoring which are applicable for the DMA-610, 611 and 613. The EMP has been prepared by contractor and after 2nd review approved by MSC, in close coordination with the contractors, during the detailed design stage of DMA-610, 611 & 613. The final EMP and IEE are reviewed and cleared by DWASA and ADB at time of detailed design and prior to commencement of construction work.

147. **Environmental Monitoring Program.** A program of monitoring will be conducted: (i) to ensure that all parties take the specified action to provide the required mitigation, (ii) to assess whether the action has adequately protected the environment, and (iii) to determine whether any additional measures may be necessary. Most measures will be checked by simple observation, by checking of records, or by interviews with residents or workers. This will be coordinated by the PMU and Environmental unit of MSC. The Environmental unit of MSC will be responsible for all monitoring activities and reporting the results and conclusions to the PMU, and will recommend remedial action if measures are not being provided or are not protecting the environment effectively. The Environmental unit of MSC is being assisted by a fulltime Environmental Inspector who makes many of the routine observations at the various construction sites. Post-construction monitoring will be conducted by DWASA as part of their overall management of the operating infrastructure.

Table 9: Environmental Mitigation Measures Action Plan						
Activity	**Mitigation Measures**	**Responsible for Implementation**	**Responsible for Monitoring**	**Parameter to Monitor**	**Frequency of Monitoring**	**Guidelines/ Standards**
Planning and Design Phase						
Contractor's responsibility	– Be familiar with the present traffic congestion of Dhaka city, rules and regulation of Dhaka City Corporations (DNCC/DSCC) for preparation of road cutting plans before execution of works; – Arrange for temporary water supply to every household as and when their water supply is disconnected or disrupted; – Protect all underground and overground utility services viz. telephone, electricity, gas, sewer, drainage, etc. from damage during execution of the contract. Necessary compensation to be paid to the respective organization(s) as per their prevailing rules and regulations.	Contractors	DWASA PMU MSC	– Road Cutting Plan – Arrangement for temporary water supply – Disruption to utilities	As required in the Program of Performance	Contract Provisions EMP
Pipe replacement rehabilitation,[18] and network extension[19]	– In all cases, AC pipes shall be replaced. Existing AC pipes, where intact, shall be left in-situ and not disturbed. Where the AC pipe is damaged and where there is a risk of asbestos particles becoming airborne, the contractor shall follow all necessary procedures, guidelines and laws as laid out locally or by this EMP to contain and remove hazardous material. – The network expansion into different residential / industrial areas will be through trenchless or conventional trenching methods whereby the pipelines will be laid with a minimum cover depth of 1.0 meters.	Contractors	DWASA PMU MSC	– Residual design life and proposed methods of repair – Inventory of AC pipes	As required in the Program of Performance	Contract Provisions EMP **AC Pipe Handling Protocol**
Working hours and times	– All work in major roads and on minor roads that are heavily used by traffic will only be permitted at night between 7:00 PM and 7:00 AM. – All the minor roads and alley with less traffic may be considered for both day and night working provided alternative passageway can be maintained.	Contractors	DWASA PMU MSC	Work hours	As required in the Program of Performance	- Contract Provisions - EMP

[18] The term pipe replacement is understood to mean that the existing pipe will be replaced, either by the traditional open trench method, where the existing pipe will be abandoned and a new pipe will be installed or by pipe bursting, where the existing pipe will be used as a host pipe which will be cut open, expanded and a new pipe will be installed inside the old pipe.

[19] The term pipe extension is understood to mean the laying of a new pipe where no distribution pipes previously existed. Laying pipes in un-served and underserved area and replacing spaghetti lines (bunch of small diameter coil pipes) with new reticulation pipe lines will be considered as extension work.

Table 9: Environmental Mitigation Measures Action Plan						
Activity	**Mitigation Measures**	**Responsible for Implementation**	**Responsible for Monitoring**	**Parameter to Monitor**	**Frequency of Monitoring**	**Guidelines/ Standards**
Road cutting[20]	– Unnecessary road cutting should be avoided. – The contractor has to take all necessary safeguards to avoid accidents at site, prevent loss/damage to all existing utilities like pipelines, telephone/gas/electric cables, poles etc and any government or private property during the contract period. – DWASA will apply for the road cutting permission and the contractor shall give full effort and cost for collection of road cutting permission for required days. Therefore, the road cutting plans necessary for the application must be prepared by the contractor. – No temporary or permanent works must proceed before the design and drawings are approved by the Project Manager and road cutting permission obtained from DNCC/DSCC by PMU. – The contractor shall prepare a traffic management scheme (road closure program or diversions) and incorporate detail of traffic diversions and pedestrian routes, all traffic signs (for the regulation and for information) and road markings shall be ensured prior to start of road cutting.	Contractors for preparation of road cutting plan and payment for pavement restoration Contractor for preparation and implementation of traffic management scheme DWASA for the road cutting permit DNCC/DSCC for pavement restoration	DWASA PMU DNCC/DSCC for issuance and monitoring of pavement compaction	– Road category along pipe alignments – Budget allocation for pavement restoration – Road cutting plan – Road cutting permission from DNCC/DSCC	Prior to start of civil works After compaction and turn-over to DNCC/DSCC for pavement restoration	- Contract Provisions - EMP
Road excavation	– All excavations shall be done to the minimum dimension as required for safety and working facility – The excavation shall not damage or interfere with existing services or structures. If damage or interference is so caused the contractor shall make arrangements with the supply and/or building owner to execute the repairs at the contractor's own cost. – All trench and pit excavations and other work shall be carried out during night time and within the limits of any existing road area shall be completed as rapidly as possible. - Road drains and channels shall be kept free from obstructions at all times. – In case of excavation in VIP and other large roads, the trenches and pits maybe need to be covered by steel plates to allow traffic to pass during non-working periods. The contractor must liaise with the DCC and the responsible police to familiarize themselves and adhere	Contractors for preparation of road cutting plan and payment for pavement restoration Contractor for preparation and implementation of traffic management scheme DWASA for the road cutting permit	DWASA PMU DNCC/DSCC for issuance and monitoring of pavement compaction	– Road category along pipe alignments – Budget allocation for pavement restoration – Road cutting plan – Road cutting permission from DNCC/DSCC	Prior to start of civil works After compaction and turn-over to DNCC/DSCC for pavement restoration	- Bangladeshi Standards and Codes of Practice in their latest version, National Building code and Public Works Department (PWD) specification of the Govt. - Contract provisions - EMP

[20] Most of the roads are owned and maintained by DCC. Some narrow roads having width even less than 2 m are privately-owned.

Table 9: Environmental Mitigation Measures Action Plan						
Activity	**Mitigation Measures**	**Responsible for Implementation**	**Responsible for Monitoring**	**Parameter to Monitor**	**Frequency of Monitoring**	**Guidelines/ Standards**
	to such rules. All costs involved to adhere to such rules shall be borne by the contractor. – Pits and trenches not backfilled at end of a night shift, the excavation must be covered with steel plates and in alleys with wooden plates. – Where trench excavation or any other part of the works obstructs any footpath or right-of-way, the contractor shall provide, at his own cost, a temporary footpath around the obstruction to the satisfaction of the Project Manager. – The contractor shall have particular regard to the safety of pedestrian, livestock, and shall ensure that all open excavation, access routes and steep or loose slopes arising from the contractor's operations are adequately fenced and protected.	DNCC/DSCC for pavement restoration				
Trenchless pipe installation	– Pipes shall be installed by the horizontal directional drilling (HDD) methods where required. Should survey information indicate that the method is not feasible the contractor shall inform the Project Manager and gain prior approval for an alternative method or for open trench method. – Excavation material shall be removed from the conduit as the work progresses. No accumulation of excavated material within the conduit will be permitted. – The contractor shall provide sediment and erosion control measures to prevent drilling fluid or borehole cuttings from entering water courses or other land adjacent to the site in accordance with local environmental legislation. – The contractor shall supply portable mud tanks or construct temporary mud pits to contain excess drill fluids during construction. Spent drilling fluids and cuttings shall be confined to the entrance and exit pits. – The contractor shall take all necessary precautions to minimize the damage to the adjacent properties. Any drilling fluid that enters the pipe shall be removed by flushing or other suitable methods. – The contractor shall be responsible for cleanup and restoration – Pits excavated to permit connection of bored pipe shall be backfilled, and disturbed areas shall be restored to their original state or better. Sections of sidewalks, curbs,	Contractors	DWASA PMU MSC	– Program of Performance – Pipe Bursting Plan – Plan for locating, exposing and re-connecting service connections – Proposed pit size and location – Temporary water supply plan; – Plan for consumer notification. – Traffic management plan	As required in the Program of Performance	Contract provisions

Table 9: Environmental Mitigation Measures Action Plan						
Activity	**Mitigation Measures**	**Responsible for Implementation**	**Responsible for Monitoring**	**Parameter to Monitor**	**Frequency of Monitoring**	**Guidelines/ Standards**
	and gutters or other permanent improvements damaged during HDD operations shall be repaired or replaced at the contractor's expense.					
Resettlement Plan	– Implement Resettlement Plans, prepared by DWASA. No civil works will begin until all compensation to affected persons is paid.	PMU DSC Contractors NGO	DWASA ADB	– Number of affected person – Compensation to affected persons – Number and type of information dissemination activities – Complaints from stakeholders	Prior to start and during civil works	Resettlement Plan
Preparation of catalogues, installation and O&M manuals	– The contractor shall supply catalogues and installation manuals for each type of pipes to DWASA at the time of submission the Operation and Maintenance manuals. – All catalogues and manuals shall be printed in the English language or accompanied by an English translation.	Contractors	DWASA PMU MSC	– Program of Performance	Completion of civil works and decommissioning	– Contract provisions
Prior to Construction Phase						
Preparation of final IEE/EMP	– Revise/update IEE/EMP based on detailed design – Submit to ADB for approval and disclosure	MSC to update DWASA to submit to ADB	DWASA	- Detailed Design	After completion of detailed design and prior to start of civil works	ADB SPS EARF
Environmental Monitoring Report	– Submit to ADB Semi-Annual Environmental Monitoring Report	MSC to prepare DWASA to submit to ADB	DWASA	- EMP - Contract provisions	Semi-annual	ADB SPS EARF IEE
Legislation, permits, and agreements	– In all instances, DWASA, service providers, contractors, and consultants must remain in compliance with relevant local and national legislation. – A copy of the IEE must be kept on-site and disclosed in DWASA and ADB website	Contractor	PMU Environment Specialist and Environment unit of MSC	All applicable permits and approvals	Prior to award of contract and as necessary	- Location Clearance - ECC - Road cutting permit
Education of site staff on general and environmental conduct[21]	– Ensure that all site personnel have a basic level of environmental awareness training. – Staff operating equipment (such as excavators, loaders, etc.) shall be adequately trained and sensitized to any potential hazards associated with their task.	Contractor	PMU and MSC	Records of training	Prior to start of civil works and every new employee	Environmental management plan (capacity building)

[21] These points need to be made clear to all staff on-site before the project begins.

Table 9: Environmental Mitigation Measures Action Plan						
Activity	**Mitigation Measures**	**Responsible for Implementation**	**Responsible for Monitoring**	**Parameter to Monitor**	**Frequency of Monitoring**	**Guidelines/ Standards**
	– No operator shall be permitted to operate critical items of mechanical equipment without having been trained by the contractor. – All employees must undergo safety training.					
Safeguards supervisors	– The contractor shall appoint one environment safeguard supervisor and one resettlement supervisor who will be responsible for assisting contractors in implementation of EMP, coordinating with the MSC environment management specialist and resettlement specialist, community liaison, consultations with interested/affected parties, reporting, and grievance redressal on a day-to-day basis.	Contractor	Consultant	Hiring and actual work	As work progresses	Continuous work output and reporting records
Construction Phase						
Safety, security and protection of the environment	– Take all necessary precautions against pollution or interference with the supply or obstruction of the flow of, surface or underground water. These precautions shall include but not be limited to physical measures such as earth bunds of adequate capacity around fuel, oil and solvent storage tanks and stores, oil and grease traps in drainage systems from workshops, vehicle and plant washing facilities and service and fuelling areas and kitchens – Establish sanitary solid and liquid waste disposal systems – Should any pollution arise, clean up the affected area immediately at his own cost and to the satisfaction of the Project Manager, and pay full compensation to any affected parties.	Contractors	DWASA PMU MSC MoEF	- ECC provisions - Program of Performance - Waste Management Plan - Complaints from stakeholders	- As required in the Program of Performance - As work progresses	- ECC - Contract provisions - EMP - No complaints received
Protection of waterways	– Every effort shall be made to ensure that any chemicals or hazardous substances do not contaminate the soil or water on-site. – Care must be taken to ensure that runoff from vehicle or plant washing does not enter the surface/ground water. – Site staff shall not be permitted to use any stream, river, other open water body, or natural water source adjacent to or within the designated site for the purposes of bathing, washing of clothing, or for any construction or related activities. – All concrete mixing must take place on a designated, impermeable surface. – No vehicles transporting concrete to the site may be washed on-site.	Contractor	DWASA MSC	- ECC Provisions - Complaints from community	As work progresses	- No visible increase in turbidity and construction materials/ wastes in surface water, any waterways, or drainage channels - Zero complaints from community

Table 9: Environmental Mitigation Measures Action Plan						
Activity	**Mitigation Measures**	**Responsible for Implementation**	**Responsible for Monitoring**	**Parameter to Monitor**	**Frequency of Monitoring**	**Guidelines/ Standards**
	– No vehicles transporting, placing, or compacting asphalt or any other bituminous product may be washed on-site. – All substances required for vehicle maintenance and repair must be stored in sealed containers until they can be disposed of removed from the site. – Hazardous substance/ materials are to be transported in sealed containers or bags.					
Construction of temporary structures (such as offices, storages, warehouses, scaffolding, etc.)	– Before commencement of the works on the sites submit to the Project Manager the drawings, where the proposed location and general arrangement or site construction survey of the contractor's office premises, workshops, storages, headquarters and other temporary constructions, necessary for adequate and easy execution of the contract. – Obtain own information about the access to all the parts of the sites and, if the contractor wants to use the roads, going through private properties, he shall complete all the formalities with the owners. – Ensure all necessary precautionary measures to avoid any accident due to traffic. He should ensure that for any activities/temporary or permanent structures, machineries and equipment, scaffolding or shoring should not obstruct free flow of surface runoff towards sewer system or drain. – Under no circumstances may open areas or the surrounding bushes be used as a toilet facility. – Encourage recycling and provide separate waste receptacles for different types of wastes. Ensure that all litter is collected from the work and camp areas daily. Ensure camp and working areas are kept clean and tidy at all times. – - No trees, shrubs, or groundcover may be removed or vegetation stripped without the prior permission of the engineer. – The contractor shall submit a method statement and plans for the storage of hazardous materials (fuels, oils, and chemicals) and emergency procedures. - The contractor shall ensure the material safety data sheets of chemicals are posted in conspicuous areas.	Contractor	MSC	Location plan	- Prior to start of civil works - As work progresses	- Approved location plan - Construction method - No complaints received - No dumped wastes and litter at work sites at all times
Handling of surface water, flooding event,	– Protect the working area including pits, trenches, materials, machineries and equipment from any damage due to inundation by downpour.	Contractors	DWASA PMU MSC	- Program of Performance - Bi-weekly 6 weeks	- As required in the Program of Performance	- Contract Provisions - EMP

Table 9: Environmental Mitigation Measures Action Plan						
Activity	**Mitigation Measures**	**Responsible for Implementation**	**Responsible for Monitoring**	**Parameter to Monitor**	**Frequency of Monitoring**	**Guidelines/ Standards**
heavy downpour, etc.[22]	– Ensure not to make any congestion in the open drains or natural or artificial channels by any of his activity. – Take necessary measure to bring the site to the condition prevailing before the downpour without delay. Necessary measure has to be taken so that storm water does not get into the newly installed pipelines. – Be particular in keeping updated weather forecast and maintain a record book at site in which weather condition is recorded.			running plan - On-site record book	- As work progresses	
Handling of excavated soil	– Make own arrangements for the temporary storage of any excavated material. Haul away all excavated materials from the excavation site and deposit these in an area designated by DWASA. – Have regard to the working areas available to him for the construction of the pipeline particularly where this is located in roads or in other places to which the public has free access. – Be responsible for removal and disposal of any excavated material required for or not suitable for use as refilling as aforesaid or use elsewhere in the works. The cost of such removal of excess excavated earth shall be deemed to be included in the contract rates. – Hauling vehicles must always be present at the excavation site.	Contractors	DWASA PMU MSC	- Program of Performance - Bi-weekly 6 weeks running plan - On-site record book - Complaints from stakeholders	- Prior to start of civil works - As work progresses	- Contract Provisions - EMP
Minimization of public disturbance	– Restrict his work to the sites allocated to him, and keep the sites accessible for inspection by competent authority at any time. – Ensure, as far as possible to minimize public disturbance and work during the nights. – Advance road signage indicating the road detour and alternative routes. Provide sign boards for pedestrians to inform them of nature and duration of construction works and contact numbers for concerns/ complaints. – Provide adequately illuminated signs and barriers at night. Ensure these are clean, legible at all times and repositioned as necessary as the work progresses.	Contractors	DWASA PMU MSC	- Program of Performance - Inventory of utilities, signs and barriers - access to paths, steps, bridges, crossings or drives for all entrances to property - Complaints from stakeholders and affected people	- Prior to start of civil works (per pipe section) - During pipe laying/ replacement/ bursting - As work progresses	- Contract provisions - EMP - No complaints received

[22] Water logging problem exists during downpours and monsoon. Portions of roads may be flooded for prolonged periods after heavy downpours. The existing drainage facilities of Dhaka are insufficient. Only about 30% of the city's population is connected to the sewerage system. Dispose of wastewater through surface drains, or in low-lying areas, natural drains, or water bodies that find their way to storm sewers. During monsoon period with medium to heavy downpour the roads are inundated for 1-6 hours.

Table 9: Environmental Mitigation Measures Action Plan						
Activity	**Mitigation Measures**	**Responsible for Implementation**	**Responsible for Monitoring**	**Parameter to Monitor**	**Frequency of Monitoring**	**Guidelines/ Standards**
	– For the duration of the works, provide convenient access to paths, steps, bridges, crossings or drives for all entrances to property abutting the site and maintain them clear, tidy, and free from mud and objectionable matter.			- Records of disclosure and public consultations		
Warning of users prior to any disturbance in water supply	– Submit detailed work plan for the particular portion of the work to the Project Manager for approval. – Before setting out for the work, inform the inhabitants, businesses and consumers through appropriate means (bill board display, leaflet distribution, using color papers announcement on radio and TV, publishing in the widely circulated daily newspapers) at least 7 days (or as directed by the Project Manager) before commencement of any work.	Contractors NGO	DWASA PMU MSC	- Program of Performance - Inventory of utilities - Liaison with utilities owners and operators - Number and type of information dissemination activities - Complaints from stakeholders and affected people	- Prior to start of civil works (per pipe section) - During pipe laying/ replacement/ bursting	- Contract provisions - EMP - No complaints received - 7-day notice to public
Maintaining water supply	– Plan and execute in such a way the water supply shall be kept in operation with maximum disruptions of one working day (12 hours) – Notify existing users about temporary disruption of water supply if unavoidable. – Provide with alternative water source to disconnected consumers to meet their daily requirement. – Ensure only clean water free from deleterious materials and of appropriate quality for its intended use is supplied. – In providing water, ensure that the rights of and supply to existing users are not affected either in quality, quantity or timing. – Inform the Project manager in the event of a dispute over the effect of the contractor's arrangements on the water supply of others.	Contractors	DWASA PMU MSC	- Program of Performance - Number of disconnected consumers - Quantity of supplied water to affected consumers	- Prior to start of civil works (per pipe section) - During pipe laying/ replacement/ bursting	- Contract provisions - EMP - No complaints received
Provision for security of the sites	– Be responsible for guarding all utilities, plants equipment, material, etc. delivered on sites and for ensuring that all sign, lights, fences, etc. are in their proper place. – Provide, install and maintain suitable barriers and/or fences to protect the facilities, constructions camp, storage yard, existing facilities and construction and installation operations and to remove same when no longer required by DWASA, or at completion of the project.	Contractors	DWASA PMU MSC	- Program of Performance - Signs and barriers - Security measures in place	- Prior to start of civil works (per pipe section) - During pipe laying/ replacement/ bursting - As work progresses	- Contract provisions - EMP - No complaints received
Protection of trees and	– Ensure that no trees or shrubs are felled or harmed except for those required to be cleared for execution of	Contractors	DWASA PMU	- Program of Performance	- As required in the Program of	- ECC - Contract

Table 9: Environmental Mitigation Measures Action Plan						
Activity	**Mitigation Measures**	**Responsible for Implementation**	**Responsible for Monitoring**	**Parameter to Monitor**	**Frequency of Monitoring**	**Guidelines/ Standards**
vegetation	the works. – Ensure no tree shall be removed without the prior approval of the Project Manager and any competent authorities. – Plant and maintain two trees of the same species for every one that is removed.		MSC MoEF	- Complaints from stakeholders - Number of trees cut and planted	Performance - As work progresses	provisions - EMP - No complaints received - 100% survival of trees planted
Use of wood as fuel	– Not use wood as a fuel for the execution of any part of the works, including but not limited to the heating of bitumen and bitumen mixtures and the manufacture of bricks for use in the works. – To the extent practicable, ensure that fuels other than wood are used for cooking, and water heating in all his camps and living accommodations.	Contractors	DWASA PMU MSC	- Program of Performance - Complaints from stakeholders	- As required in the Program of Performance - As work progresses	- Contract provisions - EMP - No complaints received
Fire prevention	– Take all precautions necessary ensure that no buildings and supply utilities, etc. or vegetation along the line of the road outside the area of the permanent works is affected by fires arising from the execution of the works. – Follow any instructions of the competent authorities with respect to fire hazard when working in the vicinity of gas installations. – Immediately suppress if a fire occurs in the natural vegetation or plantations adjacent to the road for any reason. – In areas of forest, shrub or plantation damaged by fire considered by the Project Manager to have been initiated by the contractor's staff or labor, replant and restore to the satisfaction of the Project Manager.	Contractors	DWASA PMU MSC	- Program of Performance - Number of fire occurrences	- As required in the Program of Performance - As work progresses	- Contract provisions - EMP - Zero fire occurrence
Handling traffic and access	– Submit to the Project Manager for approval a traffic management plan and detailed work plan showing activities on hourly basis. – Plan and conduct work in such a way that can be completed in 6-8 hours with as little as possible of traffic interruption, so all of this work (and probably most of the daytime work in minor roads) will be conducted by small teams of men, working on short lengths of the network (around 100 -150 m) at a time. – Provide, erect and maintain barricades, signs, markings, flags, lights and flagmen as may be required for the information and protection of traffic. The flagmen shall be equipped with red and green flags and lanterns/lights. – Ensure barricades, signs, marking, and flags are of strong design. All barriers on roads and pedestrian areas	Contractors	DWASA PMU MSC	- Program of Performance - Traffic management plan - Lists and samples of warning signs and barricades	- As required in the Program of Performance - As work progresses	- Contract provisions - EMP - No complaints received

Table 9: Environmental Mitigation Measures Action Plan						
Activity	**Mitigation Measures**	**Responsible for Implementation**	**Responsible for Monitoring**	**Parameter to Monitor**	**Frequency of Monitoring**	**Guidelines/ Standards**
	shall be lit with warning lights during night time or when there is poor visibility. – Where the diversion or closure of any existing carriageway, walkway or public right of way is temporarily necessitated by the works, provide and maintain an alternative, which shall be operational before interference with the existing way. – Where ramps, temporary carriageways and walkways are required, they shall be provided and maintained to a standard suitable in all respects for the class or classes or traffic or pedestrians. These must be kept usable by women, children, patients and disables.					
Minimizing noise level	– Ensure noise level of the machineries and equipment must not exceed 70dB (A). – Use modern vehicles and machinery with standard adaptations to reduce noise and exhaust emissions, and ensure they are maintained to manufacturers' specifications. – Noise-generating equipment must be fitted with silencers. – If a worker is exposed to noise above a noise exposure limit, the contractor must investigate options for engineered noise control such as using low-noise excavators, jackhammers, drills, and power generators. – 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.	Contractors	DWASA PMU MSC	- Complaints form community - Noise level monitoring record	As work progresses	- Bangladeshi Noise Standards - ECC Provisions
Minimizing dust generation and air pollution	– Limit dust by removing waste soil quickly, bringing sand to site only when necessary, covering and watering stockpiles, and covering soil and sand when carried on trucks. – Vehicles travelling to and from the construction site must adhere to speed limits so as to avoid producing excessive dust. – Access and other cleared surfaces, including backfilled trenches, must be dampened whenever possible and especially in dry and windy conditions to avoid excessive dust. – Vehicles and machinery are to be kept in good working order and to meet manufacturer's specifications for safety, fuel consumption, etc.	Contractors	DWASA PMU MSC	- Program of Performance - Complaints from stakeholders - Vehicle emission testing records	- As required in the Program of Performance - As work progresses	- No visible increase in dust and particulate matters - No complaints received

Table 9: Environmental Mitigation Measures Action Plan						
Activity	**Mitigation Measures**	**Responsible for Implementation**	**Responsible for Monitoring**	**Parameter to Monitor**	**Frequency of Monitoring**	**Guidelines/ Standards**
	– The contractor is to have the equipment seen to as soon as possible should excessive emissions be observed.					
Protecting the community and facilities and locations of social and cultural importance (e.g. schools, hospitals, mosques, museums, etc.)	– Increase the workforce in sensitive areas to complete the work quickly. – Provide wooden walkways for pedestrians and metal sheets for vehicles to allow access across open trenches, where required. – Use directional down-facing lighting, fitted with effective shades at all times when working at night. – Give special attention to the screening of highly reflective materials on site. – Locate storage facilities and other temporary structures on site such that they have as little visual impact on local residents as possible. – Provide screening in areas where the visual environment is particularly important (e.g., along commercial routes) or privacy concerns for surrounding buildings exist. This can be in a form of shade cloth, temporary walls, or other suitable materials.	Contractors	DWASA PMU MSC	- Program of Performance - Bi-weekly 6 weeks running plan - On-site record book - Complaints from stakeholders - Grievance Redress Mechanism records	As required in the Program of Performance	- Contract Provisions - EMP - Zero complaints from the stakeholders
Protecting health and safety of workers	– Ensure continuing health and safety of the employees by producing and applying a Health and Safety (H&S) Plan for all working sites. The H&S plans will include such measures as: (i) excluding the public from construction sites; (ii) ensuring that all workers are provided with and use appropriate Personal Protective Equipment; (iii) health and Safety Training for all site personnel; (iv) documented procedures to be followed for all site activities; (vi) documented procedures to be followed for AC pipes; and (vi) accident reports and records. – Prior to the commencement of any hazardous operation, submit a Safety Method Statement to the Project Manager for his approval. – Ensure all workers have been suitably trained prior to commencing work and are to be adequately supervised whilst carrying it out. – Ensure all plant and equipment is suitable for the task to be undertaken and properly inspected/tested prior to being put into operation. – Maintain records and make reports concerning health, safety and welfare of persons, and damage to property. Take remedial action to prevent a recurrence of any accidents that may occur.	Contractors	DWASA PMU MSC	- Program of Performance - Number of accidents - On-site Record	As required in the Program of Performance	- Contract provisions - EMP - Zero accident record - No complaints received

Table 9: Environmental Mitigation Measures Action Plan						
Activity	**Mitigation Measures**	**Responsible for Implementation**	**Responsible for Monitoring**	**Parameter to Monitor**	**Frequency of Monitoring**	**Guidelines/ Standards**
	– Provide hard hats, boots, other protective equipment and first aid box with all necessary medicines. – Train workers in safety issues. Provide suitable arrangements to cater for emergencies, including: first aid equipment (dressings, etc.); person(s) trained to administer first aid; communication with, and transport to, the nearest hospital with an accident / emergency department; monitoring equipment; rescue equipment; firefighting equipment; and communication with nearest fire brigade station. – Provide adequate welfare facilities including, as a minimum, drinking water; toilets; washbasins with warm water, soap and towels; and clean/dry/warm area equipped with tables and chairs at which food can be eaten.					
Replacement of asbestos cement (AC) pipes	– Follow the protocol prepared by the design consultants to be applied in any instance that AC pipes are found. – Train all personnel (including manual laborers) to enable them to understand the dangers of AC pipes and to be able to recognize them in situ. – Inform the management immediately if AC pipes are encountered. – Remove all persons to a safe distance. – Delegate trained persons to deal with AC materials and require use of appropriate breathing apparatus and protective equipment – Implement procedures for the safe removal and long-term disposal of all asbestos-containing material encountered.	Contractor MSC to develop AC pipes protocol	DWASA MSC	- H&S plan - Number of accidents and work-related injuries - Complaints from community	As work progresses	- Construction method - Detailed design documents - H&S Plan - AC Protocol - Zero accident and work-related injuries. **- AC Pipe Handling Protocol**
Cultural and historical environment	– All the staff and laborers of the contractor be informed about the possible items of historical or archaeological value, which include old stone foundations, tools, clayware, jewelry, remains, fossils, etc. – If something of this nature is uncovered, the Department of Archaeology shall be contacted and work shall be stopped immediately.	Contractor	Consultant	Chance finds	As necessary	All chance finds shall be reported and turned over to the Department of Archaeology.
Post-construction phase (prior to turnover to DWASA)						
Access	– All excavated roads shall be reinstated to original or better condition.	Contractor	MSC	Road conditions	Prior to turn-over	Pre-existing conditions
Utilities and other existing infrastructure	– All disrupted utilities restored – All affected structures rehabilitated/compensated	Contractor	MSC	All affected utilities	Immediately after civil works	All disrupted services restored

Table 9: Environmental Mitigation Measures Action Plan						
Activity	**Mitigation Measures**	**Responsible for Implementation**	**Responsible for Monitoring**	**Parameter to Monitor**	**Frequency of Monitoring**	**Guidelines/ Standards**
Construction camps and storage areas	– After construction work, all structures comprising the construction camp are to be removed from site or handed over to the property owner/community as per mutual agreement (if established on private/community land). – 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 topsoiled 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.	Contractor	MSC	General condition of the areas	Prior to end of construction period/demobilization	Pre-existing condition
Waste management	– All wastes shall be removed from the site and transported to a disposal site or as directed by the environment management specialist. Waybills proving disposal at each site shall be provided for the environment management specialist's inspection.	Contractor	MSC	General condition of the areas	Prior to end of construction period/demobilization	Pre-existing condition
Operation and maintenance phase (including Defects Liability Period)						
Detection and repair of leaks and pipe bursts	– Ensure leak detection and restoration time is minimized to the extent possible.	DWASA	DWASA	Number of reported leaks	As part of operations and maintenance of the improved system	Standards set by DWASA

148. This discussion written in relation to Table: 9, which is described as environmental mitigation measures action plan in detail for DMA-610, 611 & 613 under package ICB 02.7. It will be implemented as 4th Batch of construction, considering the applicability to each activity described in the table.

149. Implementation of the package under water supply improvement project will not create any significant adverse impacts on environment. However, most of the roads and streets where distribution networks located will be affected due to construction works for roughly three months, as per contractor's information, for each DMA. The contractor does not need to rehabilitate pipe network in DMA-610, 611 & 613 rather implementation of the DMAs will only be due to new construction. As a result, impacts caused by rehabilitation work are insignificant in that area but there will be impacts on surrounding environment due to new pipe installation works that involve nearly 62% of installation work will be done by open trenching method. The open trenching work will involve huge waste management work and will definitely cause some physical impacts on air, noise and soil topology during excavation, storage and transportation of soil, and the importation of sand for infilling. These impacts will be mitigated through some measures taken by contractors mentioned in Table 9. Since no AC pipes will be disturbed and will be left in situ where found, no significant mitigation measures will be required. However, if AC pipes would require for handling, **AC Pipes Handling Protocol**, already developed by MSC, will be followed by the contractors.

150. The mitigation measures action plan in Table 9 has been formulated considering the impacts that might occur during implementation and post implementation period of DMA-610, 611 & 613. The contractor must work accordingly to the mitigation measures action plan during implementation of the package.

D. Reporting

151. The Management and Supervision Consultants (MSC) will submit monthly monitoring reports to PMU reflecting performance of contractors in EMP implementation. The PMU safeguards unit will then submit Semi-Annual environmental monitoring reports to ADB for review and disclosure on ADB's website, as per ADB's safeguards policy and public communication policies. A sample monitoring template is in Appendix 4. The report should include update and progress of compliance with the ADB and government policies, and specifically on the progress of EMP implementation in relation to design and construction activities, grievances, and corrective actions.

E. Environmental Costs

152. The contractor's cost for site establishment, preliminary activities, construction, defect liability activities, and environmental mitigation measures related to EMP implementation during planning, design, and construction were incorporated into the contractual agreements and engineer's costs, which had been binding for implementation. The survey has been conducted by the contractor.

153. The operation phase mitigation measures are again of good operating practices, which will be the responsibility of the implementing agency (DWASA). All monitoring during the operation and maintenance phase will be conducted by DWASA; therefore, there are no additional costs will be applicable by naming environmental cost.

154. The activities identified in the EMP mainly include site inspections and informal discussions with workers and local community, and this will be the responsibility of PMU with the assistance of MSC, costs of which are part of project management.

155. Table 10 presents the indicative cost to implement the EMP.

Table 10: Indicative Cost for EMP Implementation

Component	Description	Number	Cost per Unit (USD)	Cost (USD)	Source of Funds
Capacity building	(i) Orientation workshop for DWASA officials involved in the project implementation on ADB Safeguards Policy Statement, Bangladeshi Environmental Laws and Regulations, and environmental assessment process; (ii) induction course for the training of contractors, preparing them on EMP implementation and 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; and (iii) Lessons learned information sharing	Three modules, 1 day per module	$500 per module	$1,500	Covered under MSC contract
Dust suppression at work sites	Application of dust suppression measures during construction phase	As required	Contractor's liability	$5,000	Covered under engineering design and construction – contractor
Baseline monitoring for noise	Once before start of construction works at specified corridor per work day	Two samples (daytime and nighttime) per work day	$100 per sample	$1,000	Covered under engineering design and construction – contractor
Surveys	Ongoing before start of construction work along pipe replacement corridors	Lump sum	Contractor's liability	$5,000	Covered under engineering design and cost –contractor

9. CONCLUSION AND RECOMMENDATION

156. The process described in this IEE for DMA-610, 611 & 613 have assessed the potential environmental impacts of all elements of the project in Dhaka city. All potential impacts were identified in relation to pre-construction, construction, and operation phases.

157. Planning principles and design considerations have been reviewed and incorporated into the site planning process whenever possible; thus, environmental impacts as being due to the project design or location were not significant. However, the social impacts (access disruptions) due to construction activities are unavoidable, as the residential and commercial establishments exist along the project corridor. A resettlement plan has been developed in accordance with ADB SPS 2009 and Bangladeshi laws and regulations.

158. The EMP will assist the PMU, MSC, and contractors in mitigating the environmental impacts, and guide to execute the proposed project as environmentally sound. The EMP will also ensure efficient lines of communication between the implementing agency, project management unit, and contractors.

159. The public participation processes undertaken during project design ensured stakeholders are engaged during the preparation of the IEE. The planned information disclosure measures and process for carrying out consultation with affected people will facilitate their participation during project implementation.

160. The project's grievance redressal mechanism will provide the citizens with a platform for redressal of their grievances, and describes the informal and formal channels, time frame, and mechanisms for resolving complaints about environmental performance.

161. 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.

162. The project will benefit the general public by contributing to the long-term improvement of water supply system and community livability in Dhaka city. The potential adverse environmental impacts are mainly related to the construction period, which can be minimized by the mitigating measures and environmentally sound engineering and construction practices.

163. Therefore, as per ADB SPS, the project is classified as environmental **Category B** and does not require further environmental impact assessment.

APPENDIX 1: ADB REA CHECKLIST

SCREENING QUESTIONS	Yes	No	REMARKS
A. Project Sitting Is the project area…			The population distribution shows that the project area is densely populated.
A. Densely populated?	☑		
Heavy with development activities?	☑		
Adjacent to or within any environmentally sensitive areas?		☑	No environmentally sensitive and valuable ecosystems, including protected areas and forests are within or near the DMA locations.
Cultural heritage site		☑	
Protected Area		☑	
Wetland		☑	
Mangrove		☑	
Estuarine		☑	
Buffer zone of protected area		☑	
Special area for protecting biodiversity		☑	
Bay		☑	
B. Potential Environmental Impacts Will the Project cause…			
Pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff?		☑	The pipeline network will be installed below ground by HDD, PB and OT method and backfilled with adequate compaction which will be placed apart and separated from the wastewater network, industrial discharging line etc.
Impairment of historical/cultural monuments/areas and loss/damage to these sites?		☑	Not applicable
Hazard of land subsidence caused by excessive ground water pumping?		☑	Not applicable
Social conflicts arising from displacement of communities?		☑	No displacement of communities is required in these DMAs
Conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters?		☑	Water quantity will be sufficient at time of operation phase. There is no additional abstraction from groundwater and treated surface-water will be injected into the network to fulfill the designed water demand.
Unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)?		☑	Raw water from groundwater will be treated prior of distribution. Treated water (groundwater and injected surface-water) quality will be met the Bangladesh standards for drinking water.
Delivery of unsafe water to distribution system?		☑	The water will be supplied through new HDPE pipes to prevent leakages and contamination.

SCREENING QUESTIONS	Yes	No	REMARKS
Inadequate protection of intake works or wells, leading to pollution of water supply?		☑	The intake will be secured & accessible. It will also be monitored to ensure the treated & safe water will be distributed
Over pumping of ground water, leading to salinization and ground subsidence?		☑	Not applicable
Excessive algal growth in storage reservoir?		☑	Not anticipated. The storage reservoirs are fully enclosed structures. In addition, treated water will only be stored for a short period of time.
Increase in production of sewage beyond capabilities of community facilities?		☑	Improved sewerage systems are being undertaken by DWASA.
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 short in duration. The EMP includes measures to mitigate the impact.
Health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals.		☑	Not applicable
Health and safety hazards to workers from the management of chlorine used for disinfection and other contaminants?		☑	Personal Protective Equipment (PPE) is being provided to workers. Regular training is also being conducted to ensure that workers are aware of the health hazards of working in excavation and construction sites.
Dislocation or involuntary resettlement of people		☑	No displacement of communities is required in these DMAs
Social conflicts between construction workers from other areas and community workers?		☑	Priority in employment will be given to local residents.
Noise and dust from construction activities?	☑		Anticipated during construction activities. However, impacts are temporary and short in duration. The EMP includes measures to mitigate the 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 the impacts. Contractor needs to be coordinated with the local traffic police.
Continuing soil erosion/silt runoff from construction operations?		☑	Not anticipated, as topography of Dhaka is plain. However, the EMP still includes measures to mitigate the impacts. Contractor needs to be provide the channelization where required.

SCREENING QUESTIONS	Yes	No	REMARKS
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?		☑	Not anticipated. All pipes will be disinfected properly prior of any water delivery. During O&M, all monitoring processes will be activated to provide safe drinking water by the network.
Delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals?		☑	Not anticipated. Water quality is being regularly monitored by DWASA
Accidental leakage of chlorine gas?		☑	Not anticipated
Excessive abstraction of water affecting downstream water users?		☑	Not anticipated. Water quantity is sufficient and there is no additional abstraction.
Competing uses of water?		☑	Not anticipated
Increased sewage flow due to increased water supply	☑		Improved sewerage system is being undertaken by DWASA.
Increased volume of sullage (wastewater from cooking and washing) and sludge from wastewater treatment plant		☑	Improved sewerage system is being undertaken by DNCC/DSCC.
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 any explosives. For rock and concrete breaking, contractor is being used Asphalt cutter and road breakers. Chemical material safety data sheets will be posted in conspicuous areas. The EMP ensures measures are included for the storage areas.
Community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project are accessible to members of the affected community, or where their failure could result in injury to the community throughout project construction, operation, and decommissioning		☑	Construction area will be clearly demarcated and access controlled. Only workers and project concerned members will be allowed to visit the construction sites.

APPENDIX 2: DETAILED COMPONENTS OF DMA 610, 611 & 613

Item	Description	Unit	Qty.
1	**INSTALLATION DMA 610**		
1.1	Installation of Distribution pipes through open trench, pipe bursting and HDD method including installation of buried Gate Valves and Wash Out up to 200 mm dia, Data Loggers (DLs), Non Return Valves as required and approved, but excluding valves and DLs for PTWs & Interconnection Chambers for isolation of DMA (all gate valves, DLs and NRVs are of Employer's Supply)	m	25620.2
1.2	Installation of Reticulation pipes through open trench and HDD method including installation of buried Gate Valves, Wash Out (all gate valves are of Employer's Supply)	m	1995.0
1.3	Rehabilitation of service connections of length as required including supply of saddles, Ferrule, transition coupler, gate valves, float valves, meter chamber incl. required fittings for the meter to be placed within 0.6 meter from ground level all complete (water meters are of Employer's Supply)	nos.	2043
1.4	Upgrading of Tube Wells (PTWs)	nos.	4
1.5	Construction of Gate Valve Chamber, Interconnection Chamber and Interconnection with transmission main of approved design including necessary fittings and fixtures, excavation and backfilling all complete (valves, meters and data loggers are of Employer's Supply)		
1.5.1	Construction of RCC Gate Valve Chamber for pipeline of 315 mm dia and above including installation of gate valves with necessary fittings, fixtures all complete as per approved design, drawing and direction of project manager	nos.	10
1.5.2	Construction of RCC Interconnection chamber for isolation of DMA where required including installation of Pressure Sustaining Valves, Pressure Reducing Valves, Air Release Valves, Non Return Valves, Bulk Water Meters and Data Loggers with all fittings, fixtures all complete as per approved design, drawing and direction of project manager	nos.	1
1.5.3	Interconnection with the existing water transmission main from 300 mm to 600 mm diameter where required including supply of Tee, Reducer with fittings, fixtures all complete as per approved design, drawing and direction of project manager	nos.	3
2	**INSTALLATION DMA 611**		
2.1	Installation of Distribution pipes through open trench, pipe bursting and HDD method including installation of buried Gate Valves and Wash Out up to 200 mm dia, Data Loggers (DLs), Non Return Valves as required and approved, but excluding valves and DLs for PTWs & Interconnection Chambers for isolation of DMA (all gate valves, DLs and NRVs are of Employer's Supply)	m	40986.6
2.2	Installation of Reticulation pipes through open trench and HDD method including installation of buried Gate Valves, Wash Out (all gate valves are of Employer's Supply)	m	7384.1
2.3	Rehabilitation of service connections of length as required including supply of saddles, Ferrule, transition coupler, gate valves, float valves, meter chamber incl. required fittings for the meter to be placed within 0.6 meter from ground level all complete (water meters are of Employer's Supply)	nos.	3944

Item	Description	Unit	Qty.
2.4	Upgrading of Tube Wells (PTWs)	nos.	11
3.5	Construction of Gate Valve Chamber, Interconnection Chamber and Interconnection with transmission main of approved design including necessary fittings and fixtures, excavation and back filling all complete (valves, meters and data loggers are of Employer's Supply)	nos.	
3.5.1	Construction of RCC Gate Valve Chamber for pipeline of 315 mm dia and above including installation of gate valves with necessary fittings, fixtures all complete as per approved design, drawing and direction of project manager	nos.	40
4.5.2	Construction of RCC Interconnection chamber for isolation of DMA where required including installation of Pressure Sustaining Valves, Pressure Reducing Valves, Air Release Valves, Non Return Valves, Bulk Water Meters and Data Loggers with all fittings, fixtures all complete as per approved design, drawing and direction of project manager	nos.	-
5.5.3	Interconnection with the existing water transmission main from 300 mm to 600 mm diameter where required including supply of Tee, Reducer with fittings, fixtures all complete as per approved design, drawing and direction of project manager	nos.	6
3	**INSTALLATION DMA 613**		
3.1	Installation of Distribution pipes through open trench, pipe bursting and HDD method including installation of buried Gate Valves and Wash Out up to 200 mm dia, Data Loggers (DLs), Non Return Valves as required and approved, but excluding valves and DLs for PTWs & Interconnection Chambers for isolation of DMA (all gate valves, DLs and NRVs are of Employer's Supply)	m	35747.6
3.2	Installation of Reticulation pipes through open trench and HDD method including installation of buried Gate Valves, Wash Out (all gate valves are of Employer's Supply)	m	5101.2
3.3	Rehabilitation of service connections of length as required including supply of saddles, Ferrule, transition coupler, gate valves, float valves, meter chamber incl. required fittings for the meter to be placed within 0.6 meter from ground level all complete (water meters are of Employer's Supply)	nos.	2514
3.4	Upgrading of Tube Wells (PTWs)	nos.	9
3.5	Construction of Gate Valve Chamber, Interconnection Chamber and Interconnection with transmission main of approved design including necessary fittings and fixtures, excavation and back filling all complete (valves, meters and data loggers are of Employer's Supply)		
3.5.1	Construction of RCC Gate Valve Chamber for pipeline of 315 mm dia and above including installation of gate valves with necessary fittings, fixtures all complete as per approved design, drawing and direction of project manager	nos.	27
3.5.2	Construction of RCC Interconnection chamber for isolation of DMA where required including installation of Pressure Sustaining Valves, Pressure Reducing Valves, Air Release Valves, Non Return Valves, Bulk Water Meters and Data Loggers with all fittings, fixtures all complete as per approved design, drawing and direction of project manager	nos.	2
3.5.3	Interconnection with the existing water transmission main from 300 mm to 600 mm diameter where required including supply of Tee, Reducer with fittings, fixtures all complete as per approved design, drawing and direction of project manager	nos.	2

APPENDIX 3: RECORDS OF STACKHOLDER CONSULTATION MEETINGS

1. DMA-610

A. Proceedings of the Meeting

Dhaka Environmentally Sustainable Water Supply Project (DESWSP)
Resettlement Awareness Program and Support LIC's in ICB-02.7
Report on Public Consultation Meetings at DMA-610

Introduction: Public Consultation Meeting is one of the significant activities of NGO-SAMAHAR at DESWS Project. This activity is a platform to disseminate messages among water users in the community especially to the house owners. Generally, NGO used to choose different schools and/or educational institutions as venue because of targeting the female like guardians, teachers, housewives and house owners. A project leaflet is being distributed to the participants in the meeting and requested the teachers for discussing the leaflets in different classes. The leaflet consists of project related information as well as messages. If it is then a huge no of families are informed of the project. On the other hand, it is an ADB concern whether mass people are informed of or not during the preparation of Resettlement Plan (RP). At least 03 Public Consultation Meetings at 03 different places is being conducted by the NGO to inform the local people about the project implementation and the beneficiary impacts in the DMA area.

Objective of the Meeting: The main objective of the meeting is to share project related issues like house connection, access to connection permission, illegal connection, project supports, grievance redress mechanism, cooperation & coordination from the community, social safeguard and environmental matters with the participants. Actually this is not a decision making meeting. After the completion of the technical session of the meeting, a question & answer session is being arranged for how the beneficiaries can get support from the project. In this procedure recommendations or opinion are being collected from the participant's for implementing the project smoothly.

The following discussions are been made in the meeting with issue based information,

NGO Representative: NGO representative informed the house about DESWS Project?
- Dhaka WASA has initiated a Project named DESWS Project for DHAKA City by the financial support of ADB.
- Object of the Project
- To reduce Water Loss
- To improve water quality
- Ensuring adequate Water Supply round the clock
- Keeping sufficient pressure for water flow
- Existing Water Supply System is underground water producing by DTW
- New water supply system will be surface water supply.
- New pipe installation is needed to cut the road and could interrupt easy movement through the roads.
- So Support from the community is very essential.

Contractor's Representative: Contractor's Representative informed the technical issues.
- Three types of pipe installation method will be used for construction work.
  - HDD (Horizontal Directional Drilling)
  - PB (Pipe Bursting)
  - OT (Open Trench)
- High quality materials will be used for implementing the project, i.e. HDEP (High Density Poly-phenyl Pipe).
- Connection from transition line to preserver will be established by project cost.
- Broken, damaged and out of order meters will be replaced by a newer one.
- Water supply with old connection will be stopped after establishing new connection.

PMU Representative: PMU Representative informed that the Project is Environmentally Sustainable Water Supply Project, So,
- The DESWS Project is an Environment Friendly Project.
- Tried most to minimize casualties during construction works.
- Ensuring maximum Public Safety & Security

- The Contractor must remove wastage soil immediately after Road cutting to reduce pollution from soil dust.
- HDD machine will be operated in the night to avoid sound pollution.
- Enclosure will be ensured during construction work.
- Plain Sheet will be used for bridging entering to households.

MSC Representative: MSC Representative shared the followings...
- Reducing water loss is a major objective of the project.
- Stopping Illegal Connection
- To increase revenue for Govt.
  - New Connection could be established during construction work.
- Fee should be needed for new Connection Permission
- For new connection please communicate with MOD Zones-6
- All affected person will be compensated, if anybody affect during construction of the pipeline (in case temporary income loss)

Question and Answer: At the end of the meeting a Question & Answer Session was conducted.
Q. What are the advantage of the Project rather than that of the previous?
A. 24 Hours adequate water supply will be existed with sufficient water pressure. Inter DMA connection will ensure available water supply. The water assumed need not to boil for drinking.

Q. How much pressure will be kept?
A. It may be 1 Bar or 30 feet .That means water will reach up to 3rd floor of a building.

Q. How a new connection can be avail?
A. An Application for new connection to be submitted to the EXEN of MOD Zone 6 by paying a fixed fee is enough for a new connection.

Q. How many times will be needed to complete the construction work?
A. It will be needed three month for construction but contractors will observe the DMA for One year.

Q. Is there any plan for replacing the older meters?
A. Only damaged, non-functional, broken or more than 5 years older meters will be replace by a newer one.

Q. Who will responsible for repair works of the roads?
A. Respective Authority like City Corporation, Roads & Highway, housing authority or LGED will be responsible for repair works. A payment of such damaged road ensured before going to start construction work.

Conclusion: The participants were asked to show their interest and opinion of the new system of the project. One of the participants informed a bitter experience of pipeline installation at Ulan area. He said WASA contractor dug a ditch for pipeline installation in the plan area and didn't fill the ditch after completion of the work. In the last rainy season the ditch came into full with rainwater and the people suffered. So Project personnel's are requested to care for the repair and maintenance work of the roads.

B. Photos of Public Consultation & Project Information Disclosure

Public Consultation Meeting on 17.06.2017

Public Consultation Meeting on 18.06.2017

Public Consultation Meeting on 18.06.2017

Vendor Selection at DMA 610 as AP

Vendor Selection at DMA 610 as AP

Vendor Selection at DMA 610 as AP

C. Attendance List

SAMAHAR

Dhaka Environmentally Sustainable Water Supply Project (DESWSP)
Resettlement Awareness Program and Support LIC's in ICB-02.7

Name of Meeting: Project Information Disclosure meeting
Date: 18-06-2017
Venue: Mohanagar Akashik samaj kallayn samity
Time: 2:00 PM

SL No	Name of the Participant	Occupation	Address	Mobile No	Signature
1	[illegible]	[illegible]	[illegible]	[illegible]	
2	[illegible]	[illegible]	F6/99	01673994274	
3	[illegible]	[illegible]	D-34	01713000 141	
4	Zaedul Kabir	Business	A-17.	01755365	
5	A. Samad	Business	C-117	01718933860	
6	Delowar	Business	C-77	01731612569	
7	MD RATAN		C14	01796265315	
8	A RASHID	Retired Officer	D/13 Mohanagar Project	01711750630	
9.	Mir. Mosharraf Hossain	Retd.	House no:- 23/B, Road-1. Mohanagar Project.	01832391508	
10,	Md Jahirul Islam	Service	D-86 Rd 4	01552344251	
11	M. Mofazzal Hossain		B.22-	01715962	
12	A. Wadud Chowdhury		Rd-6. House-D-147	01718040882	
13	Shahidul Alam	RTD ARMY	Road-5 House D/135	01716815144	
14.	MD. Mojibur Rahman		B/10/20.2	01843596153	

SAMAHAR

Dhaka Environmentally Sustainable Water Supply Project (DESWSP)
Resettlement Awareness Program and Support LIC's in ICB-02.7

Name of Meeting: Project Information Disclosure meeting
Date: 18-06-2017
Venue: Mohanagar Akashik samaj kallayn samity
Time: 2:00 PM

SL No	Name of the Participant	Occupation	Address	Mobile No	Signature
15.	Md. Omar Faruque	Rtd.	D/7, Rd-2 Mohanagar Project	01716002604	
16	Dr. Md. Shahjahan	Physician	D-108, Road-5	01743515713	
17	SK Rabiul Islam	House Owner C/72	Block E Plot No 72	01715552299	
18	Md. Abdul Kadir	[illegible]	147 WAPDA Rd.	01720834097 01720834097	
19.	Adv. Asad	Lawyer	D-2.3. Rd-3	01711235512	
20	Tofazzal Hossain	SSO(SSD)	DESWSP, Dhaka WASA.	01745-421948	
21	Nilufa Yeasmin	Supervisor	SAMAHAR	01716247994	Nilufa
22.	Tanveer Ahmed	FO	SAMAHAR	01843830935	
23	SHAHID	S.S	D-10	01826006841	SHAHID
24	Shafat	Business	134 WAPDA Road.	01715062937	
25.	Amina Akter	F.O	SAMAHAR	01725789992	Amina
26.	Sharmin Sultana	F.O	SAMAHAR	01558782818	Sharmin
27.	Md. Abdul Awal Khan	Govt. offg.	100/B, Road #01	01550151227	
28.	Md. Mokbul Alam	Jobs	Samahar	01743947932	

2. DMA-611

A. Proceedings of the Meeting

Dhaka Environmentally Sustainable Water supply Project (DESWSP)
Resettlement Awareness Program and Support LIC's in ICB-02.7
Report on Public Consultation Meetings at DMA-611

Introduction: Public Consultation Meeting is one of the significant activities of NGO-SAMAHAR at DESWS Project. This activity is a platform to disseminate messages among water users in the community especially to the house owners. Generally, NGO used to choose different schools and/or educational institutions as venue because of targeting the female like guardians, teachers, housewives and house owners. A project leaflet is being distributed to the participants in the meeting and requested the teachers for discussing the leaflets in different classes. The leaflet consists of project related information as well as messages. If it is then a huge no of families are informed of the project. On the other hand, it is an ADB concern whether mass people are informed of or not during the preparation of Resettlement Plan (RP). At least 03 Public Consultation Meetings at 03 different places is being conducted by the NGO to inform the local people about the project implementation and the beneficiary impacts in the DMA area.

Objective of the Meeting: The main objective of the meeting is to share project related issues like house connection, access to connection permission, illegal connection, project supports, grievance redress mechanism, cooperation & coordination from the community, social safeguard and environmental matters with the participants. Actually this is not a decision making meeting. After the completion of the technical session of the meeting, a question & answer session is being arranged for how the beneficiaries can get support from the project. In this procedure recommendations or opinion are being collected from the participant's for implementing the project smoothly.

The following discussions are been made in the meeting with issue based information.

NGO Representative: NGO representative informed the house why DESWS Project?
- The Govt. is going to establish DESWS Project in 16 DMA's of DHAKA City.
- Population is increasing in Dhaka City day by day and consequently demand of water also increasing.
- Existing Water Supply System is underground water producing by DTW
- Current pipe and fittings are not fit for much water supply
- Targeting to reduce 40% water loss.
- New establishment is needed to cut the Road for Pipe installation.
- Support is needed from community.

Contractor's Representative: Contractor's Representative informed the technical issues.
- Three types of pipe installation method will be used.
- High quality materials will be used establishing the new project.
- Connection from transmission line to preserver will be established by project cost.
- Broken, damaged and out of order meters will be replaced by a newer one.
- Ensuring 24 hour water supply with sufficient pressure.
- Inter DMA connection will be ensured.
- Respective Authority will be responsible for repair work

MSC Representative: MSC Representative shared the followings.
- Ensuring sufficient water supply
- Stopping Illegal Connection
  - New Connection can be taken during construction work
- Fee should be needed for new Connection Permission 01711803349
- For new connection please communicate with MOD Zones-6
- Compensation will be paid to the affected person, who will lose their income for the temporary displacement due to pipe laying.
- The other affected persons have the rights to raise grievance

PMU Representative: WASA Representative informed that the Project is Environmentally Sustainable Water Supply Project, So.
- The waste soil will be removed from the narrow roads immediately and from the wider road within 24 hours.
- Old line will be disconnect after establishing new supply line
- Sound pollution will be reduced.
- Enclosure will be ensured during construction work.
- Plain Sheet will be used for as bridge entering houses

Question and Answer:

Q. Meters are now in the depth of 5 feet what would happen after connection?
A. The meter will be placed within 2 to 3 meter depth from the plinth during house connection.

Q. How much distance the connection of meter and preserver is established?
A. The project will be established connection up to ten meter distance from transmission line to preserver.

Q. If drinking water crisis occurs during new pipeline connection
A. The contractor will responsible to supply water until the pipe supply water is normal

Conclusion: Participants of both the meeting have shown their mixed reaction. Some of them couldn't be trust for their past experience and some of them said wait and see. But NGO representative invited them to observe water supply system in the area where the new connection established in the DMA's. Then some participants confessed that they have the information that sufficient water supply is prevailing in the new DMAs.

B. Photos of Public Consultation & Project Information Disclosure

Public Consultation Meeting on 24.10.2017

Public Consultation Meeting on 24.10.2017

Public Consultation Meeting on 24.10.2017

Public Consultation Meeting on 26.10.2017

Public Consultation Meeting on 26.10.2017

Public Consultation Meeting on 26.10.2017

C. Attendance List

SAMAHAR

Dhaka Environmentally Sustainable Water Supply Project (DESWSP)

Resettlement Awaressness Program and Support LIC's in ICB-02.7

Name of the Meeting: Public Consultation Meeting

Venue of the Meeting: Monpura School & College

Date: 24.10.2017 Time: 10.00 am

Sl No	Name of Participant	Occupation	Address	Mobile No	Signature
1	Tania	Housewife	87/1 Naya Paltan	0181922868 6	Tania
2	Nabila	Housewife	87/1 Naya Paltan	01914339333	Nabila
3	Mitu	Housewife	36/B/A, Malibag	01956892889	Mitu
4	URME	Housewife	38/4, Malibag	01915030007	URME
5	Lacky Akther	Housewife	32/2 Nayapaltan	01768054659	Lacky
6	Nasrin	House wife	29/2 Malibag	01758151922	Nasrin
7	Monika	Housewife	38/C Malibagh	01746803200	Monika
8	Nasrin	Houre wife	32/G Malibag	01858979866	Nasrin
9	Lutfunnahar	Housewife	102/B/Malibagh	01819726700	Rina
10	[illegible]	[illegible]	[illegible]	01861620443	[illegible]
11	Sumaiya	Shamima	[illegible]	01711476143	[illegible]
12	[illegible]	[illegible]	25/C [illegible]	01910500578	[illegible]
13	Rozina	গৃহিনী	আলিবাগ	01677333377	Rozina
14	[illegible]	Student	32/J/A Malibag Chowdhury Para	01705577053	[illegible]

SAMAHAR

Dhaka Environmentally Sustainable Water Supply Project (DESWSP)

Resettlement Awaressness Program and Support LIC's in ICB-02.7

Name of the Meeting: Public Consultation Meeting

Venue of the Meeting: Monpura School & College

Date: 24.10.2017 Time: 10.00 am

Sl No	Name of Participant	Occupation	Address	Mobile No	Signature
15	[illegible]	[illegible]	[illegible]	01724867556	[illegible]
16	[illegible]	[illegible]	[illegible]	01733433738	[illegible]
17	[illegible]	[illegible]	[illegible]	01912845417	[illegible]
18	[illegible]	[illegible]	[illegible]	01914712016	[illegible]
19	[illegible]	[illegible]	[illegible]	01718837672	[illegible]
20	[illegible]	[illegible]	[illegible]	01918202240	[illegible]
21	[illegible]	[illegible]	[illegible]	01739227046	[illegible]
22	[illegible]	[illegible]	[illegible]	01622656728	[illegible]
23	[illegible]	[illegible]	[illegible]	01857267700	[illegible]
24	[illegible]	[illegible]	7/5, Hazipara Rampura	01712677218	[illegible]
25	[illegible]	[illegible]	7/5/1	01715770707	[illegible]
26	[illegible]	Business	38/3 Malibagh Chow Para	0171-1227942	[illegible]
27	[illegible]	[illegible]	[illegible]	01722479525	[illegible]
28	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

SAMAHAR

Dhaka Environmentally Sustainable Water Supply Project (DESWSP)

Resettlement Awaressness Program and Support LIC's in ICB-02.7

Name of the Meeting: Public Consultation Meeting

Venue of the Meeting: Monpura School & College

Date: 24.10.2017 **Time: 10.00 am**

SL No	Name of Participant	Occupation	Address	Mobile No	Signature
49	মাহমুদা বেগম	গৃহিণী	২২৯/১, নয়াবাজার	01726703746	Mahmuda Begum
50	নিজামনী	চাকরী	৩৮, নয়াবাজার	01716[illegible]8456	নিজামনী
51	মোঃ রেজাউল	ব্যবসা	নয়াবাজার	01912275528	মোঃ রেজাউল
52	[illegible]	চাকরী	নয়াবাজার		[illegible]
53	সাবিবর রহমান	ব্যবসা	৩৫/২ পূর্ব নয়াপোল্টা	018463 40329	[illegible]
54	মোঃ [illegible]	চাকুরী	২৯/১৫, নয়াবাজার	01767547 55878	[illegible]
55	কানিজ ফাতিমা	শিক্ষিকা	[illegible]	01892601[illegible]	[illegible]
56	নবনম হোসাইন	মিস্ত্রিকা	মনসুরা স্কুল	01718161731	[illegible]
57	শামিম	ব্যবসা	৩৬/১ নয়াপল্টন	01954477[illegible]	শামিম
58	[illegible]	চাকরী	ঢাকা	01954538 7570	[illegible]
59	মাসুদ রানা	চাকরী	বনশ্রী		Rana
60	[illegible]	PEO	FSL	01771342978	[illegible]
61	Hafen Rahman	Service	MSC	01712532[illegible]	[illegible]
62	Shamim	Teacher	Rupibag.	01926694[illegible]	[illegible]
63	Aziz	Acc. Offi!	Shajahan Pm	01675838758	[illegible]

SAMAHAR

Dhaka Environmentally Sustainable Water Supply Project (DESWSP)

Resettlement Awaressness Program and Support LIC's in ICB-02.7

Name of the Meeting: Public Consultation Meeting

Venue of the Meeting: Monpura School & College

Date: 24.10.2017 **Time: 10.00 am**

SL No	Name of Participant	Occupation	Address	Mobile No	Signature
40	[illegible]	[illegible]	[illegible]	01711626[illegible]	[illegible]
45	[illegible]	ব্যবসা	[illegible]	0[illegible]	[illegible]
46	[illegible]	ব্যবসা	[illegible]	01720191301	[illegible]
47	[illegible]	ব্যবসা	[illegible]	01913375738	[illegible]
48	[illegible]	[illegible]	TEEL	0167822451	[illegible]
49	[illegible]	[illegible]	TEEL	0167822451	[illegible]
50	[illegible]	ব্যবসা	[illegible]	01957051880	Mamun
51	[illegible]	চাকুরী	[illegible]	01911857[illegible]	[illegible]
52	[illegible]	[illegible]	[illegible]	01615049107	[illegible]
53	[illegible]	[illegible]	[illegible]	01724-511946	[illegible]
54	[illegible]	[illegible]	[illegible]	01918303007	[illegible]
55	[illegible]	ব্যবসা	62/H/S	01737783613	[illegible]
56	[illegible]	[illegible]	62 [illegible]	01780354706	
57	[illegible]	[illegible]	DESWSP	01745421948	[illegible]
58	Md. Rezaul Islam	Job	SAMAHAR	01914[illegible]8286	
59	[illegible]	Job	SAMAHAR	01837946 3178	[illegible]

3. DMA-613

A. Proceedings of the Meeting

Dhaka Environmentally Sustainable Water supply Project (DESWSP)
Resettlement Awareness Program and Support LIC's in ICB-02.7
Report on Public Consultation Meetings at DMA-613

Introduction: Public Consultation Meeting is one of the significant activities of NGO-SAMAHAR at DESWS Project. This activity is a platform to disseminate messages among water users in the community especially to the house owners. Generally, NGO used to choose different schools and/or educational institutions as venue because of targeting the female like guardians, teachers, housewives and house owners. A project leaflet is being distributed to the participants in the meeting and requested the teachers for discussing the leaflets in different classes. The leaflet consists of project related information as well as messages. If it is then a huge no of families are informed of the project. On the other hand, it is an ADB concern whether mass people are informed of or not during the preparation of Resettlement Plan (RP). At least 03 Public Consultation Meetings at 03 different places is being conducted by the NGO to inform the local people about the project implementation and the beneficiary impacts in the DMA area.

Objective of the Meeting: The main objective of the meeting is to share project related issues like house connection, access to connection permission, illegal connection, project supports, grievance redress mechanism, cooperation & coordination from the community, social safeguard and environmental matters with the participants. Actually this is not a decision making meeting. After the completion of the technical session of the meeting, a question & answer session is being arranged for how the beneficiaries can get support from the project. In this procedure recommendations or opinion are being collected from the participant's for implementing the project smoothly.

The following discussions are been made in the meeting with issue based information.

NGO Representative: NGO representative informed the house about DESWS Project?
- To reduce Water Loss
- To improve water quality
- Ensuring adequate Water Supply round the clock
- Keeping sufficient pressure for water flow
- Ensuring minimum casualties for the community people during construction work
- People are requested to inform NGO or Contractor personnel if any interruption of transportation or water supply.
- So Support from the community is very essential.

Contractor's Representative: Contractor's Representative informed the technical issues.
- Three types of pipe installation method will be used for construction work.
  - HDD (Horizontal Directional Drilling)
  - PB (Pipe Bursting)
  - OT (Open Trench)
- High quality materials will be used for implementing the project, i.e. HDEP (High Density Poly-phenyl Pipe).
- Connection from transition line to preserver will be established by project cost.
- Broken, damaged and out of order meters will be replaced by a newer one.
- Water supply with old connection will be stopped after establishing new connection.

PMU Representative: PMU Representative informed that the Project is Environmentally Sustainable Water Supply Project, So....
- The DESWS Project is an Environment Friendly Project.
- Tried most to minimize casualties during construction works.
- Ensuring maximum Public Safety & Security
- The Contractor must remove wastage soil immediately after Road cutting to reduce pollution from soil dust.
- HDD machine will be operated in the night to avoid sound pollution.
- Enclosure will be ensured during construction work.
- Plain Sheet will be used for bridging entering to households.

MSC Representative: MSC Representative shared the followings...
- Reducing water loss is a major objective of the project.
- Stopping Illegal Connection
- To increase revenue for Govt.
  - New Connection could be established during construction work.
- Fee should be needed for new Connection Permission
- For new connection please communicate with MOD Zones-6

Question and Answer:
At the end of the meeting a Question & Answer Session was conducted.

Q. There is available water in the existing system, Why the change?
A. There are many causes for changing the existing system.
- Water level is going down every year.
- Water Production is reducing day by day from the DTW's.
- Considering huge demand of water, increased population of the city & availability of water sources.
- Govt. decided to use surface water by treating water with recycling procedure.
- This is why the new system.

Q. Do we need to pay for the new system?
A. No, all cost will be borne by the project.

Q. If anybody demand money for the new connection then what could we do?
A. This is an illegal attempt and if anybody tries to does that then communicate with us immediately.

Q. Will the water supply be stopped during construction work?
A. No, the old pipeline will be untouched and water supply wouldn't interrupt.

Q. Will the water bills increased for the new connection?
A. It depends on WASA's decision of cost effectiveness.

Q. How much time will be needed for the new connection?
A. Normally it is needed three to four month after the construction completion.

Conclusion: The participants were asked to show their interest and opinion of the new system of the project. The audience didn't pass any opinion for the new system. Their demand is to have available and adequate water supply round the year especially in the dry season.

B. Photos of Public Consultation & Project Information Disclosure

Public Consultation Meeting on 10.08.2017

Public Consultation Meeting on 17.08.2017

Public Consultation Meeting on 24.08.2017

Vendor Selection at DMA 613 as AP

Vendor Selection at DMA 613 as AP

Vendor Selection at DMA 613 as AP

C. Attendance List

SAMAHAR

Dhaka Environmentally Sustainable Water Supply Project (DESWSP)
Resettlement Awareness Program and Support LIC's in ICB-02.7

Name of Meeting : Project Information Disclosure Meeting.
Venue of Meeting : Shantibag High School
Date : 17-08-2017
Time : 11:00 am

SL No	Name of the Participant	Occupation	Address	Mobile No	Signature
1				—	
2	Fazle Rabbi.	service		—	
3		Job	86,	01718583250	
4	Md. Tamikul Islam	A.E DESWSP	DWASA	—	
5	Tofazzal Hossen	SDO(SDC) DESWSP DWASA	Dhaka WASA	01745429248	Hossen 17.08.17
6		JOB	110/1 Shantibagh	01758230654	
7			91, shantibag	01914573241	
8	Jainal Abedin	Business	10/1 Shantibag	01735869045	
9			22/1 Shantibagh	01711488918	
10		service	200	01811112187	
11	17/8/17	Retd Govt Officer	114/1 Shantibagh	01817089032	
12		Job	22/B,	01753988 4664	
13	Md. Shahjalal	Business	6/1/5 Santi Bag	01711561544	
14			39/0	01714295330	

SAMAHAR

Dhaka Environmentally Sustainable Water Supply Project (DESWSP)
Resettlement Awareness Program and Support LIC's in ICB-02.7

Name of Meeting : Project Information Disclosure Meeting
Venue of Meeting : Shantibag High School
Date : 17.08.2017
Time : 11:00 AM

SL No	Name of the Participant	Occupation	Address	Mobile No	Signature
29.	MD. Khairul Alam	Business	62. Shantibagh Mogbazar Road.	01732074437	
30.	A.F.M. Rubel	Privati servic	64 No. SHANTINAGH MOGBAZAR RD.	01987118499	
31.				01726487439	
32.	Mosharof hossain Mo.	Buseness	110 Shantibagh	01785339930	
33.	Shahidul	Business.	6/4 Shantibagh	01716109220	
34.	Salam Sarkar		222	02483 17333	
35.	Md. Al Masum	Service	492/G, Bhuiyan DUR,	01712080835	Masum
36.	Md. Abdul Hasem Khan.	Business	45/1, Shantinagar Dhaka.	01916578217	
37.	Md Abdul Hakim	Job	02, L-Block Bonosree	01716685698	
38.	Md. Kawsen Hossin	Job	RFL Construction LTD.	01924602329	
39.	Azad	Job	271/1 Shahi	01711227	
40.	MD. Shafiqul Islam	F.O - SAMAHAR.	H-02, R-14 B-2 South Banashree Rampura, Dhaka.	01913741022	
41.		Job		01712223142	
42		Job.		01711-149244	

APPENDIX 4: SAMPLE GRIEVANCE REDRESS FORM

(To be available in Bangla and English)

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

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

FOR OFFICIAL USE ONLY

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

APPENDIX 5: ENVIRONMENTAL REPORTING

A. Suggested Outline for Environmental Monitoring Report

I. Introduction

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

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

II. Compliance Status

1. Compliance Status with National/State/Local Statutory Environmental Requirements

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

2. Compliance Status with Environmental Loan Covenants

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

3. Compliance Status with the Environmental Management and Monitoring Plan

- Provide the monitoring results as per the parameters outlined in the EMP. Append supporting documents where applicable, including Environmental Site Inspection Reports (refer to Appendix 7 of this IEE).
- Provide summary of the Environmental Site Inspection Report (findings, corrective action plan, and recommendations)
- Provide summary of the complaint/s received, nature of complaints, and actions taken management system
- Provide summary of information disclosure, consultations, FGDs, and other awareness building activities
- Provide summary of environment-related capacity building activities.

Summary Monitoring Table

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

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

Overall Compliance with EMP

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

4. Approach and methodology for environmental monitoring of the project

- Brief description on the approach and methodology used for environmental monitoring of each sub-project
- Brief discussion on the basis for monitoring
- Indicate type and location of environmental parameters to be monitored
- Indicate the method of monitoring and equipment to be used
- Provide monitoring results and an analysis of results in relation to baseline data and statutory requirements
- As a minimum the results should be presented as per the tables below.

Air Quality Results

Site No.	Date of Testing	Site Location	Parameters (Government Standards)		
			PM10 $\mu g/m^3$	SO_2 $\mu g/m^3$	NO_2 $\mu g/m^3$

Site No.	Date of Testing	Site Location	Parameters (Monitoring Results)		
			PM10 $\mu g/m^3$	SO_2 $\mu g/m^3$	NO_2 $\mu g/m^3$

Water Quality Results

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

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

Noise Quality Results

Site No.	Date of Testing	Site Location	LAeq (dB-A) (Government Standard)	
			Day Time	Night Time

Site No.	Date of Testing	Site Location	LAeq (dB-A) (Monitoring Results)	
			Day Time	Night Time

5. Summary of key issues and remedial actions

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

6. Appendixes

- Photos
- Summary of consultations
- Copies of environmental clearances and permits

B. Sample Environmental Site Inspection Report

Checklist for Environmental Inspection at Work Sites

Date:

DMA No	:	Location	:
Weather Condition	:	Road Name/No.	:
Work Status	:		

Sl. No.	Checking Issues	Y	N	Remarks/Notes
1	**Site Office** • Is site office established?			
	• Health and Safety Officer (HSO)			
	• Site Environmental Plan (SEP)			
	• First aid box with first aiding agents in site office			
	• Trained up First Aid provider?			
	• Fire extinguisher/protective arrangements			
	• Emergency contacts in case of any incident			
	• No. of households needed temporary water supply			
	• SEP displayed in the board			
	• Pictures of ongoing works on display board			
	• Incident register book			
	• complain/ visitor's comment book			
2	**Labor and Equipment Shed** Is any shed established?			
	• Hygiene, Sanitation etc. facilities			
	• Bin for collecting garbage and food waste			
	• Wastewater disposal system			
	• Special facilities for female labor (dress-up, breast feeding, etc.)			
	• Measures against mosquito, insects, etc. problems			
	• Installation materials and equipment storage			
	• Separate storage of fuel and lubricant			
4	**Roads safety and Traffic Management**			
	• Public consultation/FGD conducted?			
	• Safety signboards/barriers/barricades at starting of the roads where installation work is in progress			
	• Traffic management scheme			
	• Road diversion barrier and signal			
	• Warning stand with tape when cutting pit for house connection and during OT, PB, HDD			
	• Plane sheet covering over house connection pit with warning stand and tape			
5	**Occupational Health and Safety**			
	• Personal Protective Equipment (PPEs)			
	• Incident records and steps taken			
	• Training on OHS, PPE and others before starting installation in new DMA			
	• Awareness raising program for practicing PPE			
6	**Environmental Quality**			
	• Air quality monitoring			
	• Noise quality monitoring			
	• Dust and litter controlling activities			
	• Generated wastewater management system			
	• AC Pipes handling in field			
	• Management of excavated soil			
	• Any Utility service damage?			

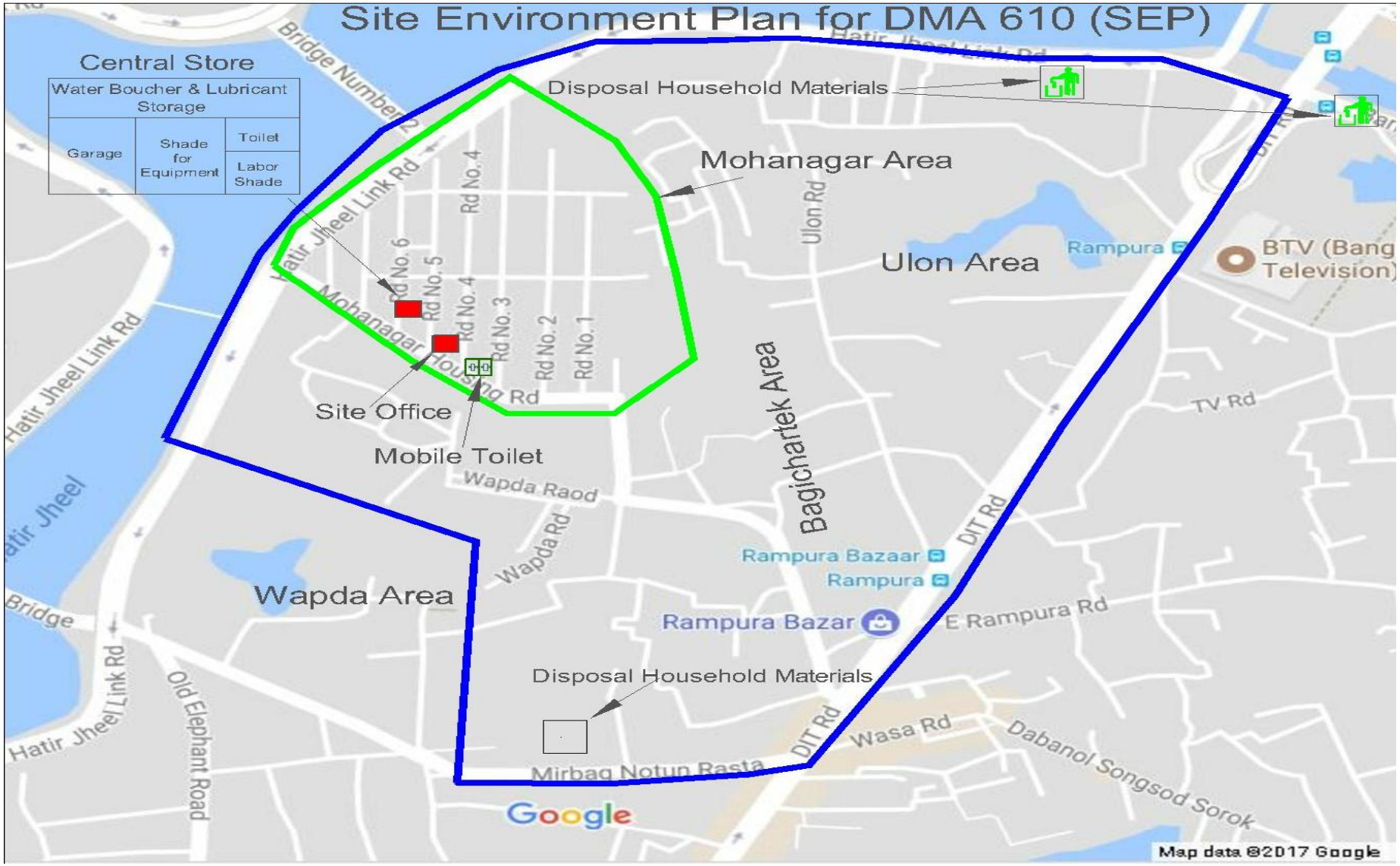
Sl. No.	Checking Issues	Y	N	Remarks/Notes
	• Measures taken to destructed trees and vegetation			
	• Any private property damages?			
	• Is generated construction waste/debris removed?			
	• Pipe joint condition			
	• Water reuse			

Signature
……
Name :
Designation: Environmental Supervisor, Contractor

Signature
……
Name :
Designation: Environmental Representative, MSC

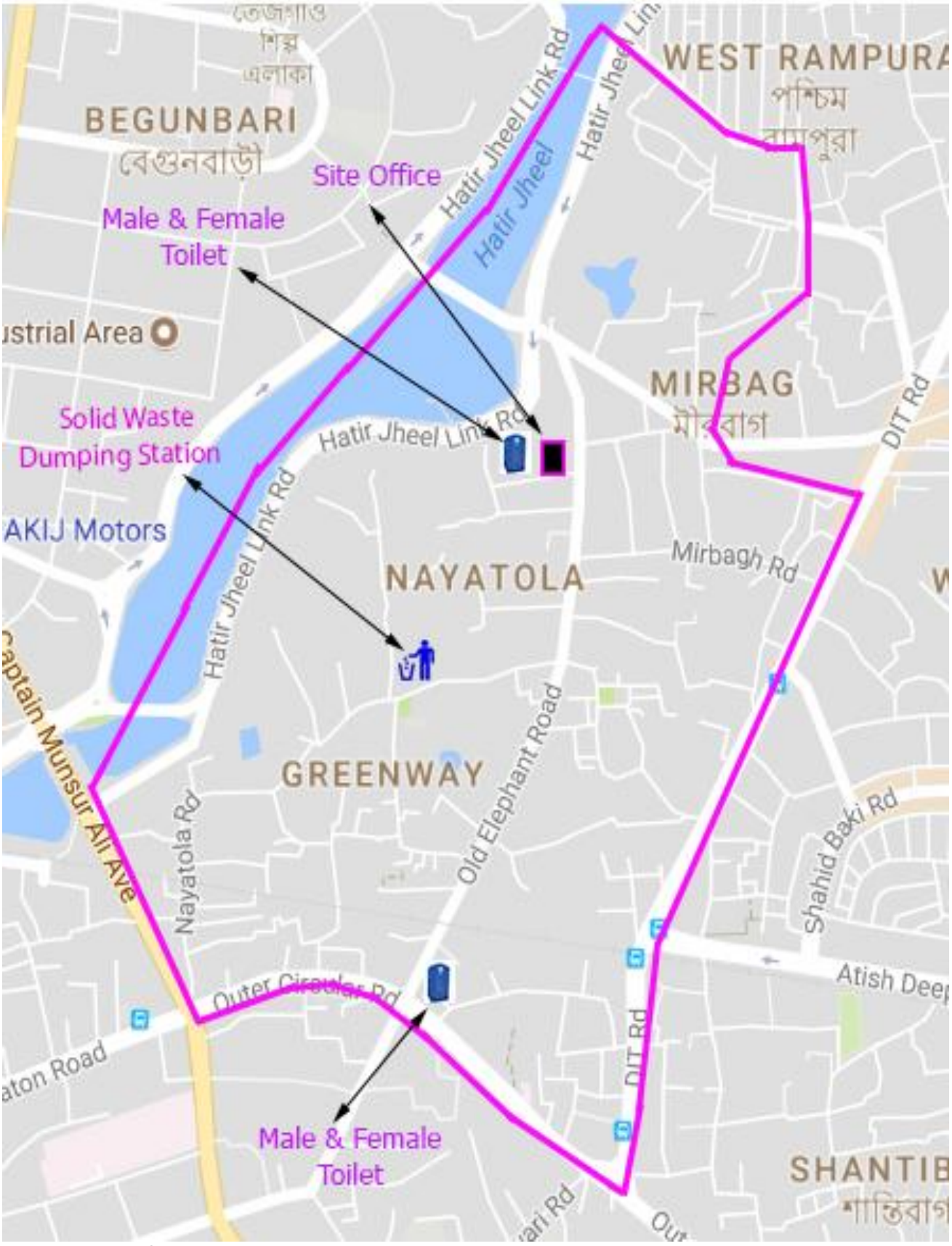
APPENDIX 6: SITE ENVIRONMENTAL PLAN OF DMA 610, 611 & 613

A. Site Environmental Plan of DMA-610



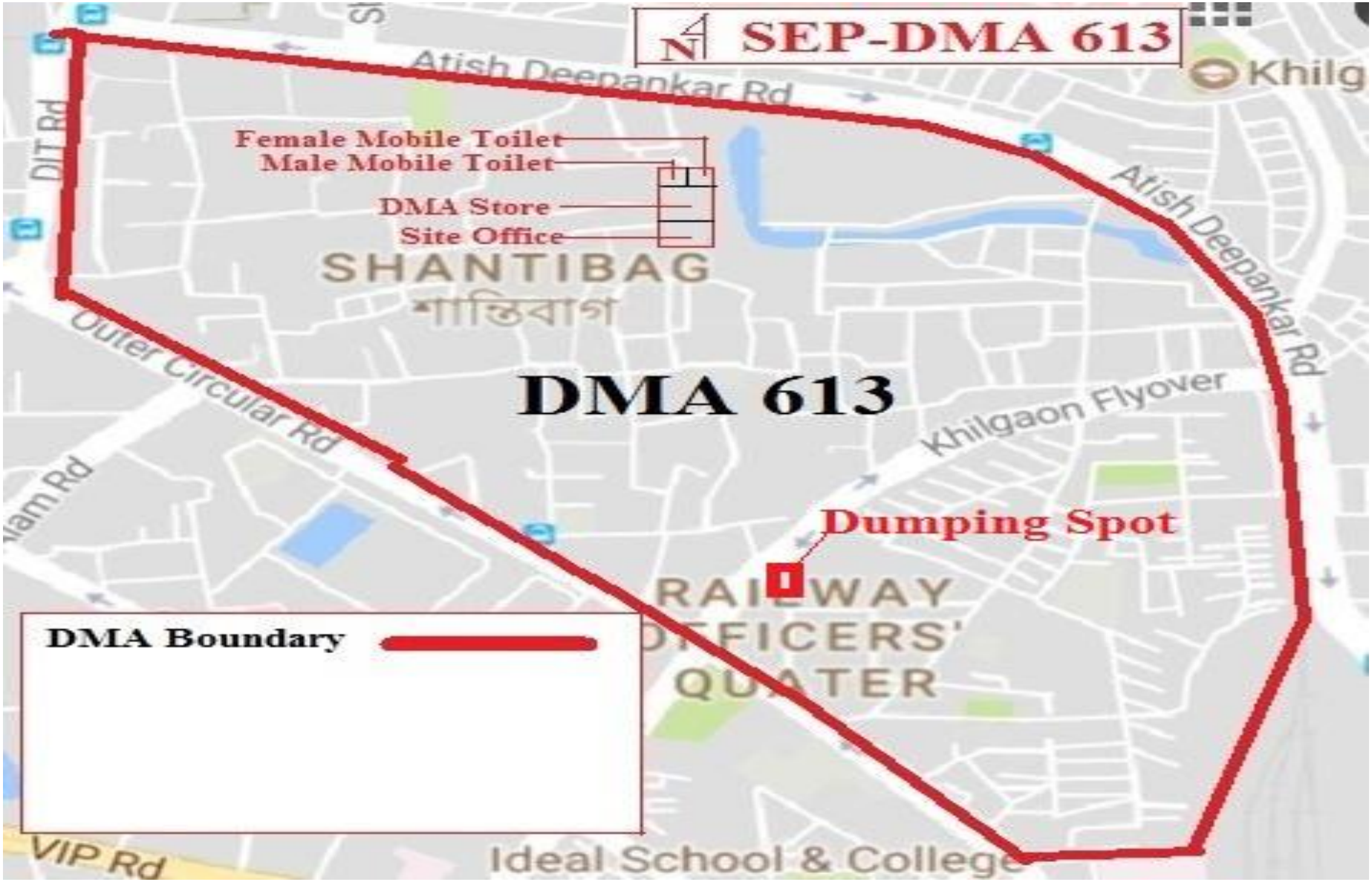
Source: EMP of DMA 610, 611 & 613

B. Site Environmental Plan of DMA-611



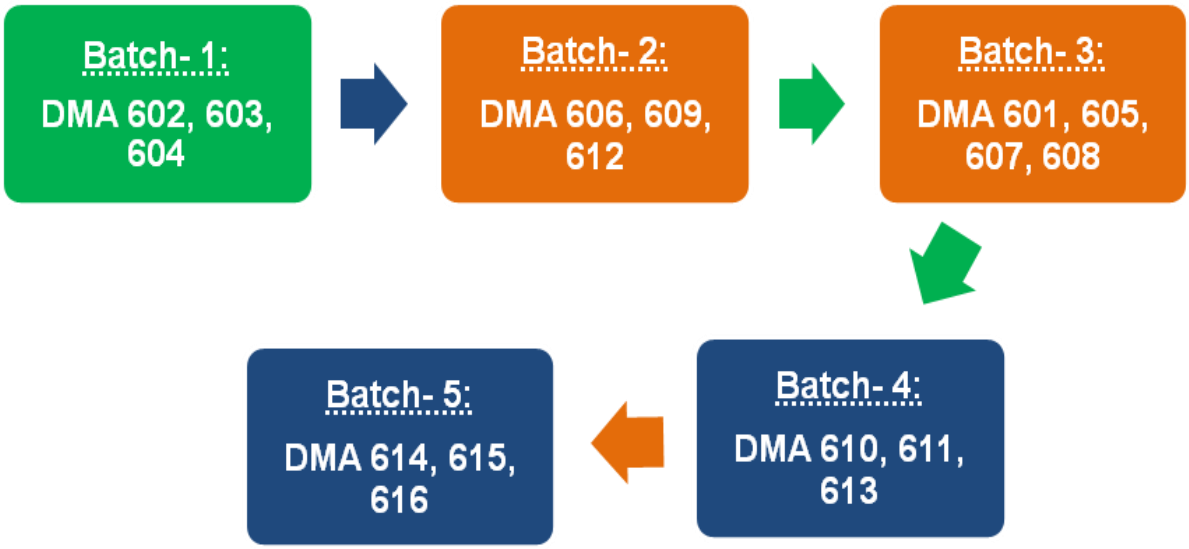
Source: EMP of DMA 610, 611 & 613

C. Site Environmental Plan of DMA-613



Source: EMP of DMA 610, 611 & 613

APPENDIX 7: IMPLIMENTATION PLAN OF PACKAGE ICB 02.7



APPENDIX 8: WORKSHOP ON EMP IMPLEMENTATION OF ICB 02.7

The workshop on the title of ***Implementation of Environmental Management Plan (EMP) under Package ICB-02.7*** addressing Environmental issues during construction, Implementation of EMP, Monitoring of EMP implementation, Reporting requirements etc. issues will be conducted by MSC with participants from PMU, PCU, MSC, Contractors & Sub-contractors, and NGO.

The workshop regarding Experiences on EMP implementation – issues and challenges and sharing the best practices will be arranged and conducted soon for capacity building of PMU, PCU, MSC, Contractors & Sub-contractors, and NGO officials.

APPENDIX 9: ASBESTOS CEMENT PIPE HANDLING PROTOCOL

ASBESTOS CEMENT (AC) PIPE HANDLING PROTOCOL

Prepared by

Management and Supervision Consultants for ICB 02.7 of
Dhaka Environmentally Sustainable Water Supply Project

November 2016

TABLE OF CONTENTS

1. ASBESTOS CEMENT (AC)

Asbestos cement is predominantly a mixture of cement and asbestos fibers which in a dry state has a density greater than 1 tonne per cubic meter (1000 kg/m^3). It is a light grey, hard material which generally contains approximately 10% asbestos fiber, but can occasionally contain more that 10% fiber, bound in a matrix of Portland cement or autoclaved calcium silicate. It is not friable: it cannot be crushed in the hand. As the fibers are tightly bound in the cement matrix they will only be released if the material is subject to significant disturbance, such as drilling, sawing, sanding etc. It should be noted that while this material is not friable, asbestos cement can be relatively brittle and so can be broken quite easily, e.g. if dropped from a height, driven over by vehicles, or struck with tools or implements.

There are two major groups of asbestos cement products. The first comprises corrugated or profiled and flat sheets, slates, rainwater goods (gutters, downpipes and troughs), flue pipes and bends and, less commonly, decking tiles, cisterns and sumps. The second group consists mainly of asbestos cement pressure pipes for the transport of drinking water, while thinner walled asbestos cement pipes have also been used for sewage and drainage. The majority of asbestos cement products contain only chrysotile asbestos fibers but some older products may contain the more hazardous crocidolite or amosite asbestos fibers.

2. DANGEROUS NATURE OF ASBESTOS CEMENT (AC)

Breathing in asbestos fibers can lead to asbestos-related lung diseases, mainly cancer, which kill more people than any other single work-related illness. The diseases can take from 15 to 60 years to develop – so you and your employees will not be immediately aware of a change in someone's health after breathing in asbestos fibers. The body gets rid of any asbestos fibers taken in with food and water naturally. Asbestos fibers cannot be absorbed through the skin. The danger, therefore, from exposure to asbestos fibers arises when asbestos fibers become airborne. They form a very fine dust which is often invisible. It is important to remember that people who smoke and are exposed to asbestos fibers are at greater risk of developing lung cancer than those who do not smoke.

In summary, the primary route of concern, i.e. the route whereby asbestos fibers can get into the body and cause harm or injury, is via the inhalatory route – the action of breathing. Other potential routes of entry into the body are not a problem because the body naturally gets rid of any asbestos fibres taken in with food and water (i.e. ingestion). Also, asbestos fibers cannot be absorbed through the skin. However, asbestos fibers which are airborne can enter the body when contaminated air is inhaled and can lead to the development of one of three fatal diseases:

Asbestosis – which is a scarring of the lungs
Lung cancer
Mesothelioma – which is a cancer of the lining around the lungs and stomach.
While the body's natural defense mechanisms can get rid of the larger fibers, microscopic fibers can pass into the lungs where they can cause asbestos-related diseases. Because such fibers can remain in the lungs for a long time, small but repeated exposures to materials containing asbestos can lead to the development of these diseases. This is why it is important to prevent or control exposure on every single job involving asbestos.

3. AC PIPE IN MODS ZONE 6

There are only a small number of AC pipes in the existing water supply system (around 20 km). These pipes are all in the old part of the city and their location is well known and marked on maps prepared by DWASA. The design of the project involves the replacement of these pipes and this can be done without removing or disturbing them, so all AC pipes will be left in situ.

Existing AC pipes, where intact, shall be left in-situ and not disturbed. Where the AC pipe is damaged and where there is a risk of asbestos particles becoming airborne, the contractor shall follow all necessary procedures, guidelines and laws as laid out locally or by this protocol to contain and remove hazardous material.

4. MANAGING EXISTING ASBESTOS CEMENT (AC) PIPE

Once an asbestos survey has been carried out, you should know, as far as is reasonably practicable, the location, type and condition of the asbestos cement. Some may be damaged, have deteriorated or degenerated with time, or be liable to be damaged as a result of its location, some may be in good condition, and some situated in areas due for maintenance, refurbishment or demolition. Based on this information, you need to make a decision on what remedial action is required and on how to manage the asbestos cement, i.e. can it be left in place or should it be removed.

5. PROCEDURE FOR WORKING SAFELY WITH ASBESTOS CEMENT (AC) PIPE

A. Planning and Preparation

It is important to remember that a higher risk is caused by breathing more fibers, because the concentration is higher, or when the exposure is over a longer period, or if the work is not planned and controlled adequately in order to prevent or reduce the potential for exposure, i.e. not performed in a safe manner. The following general principles should be followed when planning the work (these points are discussed in more detail in subsequent Sections):

- Where reasonably practicable, keep asbestos cement damp when working on it, i.e. as a method of dust suppression
- Where reasonably practicable, avoid using power and pneumatic tools
- Use cleaning methods which minimize dust disturbance
- Make sure workers have adequate information on the hazards and risks associated with working with asbestos cement, and are properly trained in the correct working practices and use of control measures.

B. Training of Employees

The Contractor must arrange a training program for all personnel (including manual laborers) to enable them to understand the dangers of AC pipes and to be able to recognize them in situ. The training should include the following issues.

- The health hazards of asbestos, including the added danger of smoking and working with asbestos
- Work methods and equipment
- Correct choice, use and maintenance of personal protective equipment (PPE)
- Decontamination procedures
- Maintenance of control measures
- Emergency procedures
- Waste disposal

C. Area Segregation

You will need to segregate the work area to prevent the spread of asbestos dust and prevent the exposure of people not involved in the work. In most cases it is sufficient to mark out the work area with signs to prevent non-asbestos workers approaching. However, if the work is likely to result in significant disturbance of the asbestos cement, you need to consider erecting a physical barrier for segregation purposes. The extent of the barrier will depend on the outcome of the risk assessment carried out before the work starts.

A physical barrier should prevent the spread of debris and airborne fibers i.e. contain any dust which may be generated during the work activity, and so also assist in cleaning up the ‘contaminated area’ which should be within the segregated zone.

Whatever means of segregation are used, there is a need to post asbestos warning notices. Where the limit value is liable to be exceeded, the notices must clearly state that the area is a ‘respirator zone’ and Respiratory Protective Equipment (RPE) must be worn. If the action level is liable to be exceeded, the area should be designated as an ‘asbestos area’. Employees not engaged in the work should not be permitted into either of these designated areas.

D. Personal Protective Equipment (PPE) for AC Pipe Removal

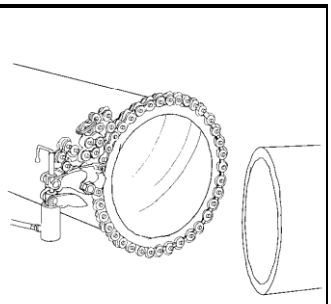
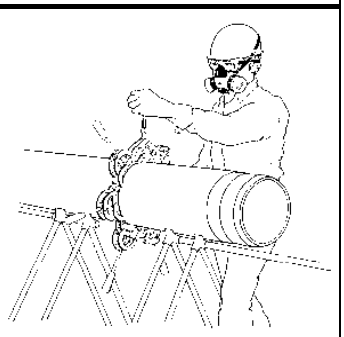
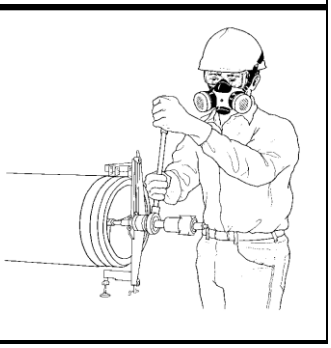
Disposable overalls fitted with a hood

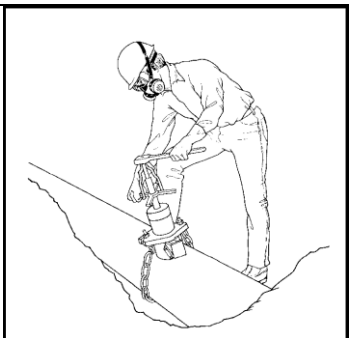
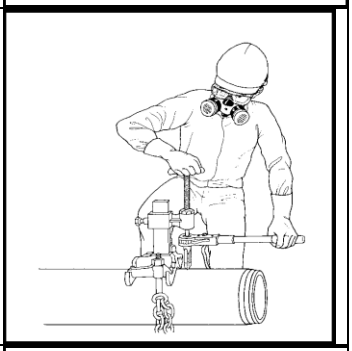
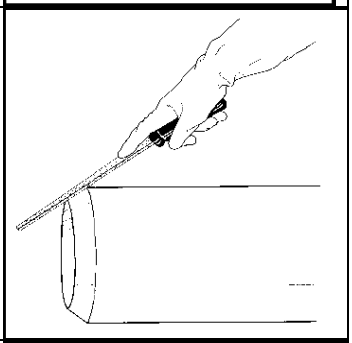
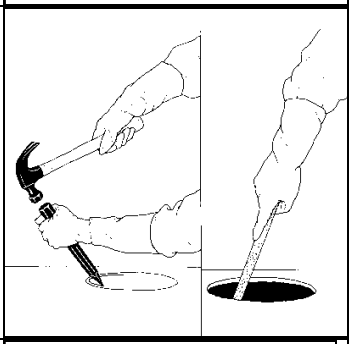
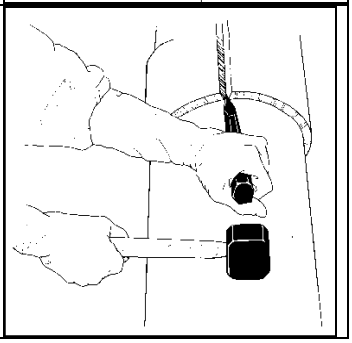
Boots without laces

Respiratory protective equipment (RPE)

E. Equipments and Methods to be used during AC Pipe Handling

The following equipments and methods are recommended for while working with AC pipes.

i) Snap cutters Snap cutters ("squeeze-and-pop" equipment) operate by means of cutting wheels mounted in a chain wrapper around the pipe barrel. Hydraulic pressure, applied by means of a remote, pneumatically, or manually operated pump, squeezes the cutting wheels into the pipe wall until the cut is made.	
ii) Carbide-tipped blade cutters Blade cutters are frame adjustable to the circumference of the pipe and have a number of self-tracking rollers that align one or more carbide-tipped cutting blades. Because of the relatively low mechanical input and clean cutting action, hand operated blade cutters do not produce significant amounts of airborne asbestos dust.	
iii) Manual field lathes Manual field lathes are designed to end-trim and re-machine rough pipe barrels to factory-machined end profiles. The lathe consists of an adjustable, self-aligning arbor inserted into the pipe bore (which acts as a mandrel upon which the turning handle operates), a screw-fed turning frame, carbide machining blades, and manual (hand or ratchet) turning handles.	

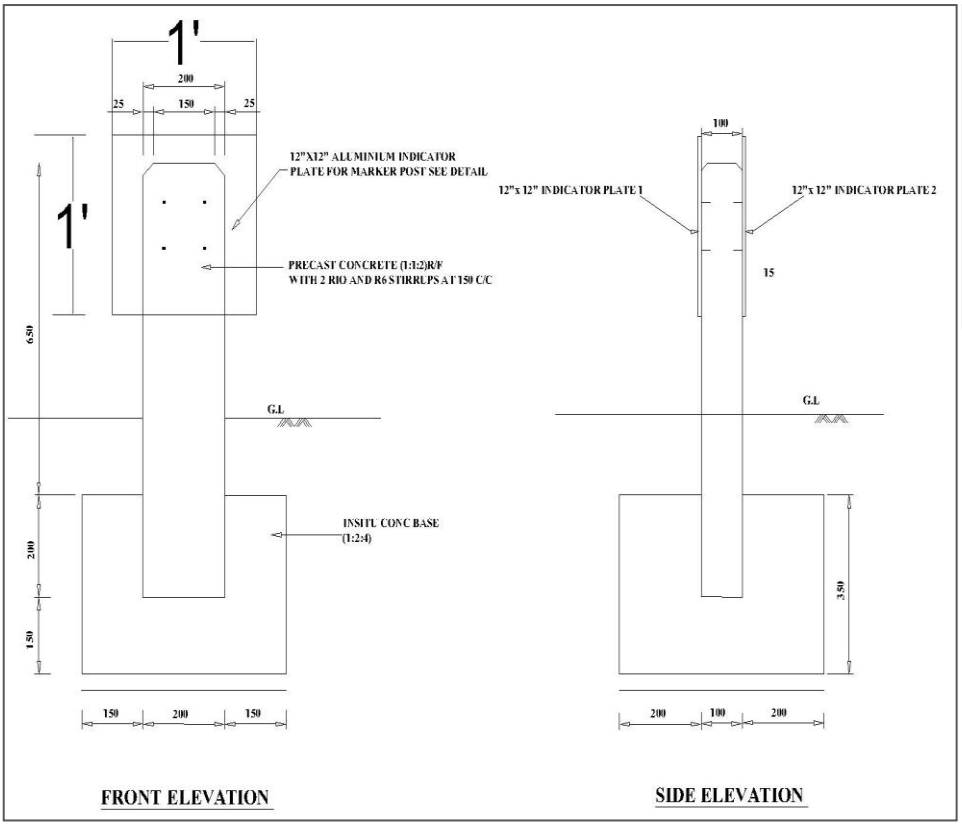
iv) Wet tapping AC pressure pipe Pressure or “wet” tapping for service connections is performed in the trench while the pipe is under pressure. The equipment (manual driven) is affixed to the pipe by means of a chain yoke. A combination boring-and-inserting bar drills and taps the pipe wall and inserts a corporation stop or pipe plug. The pressure chamber, which protects against water leakage, also catches the asbestos-cement chips, so this is essentially a dust-free operation.	
v) Dry tapping ACD pressure pipe Non-pressure or “dry” tapping for service connections may be performed in or out of the trench. The equipment is affixed to the pipe by means of a chain yoke. Separate drills and taps or a combination tool is used to drill and tap the pipe wall. Corporation stops or other connections may then be affixed to the pipe.	
vi) **Manual rasp** Short lengths of AC pipe, machined-end exclusively (MEE) and machined overall (MOA), can be cut to make closures and repairs and to locate fittings exactly. Field-cut ends may be re-beveled with a coarse wood rasp to form a taper approximating the profile of the factory-beveled end.	
vii) Chisel and rasp Holes may be cut into AC pipe with a hammer and chisel. The edge of a plumber’s wood chisel is used to cut completely around the hole outline, about ¼ in. (7 mm) from the prescribed line. The operation is repeated and the cut deepened until through. The edges of the hole are then dressed with a coarse wood rasp.	
viii) Hammer and chisel Replacement of damaged pipe may necessitate excavation, exposure and removal. AC coupling removal may be accomplished by gradually splitting the coupling lengthwise using a chisel and hammer. After the top of the coupling has been split, a crowbar or similar tool is used as a lever to split the bottom of the coupling.	

6. AC PIPE REMOVAL AND DISPOSAL

- Avoid or minimize breaking the AC pipe.
- Double-wrap large pieces in 1000-gauge polythene sheeting. Seal with duct tape.
- Attach asbestos warning stickers “DANGER ASBESTOS-CONTAINING MATERIAL”.
- Place small pieces in the asbestos waste container.
- Locate a landfill that is authorized to accept asbestos waste

7. MARKING OF AC PIPE ABOVE GROUND

Given the dangerous nature of AC pipes there is a significant health risk for workers and the public if these pipes are uncovered and damaged or cut accidentally, or deliberately to conduct the necessary work by other utility service providers e.g. gas supply, electricity line, telephone line. To warn the other utility service providers about the potential risk associated with disturbing the AC pipes which will be left in situ, proper marking should be provided above ground. The detail of marking is shown below.



Indicator Plate 1

Asbestos Cement pipe is just below this sign and is harmful to health if disturbed.

Please ensure that no damage occurs by nails, screws or hole drilling etc.

Report to DWASA if any damage occurs.

Indicator Plate 2