Initial Environmental Examination

10 March 2020

BAN: Dhaka Environmentally Sustainable Water Supply Project: Package 1

Prepared by Dhaka Water Supply and Sewerage Authority, Government of Bangladesh for the Asian Development Bank.

I. CURRENCY EQUIVALENTS

(as of 31 July 2013)

Currency unit	–	Taka (Tk)
Tk.1.00	=	$0.01286
$1.00	=	Tk. 77.760

II. ABBREVIATIONS

ADB	Asian Development Bank
AAQ	ambient air quality
BFRI	Bangladesh Fisheries Research Institute
BIWTA	Bangladesh Inland Waterways Transport Authority
BWDB	Bangladesh Water Development Board
BNBC	Bangladesh National Building Code
BOD	biological oxygen demand
BR	Bangladesh Railways
CSC	Construction Supervision Consultant
DBC	Design Build Contractor
DC	District Commissioner
DESWSP	Dhaka Environmentally Sustainable Water Supply Project
DMC	Design Management Consultants
DNCC	Dhaka North City Corporation
DoE	Department of Environment
DoF	Department of Fisheries
DSCC	Dhaka South City Corporation
DTW	Deep Tube Well
DWASA	Dhaka Water and Sewerage Authority
ECA	Environment Conservation Act
ECR	Environment Conservation Rules
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EM&MP	Environmental Management & Monitoring Plan
GW	Ground Water
IEE	Initial Environmental Examination
IWM	Institute of Water Modelling
LAP	Land Acquisition Plan
LGED	Local Government Engineering Division
MoEF	Ministry of Environment and Forest
NGO	Non-governmental Organization
PMU	Project Management Unit
RAJUK	Rajdhani Unnayan Kartripakhaya
RAP	Resettlement Action Plan
REB	Rural Electrification Board
RoW	Right of Way
SC	Supervision Consultant
STW	Shallow Tube Well
SW	Surface Water
SWTP	Surface Water Treatment Plant
WSF	Water Safety Framework
WSP	Water Safety Plan
WTP	Water Treatment Plant

WEIGHTS AND MEASURES

ha	–	hectare
km	–	kilometer
m	–	Meter
Mm	–	millimeter
km/h	–	kilometer per hour

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

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III. EXECUTIVE SUMMARY

1. An IEE has been prepared for all project packages P1, P2 and P3 in 2013. 1, The IEE (2013) was a review of the reasonably foreseeable effects on the environment of the whole proposed Dhaka Environmentally Sustainable Water Supply Project (DESWSP).

2. The present IEE refers to the revised detailed design of Package 1 (P1). Package 1 is the 22 km Treated Water Transmission Line from Bishnondi intake to Gandharbpur Water Treatment Plant. The IEE is conducted if the project is likely to have minor or limited impacts, which can easily be predicted and evaluated, and for which mitigation measures are prescribed easily. However, the IEE is also used to confirm whether this is, indeed, requires an EIA as a follow up.

3. However, ADB requires the consideration of environmental issues in all aspects of the Bank's funded projects, and the requirements for environmental assessment are described in ADB's Safeguard Policy Statement (SPS), 2009. The potential environmental impacts of the subproject have been assessed using ADB Rapid Environmental Assessment (REA) Checklist for DESWSP.

4. This IEE is based on the requirements of ADB's SPS 2009. Principal sources of information were the field data for rapid environmental assessment (REA) followed by terrestrial flora and fauna data and scoping exercises. Supplementary information was taken from direct consultations with DWASA staff, field observations and site assessment, review of documents and project plans, designs and previous reports on similar projects implemented in other areas in Bangladesh.

5. A scoping and field reconnaissance were conducted at project sites, to identify the potential impacts and categorization of project activities. The methodology of the IEE study was then elaborated in order to address all impacts. Subsequently primary and secondary baseline environmental data were collected from possible sources, and the intensity and likely location of impacts were identified with relation to sensitive receivers. The significance of impacts from construction of intake, 22 km raw water pipelines and WTP was then assessed and, for those impacts requiring mitigation measures were proposed to reduce impacts within acceptable limits. Informal public consultation (PC) was carried out in project areas.

6. The present IEE report supersedes the IEE prepared in 2013 and considers the revised detailed design of Package 1 (P1). Package 1 is the raw water intake at the Meghna river with structure with 1050 MLD capacity + 22 km raw water pipeline + WTP at Gandharbpur (WASA Land) having capacity 500 MLD. Package 1 has been categorized as category B according to ADB guidelines (ADB SPS).

7. Section 5 presents Bangladeshi laws and regulations related to environmental issues. Many of these are cross-sectoral and partially related to environmental issues. The most important of these are the Environment Conservation Act, 1995 (ECA, 1995), and the Environment Conservation Rules (ECR, 1997). The ECA 1995 is primarily an instrument for establishing the Department of Environment (DoE), and for controlling industrial and project related pollution. The Act also defines in general terms that if any particular activity is causing damage to the ecosystem, the responsible party will have to apply corrective measures.

[1] Draft Initial Environmental Examination, BAN: Dhaka Environmentally Sustainable Water Supply Project, August 2013

Until the appearance of ECR, 1997, enforcement of the Act was not possible, as many of the clauses refer to specifications detailed in the Rules. ECA and ECR were further amended to address the growing environmental challenges.

8. ADB requires the consideration of environmental issues in all aspects of ADB's operations, and the requirements for environmental assessment are described in ADB SPS, 2009. This states that ADB requires environmental assessment of all ADB investments.

9. Section 6 describes that the, he proposed project intends to withdraw up to 1,050 MLD from Meghna River in two phases for transmission to Dhaka city and for distribution after treatment. The project consists of the following components:

    (i) Construction of an intake at the village of Bishnondi from the Meghna River, with pumping and other facilities to deliver an uninterrupted supply of water into the transmission mains;
    (ii) Construction of raw water transmission pipelines connecting the raw water intake with the Gandharbpur water treatment plant (WTP);
    (iii) Construction of a 500-MLD surface water treatment plant at Gandharbpur; and
    (iv) Construction of treated water transmission mains from the Gandharbpur treatment plant to the injection point connecting with the distribution system inside Dhaka.

10. This Updated IEE under package-1 of DESWSP includes the following items.

11. Package-1: Raw water intake at the Meghna river with structure with 1050 MLD capacity + 22 km Raw water pipeline + WTP at Gandharbpur (WASA Land) having capacity 500 MLD. The project spread east-west through Araihazar and Rupganj Upazilla of Narayanganj District in Bangladesh. At the east end of the project, the intake is on the bank of Meghna River at Bishnanadi Union (adjacent GPS: N 23° 44' 45.821", E 90° 42' 45.186"), which is about 2km downstream (south) of Manikpur Ferry Ghat/crossing (Figure 1). The proposed pipelines and road are mostly through agricultural land and the pipeline will cross at Shezan Point at Dhaka-Sylhet Highway. West end of the Package-1, the Water Treatment Plant is located at Gandharbpur village of Murapara Union of Rupganj Upazilla (GPS: N 23° 45' 32.422", E 90° 30' 50.119").

12. Area: A total of 197-acre land acquired for this part of the project. More information in detailed is provided in Table 10. The land area required for the WTP site was acquired by DWASA long ago, and hence, no new land acquisition for WTP is required.

13. Section 7 details the existing physical environment of areas in and around the project site based on the baseline survey and other studies carried out as a part of the present study. Relevant information on climate, topography and drainage, geology and soils, hydrology and water resources, air quality, noise level, and water quality have been described in this Chapter.

14. Section 8 highlights on archaeological heritage and relics at Araihazar includes that, the two-storied building with 108 rooms (Sadasardi), mazars of Hazrat Garibullah Shah (R) and Jangali Shah (R) at Haizadi, colored glass decorated Durga Mandir, house of Zamindar Birendra Roy Chowdhury, Dighipar Math (Araihazar), single-domed Jami Mosque (Uchitpur). Archaeological heritage and relics at Rupganj: Bajra Mosque, residence of Mura Para Zamindar, Mura Para Shahi Mosque, At-ani Mosque and Tara Mosque at Gandharbapur, Brahmangaon Jami Mosque, Golakandail Kalim Shah Jami Mosque. The project sites are not located within any sensitive historical, cultural, and archaeological areas.

15. Section 9 focuses on anticipated environmental impacts and mitigation measures at Planning and Design Phase, construction and O&M stages. Section X includes Public Consultation. The detailed design shall identify suitable locations for construction work camps, stockpile areas, storage areas, and disposal areas and other facilities near to the project locations or DNCC disposal sites. However, if it is deemed necessary to locate elsewhere, sites to be considered shall not promote social instability and result in destruction of property, vegetation, irrigation, and water bodies.

16. None of these temporary facilities shall be located (i) within 500 m of residential areas and rivers identified as ecologically critical areas (ECA),, and (ii) within 100 m of other water courses and canals (khals). Though the contractor will be free to decide locations, a list of feasible locations shall be included in the design specifications and plan drawings for approval by the PMU. The impacts during construction will include typical construction-related impacts associated with intake structure, laying of raw water transmission pipe lines, and the WTP. While the nature of these impacts is not expected to be significant, the magnitude is, given the size and scale of the proposed facilities. The offshore intake structure shall be designed to supply both phase 1 and phase 2 of the project. The Raw Water Pipeline together with the Raw Water Pumping Station shall transfer the required flow from the River Meghna to the WTP. The Raw Water Pipeline shall be located at the eastern edge of the site.

17. Section 10 includes Public Consultation, the active participation of stakeholders including local community, NGOs, etc., in all stages of project preparation and implementation is essential for successful implementation of the project. It will ensure that the P1 Project is designed, constructed, and operated with utmost consideration to local needs, ensures community acceptance, and will bring maximum benefits to the people. Public consultation and information disclosure is a must as per the ADB policy.

18. Section 11 highlights grievance redress mechanism. A common GRM will be in place to redress social, environmental or any other project related grievances. The GRM described below has been developed in consultation with stakeholders. Public awareness campaign will be conducted to ensure that awareness on the project and its grievance redress procedures is generated. The campaign will ensure that the poor, vulnerable and others are made aware of grievance redress procedures, and PMU will ensure that their grievances are addressed, the affected people can also go to the GRC for any environmental concern.

19. Section 12 presents environmental management and mitigation. An environmental management plan (EMP) has been developed to provide mitigation measures to reduce all negative impacts to acceptable levels. The EMP will guide the environmentally-sound construction of the P1 Project and ensure efficient lines of communication between DWASA, project management unit (PMU), consultants and contractors. The contractor will be required to submit to PMU, for review and approval, a site-specific environmental plan (SSEP) including (i) proposed sites/locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes; (ii) specific mitigation measures following the approved EMP; (iii) monitoring program as per SSEP; and (iv) budget for SSEP implementation. No works are allowed to commence prior to approval of SSEP.

20. Section 13 describes the conclusion and recommendations. The proposed P1 project will not have any significant adverse impacts on the environment since the project activities will be limited within the intake site at Bishnondi, 22km raw water pipeline corridor of land, and WTP site at Gandharbpur which are already acquired by the Government. The impacts of the project are site-specific, reversible and are confined within the property. The site is not an ecologically sensitive area.

21. Based on the analysis conducted in this assessment it is concluded that overall the project will result in significant positive socio-economic benefits, and those potential negative environmental impacts that have been identified are small-scale and local and can be minimized adequately through good design and the appropriate application of mitigation measures. It is therefore recommended that the project be supported by ADB, subject to the implementation of the commitments contained in the EMP and allocation of appropriate technical, financial and human resources by implementing agencies such as DWASA, Construction Supervision Consultant and Contractors to ensure these commitments are effectively and expediently implemented.

IV. INTRODUCTION

A. Background

22. The Government of Bangladesh has received financing from the ADB, Agence Française de Développement (AFD), and European Investment Bank (EIB), which will be re-lent to Dhaka Water Supply and Sewerage Authority (DWASA) for the implementation of Dhaka Environmentally Sustainable Water Supply Project (DESWSP). The proposed project aims to provide safe, reliable and continuous drinking water as per Government of Bangladesh's standard to about 15 million people of Dhaka-the capital, located in the heart of the country.

23. DWASA is responsible for providing potable water supply services to about 90% of Dhaka's population, sewerage services, and storm water drainage services throughout its 400km2 services areas. In fact, the city relies heavily on groundwater sources for water supply, but current abstraction exceeds sustainable yields, water table levels are falling by 2 to 3 m /year and increasing numbers of tube wells become inoperable. Groundwater extraction is expected to be reduced from 1,900 MLD in 2012 to 1,360 MLD by 2020 and 1,260 MLD by 2025. In addition, ground water quality deteriorates continuously. At the same time, the overall supply needs to be increased to cater for the growing population in a larger service area.

24. Out of the total 2400 MLD currently provided by DWASA, 450 MLD is provided by the two phases of Saidabad Water Treatment Plant (WTP), which abstracts water from the nearby Shitalakhya River, where water quality is deteriorating rapidly, particularly due to high ammonia concentrations during the dry season. This puts sustainable operation of the WTP at serious risk. This in turn makes it essential for DWASA to find an adequate and sustainable source of raw water to achieve its long-term development objectives.

25. The outcome of the project will be drinking water security ensured in selected district metered areas (DMAs), and in addition, gender-responsive, and sustainable drinking water service delivered in Project DMAs.

B. Objectives of the IEE Report

26. The IEE report prepared in 2013 referred to the whole DESWSP. This IEE report refers to P.1 only, which includes

    (i) Raw water intake at Bishnondi
    (ii) Raw water mains
    (iii) Water treatment plant at Gandharbpur.

27. The present IEE report supersedes the IEE prepared in 2013 and considers the revised detailed design of Package 1 (P1). Package 1 is the raw water intake at the Meghna river with structure with 1050 MLD capacity + 22 km raw water pipeline + WTP at Gandharbpur (WASA Land) having capacity 500 MLD. Package 1 has been categorized as category B according to ADB guidelines (ADB SPS 2009). An IEE has been conducted as the project is likely to have minor or limited impacts, which can easily be predicted and evaluated, and for which mitigation measures are prescribed easily. However, the IEE is also used to confirm whether a detailed EIA will be required as a follow up.

28. However, ADB requires the consideration of environmental issues in all aspects of the Bank's operations, and the requirements for environmental assessment are described in ADB's Safeguard Policy Statement (SPS), 2009. The potential environmental impacts of the subproject have been assessed using ADB Rapid Environmental Assessment (REA)

Checklist for DESWSP. Then potential negative impacts were identified in relation to pre-construction, construction and operation of the improved infrastructure, and results of the assessment show that the project (Package 1 the raw water intake at the Meghna river with structure with 1050 MLD capacity + 22 km raw water pipeline + WTP at Gandharbpur) is unlikely to cause significant adverse impacts. Thus, this updated initial environmental examination (IEE) has been prepared in accordance with ADB SPS's requirements for environment category B projects.

29. This IEE is based on the preliminary project reports and detailed design prepared by the Consultant (Mott MacDonald), DWASA, and a feasibility report prepared by the Project Preparatory Technical Assistance (PPTA) team and will be finalized during implementation stage by design, build and operate (DBO) contractor to reflect any changes and latest project designs. The IEE was based mainly on field reconnaissance surveys and secondary sources of information. The environmental monitoring program developed as part of the environmental management plan (EMP) will require the contractors to establish the baseline environmental conditions prior to commencement of civil works. The results will be reported as part of the environmental monitoring report and will be the basis to ensure no degradation will happen during Package 1 project implementation.

30. The following IEEs have been prepared separately for other Packages. These IEEs are not subject to this report:

(i) IEE Package-2: Treated water transmission pipeline from the Gandharbpur WTP to the injection point of the existing distribution network at Baridhara near US embassy Total 13km.
(ii) IEE Package-3.1: P3.1 (Component 3.1 Distribution reinforcement line) (23 km Major Distribution Pipe)
(iii) IEE Package-3.2: P3.2 (Component 3.2) (56 km Small Distribution pipe to DMA)

C. Methodology of IEE Report

31. This IEE is based on the requirements of ADB's SPS 2009. Principal sources of information were the field data for rapid environmental assessment (REA) followed by terrestrial flora and fauna data and scoping exercises. Supplementary information was taken from direct consultations with DWASA staff, field observations and site assessment, review of documents and project plans, designs and previous reports on similar projects implemented in other areas in Bangladesh.

32. A scoping and field reconnaissance were conducted at project sites, to establish the potential impacts and categorization of project activities. The methodology of the IEE study was then elaborated in order to address all impacts. Subsequently primary and secondary baseline environmental data were collected from possible sources, and the intensity and likely location of impacts were identified with relation to sensitive receivers. The significance of impacts from construction of P1 project intervention was then assessed and, for those impacts requiring mitigation measures were proposed to reduce impacts to within acceptable limits. Informal public consultation (PC) was carried out in project areas.

D. Report Structure

33. This Report contains the following seven (7) sections including the executive summary at the beginning of the report:

(i) Introduction;
(ii) Description of the project
(iii) Policy, legal and administrative framework;

(iv) Description of the environment;
(v) Anticipated environmental impacts and mitigation measures;
(vi) Environmental management plan, and,
(vii) Conclusion and recommendation.

V. POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK

A. Relevant Government Policies, Acts, Rules and Strategies in Bangladesh

34. This section highlights relevant GoB general policies, guidelines, codes of practice and procedures to be taken into consideration for integration of environmental and social aspects into the project design.

35. A wide range of laws and regulations related to environmental issues are in place in Bangladesh. Many of these are cross-sectoral and partially related to environmental issues. The most important of these are the Environment Conservation Act, 1995 (ECA, 1995), and the Environment Conservation Rules (ECR, 1997). The ECA 1995 is primarily an instrument for establishing the Department of Environment (DoE), and for controlling industrial and project related pollution. The Act also defines in general terms that if any particular activity is causing damage to the ecosystem, the responsible party will have to apply corrective measures. Until the appearance of ECR, 1997, enforcement of the Act was not possible, as many of the clauses refer to specifications detailed in the Rules. ECA and ECR were further amended to address the growing environmental challenges.

36. In addition to the Environmental Conservation Act and Rules, there are a number of other policies, plans and strategies which deal with the water sector, agricultural development, coastal area, protected area disaster management and climate change. These are the National Water Policy, 1999; the Forest Act 1927 (last modified 30th April 2000); National Forest Policy, 1994; the National Conservation Strategy1992;; National Environmental Management Action Plan (NEMAP), 1995; Coastal Zone Policy, 2005; Coastal Development Strategy, 2006; National Agricultural Policy, 1999; National Fisheries Policy, 1996; National Livestock Development Policy, 2007; Standing Orders on Disaster, 1999 (revised in 2010); Bangladesh Climate Change Strategy and Action Plan, 2009; National Plan for Disaster Management, 2010-2015. Some of these policies and legislations are described in this chapter for reference.

Environment Conservation Act, 1995

37. The national environmental legislation known as Environmental Conservation Act, 1995 (ECA'95) is currently the main legislative document relating to environmental protection in Bangladesh, which replaced the earlier environment pollution control ordinance of 1992 and has been promulgated in Environmental Conservation Rules, 1997 (ECR'97). This Act is amended in 2000 and 2002. The main objectives of ECA'95 are: i) conservation of the natural environment and improvement of environmental standards; and ii) control and mitigation of environmental pollution.

38. The main strategies of the act can be summarized as:

(i) Declaration of ecologically critical areas, and restriction on the operation and process, which can be continued or cannot be initiated in the ecologically critical areas
(ii) Regulation with respect to vehicles emitting smoke harmful to the environment
(iii) Environmental clearances
(iv) Remedial measures for injuries to ecosystems
(v) Regulation of projects and other development activities
(vi) Promulgation of standards for quality of air, water, noise and soil for different areas for various purposes

(vii) Promulgation of standard limit for discharging and emitting waste
(viii) Formulation and declaration of environmental guidelines

39. Department of Environment (DoE) implements the Act. DoE is under the Ministry of Environment and Forest and is headed by a Director General (DG). The DG has complete control over the DoE.

Environment Conservation Rules, 1997

40. The Environment Conservation Rules provide a first set of rules under the Environment Conservation Act, 1995. These rules are further amended in 2002 and 2003. These provide, amongst other items, standards and guidelines for:

(i) Categorization of industries and development projects
(ii) Procedure for obtaining environmental clearance
(iii) Environmental quality standards in relation to water pollution, air pollution and noise, as well as permitted discharge/emission levels of water and air pollutants and noise by projects

41. The Rules incorporate "inclusion lists" of projects requiring varying degrees of environmental investigation. The Government is also empowered to specify which activities are permissible and which restricted in the ecologically critical area. Under this mandate, MOEF has declared Sundarbans, Cox's Bazar-Tekhnaf Sea Shore, Saint Martin Island, Sonadia Island, Hakaluki Haor, Yanguar Haor, Marzat Baor and Gulshan-Baridhara Lake as ecologically critical areas and accordingly has prohibited certain activities in those areas.

42. Environmental Conservation Rules (1997) classifies industrial units and development projects into four categories for the purpose of issuance of Environmental Clearance Certificate (ECC). These categories are:

(i) Green
(ii) Orange A
(iii) Orange B, and
(iv) Red

43. **Green Category** projects are considered relatively pollution-free and hence do not require initial environmental examination (IEE) and EIA. An environment clearance certificate (ECC) from the Department of Environment (DoE) is adequate.

44. **Orange Category** projects fall into two categories. Orange A projects are required to submit general information, a feasibility report, a process flow diagram and schematic diagrams of waste treatment facilities along with their application for obtaining DOE environmental clearance. Orange B projects are required to submit an Initial Environmental Examination (IEE) report, along with their application and the information and papers specified for Orange B projects.

45. **Red Category** projects are those which may cause ‘significant adverse’ environmental impacts and are, therefore, required to submit an EIA report. It should be noted that they may obtain an initial site clearance on the basis of an IEE report, and subsequently submit an EIA report for obtaining environmental clearance along with other necessary papers, such as feasibility study reports and no objections from local authorities.

46. An EIA referring to all packages P1, P2 and P3 has been prepared and submitted to DoE. A no-objection certificate has been issued by DoE on 21 May 2015 (Appendix-I). An update

of the certificate is still pending due to some changes in the detailed design. The updated EIA has been submitted to DoE for approval in spring 2018. Consequently, the DoE approved the EIA in December 2018. (Appendix - J).

47. As per ECR '97 all existing and new industries and projects in Orange B and Red category require an Environmental Management Plan (EMP) to be prepared (after conducting an IEE or EIA) and submitted along with other necessary papers while applying for environmental clearance (Appendix -M).

Bangladesh Climate Change Strategy and Action Plan (BCCSAP) 2009

48. The Government of Bangladesh prepared the Bangladesh Climate Change Strategy and Action Plan (BCCSAP) in 2008 and revised in 2009. This is a comprehensive strategy to address climate change challenges in Bangladesh. It is built around the following six themes:

(i) Food security, social protection and health to ensure that the poorest and most vulnerable in society, including women and children, are protected from climate change. All programs focus on the needs of this group for food security, safe housing, employment and access to basic services, including health.
(ii) Comprehensive disaster management to further strengthen the country ′ s already proven disaster management systems to deal with increasingly frequent and severe natural calamities.
(iii) Infrastructure to ensure that existing assets (e.g., coastal and river embankments) are well maintained and fit for purpose and that urgently needed infrastructures (cyclone shelters and urban drainage) is put in place to deal with the likely impacts of climate change.
(iv) Research and Knowledge management to predict that the likely scale and timing of climate change impacts on different sectors of economy and socioeconomic groups; to underpin future investment strategies; and to ensure that Bangladesh is networked into the latest global thinking on climate change.
(v) Mitigation and low carbon development to evolve low carbon development options and implement these as the country ′ s economy grows over the coming decades.
(vi) Capacity building and Institutional strengthening to enhance the capacity government ministries, civil society and private sector to meet the challenge of climate change

National Water Policy 1999

49. The National Water Policy was promulgated in 1999 with the intention of guiding both public and private actions to ensure optimal development and management of water in order to benefit both individuals and the society at large. The policy aims to ensure progress towards fulfilling national goals of economic development, poverty alleviation, food security, public health and safety, a decent standard of living for the people and protection of the natural environment. According to the policy, all agencies and departments entrusted with water resource management responsibilities (regulation, planning, construction, operation and maintenance) will have to enhance environmental amenities and ensure that environmental resources are protected and restored while executing their activities. Environmental needs and objectives will be treated equally with the resource's management needs. The policy has several clauses related to the protection and conservation of the natural environment to ensure sustainable development.

National Safe Drinking Water Supply and Sanitation Policy 1998

50. The National Safe Drinking Water Supply and Sanitation Policy (NSDWSSP, 1998) was adopted in 1998, and sets out the basic framework for the improvement of public health quality and to ensure an improved environment, together with a set of broad sectoral action guidelines. The policy offered the following various objectives to achieve the goal:

(i) To manage water supply and sanitation related basic needs for all;
(ii) To bring about a positive change of peoples' attitude towards water and sanitation;
(iii) To reduce the outbreak of water-borne diseases;
(iv) To increase the efficiency of the Local Government and associated communities for handling the problems related to water supply and sanitation;
(v) To improve sustainable water supply and sanitation system;
(vi) To promote proper conservation, management and use of surface water and to control water pollution in light of the scarcity of groundwater;
(vii) To take necessary steps to capture and use rain water.

National Agricultural Policy, 1999

51. The overall objective of the National Agriculture Policy is to make the nation self-sufficient in food through increasing production of all crops including cereals and ensure a dependable food security system for all. One of the specific objectives of National Agricultural Policy is to take necessary steps to ensure environmental protection as well as 'environment-friendly sustainable agriculture' through increased use of organic manure and strengthening of the integrated pest management program. The policy also suggests creating awareness so that the chemical fertilizers and pesticides used for increased crop production do not turn out to be responsible for environmental pollution. Water logging and salinity are identified as one of the serious problems in some parts of the country including the coastal areas for agricultural activities and environmental damage. The policy recommends for crop rotation and salt tolerant crop varieties.

National Fisheries Policy, 1996

52. The National Fisheries Policy, 1996 recognizes that fish production has declined due to environmental imbalances, adverse environmental impact and improper implementation of fish culture and management programs. The policy suggests following actions:

(i) Shrimp and fish culture will not he expanded to the areas which damage mangrove forest in the coastal region;
(ii) Biodiversity will be maintained in natural water bodies and in marine environment;
(iii) Chemicals harmful to the environment will not be used at fish shrimp farms;
(iv) Environment friendly fish shrimp culture technology will be used;
(v) Control measures will be taken against activities that have a negative impact on fisheries resources and vice-versa;
(vi) Laws will be formulated to ban the disposal of any untreated industrial effluents into the water bodies.

National Livestock Development Policy, 2007

53. The National Livestock Development Policy has been prepared to address the key challenges and opportunity for a comprehensive sustainable development of the Livestock

sub-sector through creating an enabling policy framework. The policy recognizes that there are no guidelines for environmental protection and bio-security when establishing poultry farms. The use of antibiotics in feeds is thought to be common and a cause of public health concern. The policy recommends for developing and enforcing specific guidelines for establishing environment-friendly commercial poultry farms.

54. In relation to compliance with DoE EIA Guideline, was necessary for DWASA to obtain only environmental clearance for this project. DWASA received exemption for IEE earlier for this project and approval of TOR for EIA study. Based on required documents, EIA report was prepared and submitted on August 2014 and approved the EIA on 21 May 2015. However, over the time there are some additional distribution pipeline work included in this project, hence the EIA required further updated. Accordingly, the updated EIA was prepared and submitted to DWASA in April 2018. The PMU further submitted the EIA to DoE for environmental clearance (EIA document is exclusively for DOE as Red Category Project, and this updated IEE is for ADB only).

55. Further to note, applicable statutory requirements for EIA is as follows:

(i) Forest Clearance: No forest exists on P1 site
(ii) No Objection Certificate: Within 60 working days from the date of application to DoE
(iii) Site Location Clearance: Within 60 working days from the date of application to DoE
(iv) Environmental Compliance Certificate and other Permit: Within 30 to 60 working days from the date of application to DoE
(v) Annual Renewal of Environmental Clearance Certificate: 30 days before expiry
(vi) The DoE environmental clearance procedure is provided in Appendix M.
(vii) The environmental clearance is issued for EIA on 11 December 2018 which is applicable for all the Packages (P1, P2, P3.1 and P3.2). The ECC is provided in Appendix-J.

Relevant International Environmental Agreements

56. Bangladesh has signed and ratified a number of international treaties, conventions and protocols relating to environmental protection. The following protocols are of particular relevance to the DESWSP.

(i) Rio Declaration, Convention on Biological Diversity, Rio De Janeiro, 1992 (Ratified 1994)
(ii) RAMSAR, 1971(Ratified 1992)
(iii) International Plant Protection Conservation, Rome, 1951 (Ratified 1978)
(iv) Basel Convention, Basel, 1989 (Ratified 1993)
(v) United Nations Framework Conservation on Climate Change, New York, 1992 (Ratified 1994)
(vi) Montreal Protocol, 1987 (Ratified 1994)
(vii) World Heritage Convention, 1972 (Ratified 1983)

57. Among them, following Table 1 summarizes the relevant to this project activity.

Table 1: International environmental conventions relevant to the project activities

International	Details	Relevance
Rio Declaration 1992	United Nations Conference on Environment and Development (UNCED) adopted the global action program for sustainable development called 'Rio Declaration' and 'Agenda 21 'Principle 4 of the Rio Declaration', 1992, to which Bangladesh is a signatory along with a total of 178 countries.	No sensitive species are located in the project area. There is no threat to the conservation of flora or fauna.
Convention on Wetland of International Importance Especially as Waterfowl Habitats, Ramsar (1972)	The Ramsar Convention was adopted on 2 February 1971 and entered into force on 21 December 1975. Bangladesh ratified the Convention on 20 April 2002. Bangladesh has two Ramsar Sites (i) parts of Sundarban Reserved Forest (Southwest of Bangladesh), and (ii) Tanguar Haor Northeast of Bangladesh).	No impact on these river/wetlands caused by P 1 project activities, these seasonal wetlands are not within P 1 project area

(viii) Health and Safety - worker and community
(ix) Physical Cultural Resources (Archaeology etc.); and
(x) the Grievance Redress Mechanism (GRM)

58. However, the Contractor shall ensure compliance with the labor laws and pertinent occupational health and safety regulation of Bangladesh, IFC's EHS Guidelines. The Contractor shall ensure that all workers are supplied with and use the relevant protection safety equipment on the construction site. Abstain from employing child labor (detailed in Appendix D).

ADB Environmental Requirements

B. ADB Environmental Requirements

59. As noted previously this IEE of DESWSP has been classified as Category "B" for Environmental Assessment. The categorization was carried out based on ADB's Safeguard Policy Statement 2009.

60. The Environmental Safeguards can be considered to use the term environment in a broad sense. The Policy states, inter alia that an assessment shall be conducted to identify direct, indirect, cumulative and induced impacts and risks to physical, biological, socioeconomic (including impacts on livelihood through environmental media, health and safety, vulnerable groups and gender issues) and physical cultural resources in the context of the projects area of influence.

61. The Policy then goes onto list the Safeguard Requirements for Environment, focusing on:

(i) Biodiversity Conservation and Sustainable Natural Resources Management;
(ii) Pollution Prevention and Abatement;

62. ADB requires the consideration of environmental issues in all aspects of ADB's operations, and the requirements for environmental assessment are described in ADB SPS, 2009. This states that ADB requires environmental assessment of all ADB investments.

63. 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:

64. Category A: Projects could have significant adverse environmental impacts. An

Environmental Impact Assessment (EIA) is required to address significant impacts.

65. 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. Package P 1 of Dhaka DESWSP has been categorized as category B. Adverse environmental impacts are site specific, limited and can be mitigated accordingly.

66. Category C: Projects are unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are reviewed.

67. 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.

68. 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.

69. Public disclosure: ADB will post the safeguard documents on its website as well as disclose relevant information in accessible manner in local communities:

(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 implementing agency during project implementation upon receipt.

70. ADB's SPS is also focused on the following:

(iv) -environmental planning and management
(v) -information disclosure
(vi) -consultation and participation
(vii) -monitoring and reporting
(viii) -unanticipated environmental impacts

C. IFC EHS Guidelines on Air Quality, Noise and Waste Water Quality

71. The IFC EHS Guidelines on Noise, Air Quality, Water Quality and supporting Performance Standard recognizes that increased economic activity and urbanization often generate increased levels of pollution to air, water, and land, and consume finite resources in a manner that may threaten people and the environment at the local, regional, and global levels. There is also a growing global consensus that the current and projected atmospheric concentration of greenhouse gases (GHG) threatens the public health and welfare of current and future generations.

72. However, these guidelines and standard outlines a project-level approach to resource efficiency and pollution prevention and control in line with internationally disseminated technologies and practices. In addition, these guidelines and standard promotes the ability

of autonomous and private sector agencies to adopt such technologies and practices as far as their use is feasible in the context of the DESWSP project that relies on commercially available skills and resources.

73. During the project life-cycle, the client will consider ambient conditions and apply technically and financially feasible resource efficiency and pollution prevention principles and techniques that are best suited to avoid, or where avoidance is not possible, minimize adverse impacts on human health and the environment. The principles and techniques applied during the project life-cycle will be tailored to the hazards and risks associated with the nature of the project and consistent with good international industry practice (GIIP), as reflected in various internationally recognized sources, including the World Bank Guidelines.

74. The Community Health, Safety, and Security (Performance Standard 4) recognizes that project activities, equipment, and infrastructure can increase community exposure to risks and impacts. In addition, communities that are already subjected to impacts from climate change may also experience an acceleration and/or intensification of impacts due to project activities. While acknowledging the public authorities' role in promoting the health, safety, and security of the public, this IFC Performance Standard addresses the client's responsibility to avoid or minimize the risks and impacts to community health, safety, and security that may arise from project related-activities, with particular attention to vulnerable groups. 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.

Ambient Air Quality:

75. Projects with significant sources of air emissions, and potential for significant impacts to ambient air quality, should prevent or minimize impacts by ensuring that:

(i) Emissions do not result in pollutant concentrations that reach or exceed relevant ambient quality guidelines and standards by applying national legislated standards (DoE), or in their absence, the current WHO Air Quality Guidelines (Table 2), or other internationally recognized sources;
(ii) Emissions do not contribute a significant portion to the attainment of relevant ambient air quality guidelines or standards. As a general rule, this Guideline suggests 25 percent of the applicable air quality standards to allow additional, future sustainable development in the same airshed.

ADB Safeguard Policy Statement Requirements:

76. During the design, construction, and operation of the project the Project Management Unit (DWASA) will apply pollution prevention and control technologies and practices consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's Environment, Health and Safety Guidelines. These standards contain performance levels and measures that are normally acceptable and applicable to projects. When Government of Bangladesh regulations differ from these levels and measures, the Project Management Unit (PMU) will achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the PMU will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS (Table 2: Air Quality Guidelines).

77. The following table presents the air quality guidelines.

Table 2: Air Quality Guidelines

WHO Ambient Air Quality Guidelines

	Averaging Period	Guideline Value in µ/m3
Sulphur dioxide (SO_2)	24-hour	125 (Interim target-1)
	10 minutes	50 (Interim target-2)
		20 (guideline)
		500 (guideline
Nitrogen dioxide (NO_2)	1-year	40 (guideline)
	1-hour	200 (guideline)
Particulate Matter	1-year	70 (Interim target-1)
PM10	24-hour	50 (Interim target-2)
		30 (Interim target-3)
		20 (guideline)
		150 (Interim target-1)
		100 (Interim target-2)
		75 (Interim target-3)
		50 (guideline)
Particulate Matter	1-year	35 (Interim target-1)
PM2.5	24-hour	25 (Interim target-2)
		15 (Interim target-3)
		10 (guideline)
		75 (Interim target-1)
		50 (Interim target-2)
		37.5 (Interim target-3)
		25 (guideline)
Ozone	8-hour daily	160 (Interim target-1)
	maximum	100 (guideline)

78. Source: IFC Environmental, Health, and Safety Guidelines, General EHS Guidelines: Environmental Air Emissions and Ambient Air Quality

79. Details are provided in IFC Environmental, Health, and Safety Guidelines, General EHS Guidelines: Environmental Air Emissions and Ambient Air Quality

Noise Level

80. Prevention and Control: Noise prevention and mitigation measures should be applied where predicted or measured noise impacts from a project facility or operations exceed the applicable noise level guideline at the most sensitive point of reception. The preferred method for controlling noise from stationary sources is to implement noise control measures at source. Methods for prevention and control of sources of noise emissions depend on the source and proximity of receptors.

81. Noise reduction options that should be considered include:

(i) Selecting equipment with lower sound power levels Installing silencers for fans
(ii) Installing suitable mufflers on engine exhausts and compressor components
(iii) Installing acoustic enclosures for equipment casing radiating noise
(iv) Improving the acoustic performance of constructed buildings, apply sound insulation
(v) Installing acoustic barriers without gaps and with a continuous minimum surface density of 10 kg/m^2 in order to minimize the transmission of sound through the barrier. Barriers should be located as close to the source or to

the receptor location to be effective & others.

82. Noise impacts should not exceed the levels presented in Table 3 or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site.

83. Following is the Noise-level Guidelines:

Table 3: World Bank Group's Environment, Health and Safety Noise Level Guidelines

Noise Level Guidelines

		One Hour (dB(A)
Receptor	Day Time (07:00 – 22:00)	Night Time (22:00 -07:00)
Residential; institutional; educational	55	45
Industrial; commercial	70	70

84. This guideline applies to projects that have either direct or indirect discharge of process wastewater, wastewater from utility operations or storm water to the environment. These guidelines are also applicable to industrial discharges to sanitary sewers that discharge to the environment without any treatment. Process wastewater may include contaminated wastewater from utility operations, storm water, and sanitary sewage. It provides information on common techniques for wastewater management, water conservation, and reuse that can be applied to a wide range of industry sectors. This guideline is meant to be complemented by the industry-specific effluent guidelines presented in the Industry Sector Environmental, Health, and Safety (EHS) Guidelines. Projects with the potential to generate process wastewater, sanitary (domestic) sewage, or storm water should incorporate the necessary precautions to avoid, minimize, and control adverse impacts to human health, safety, or the environment. In the context of their overall ESHS management system, facilities should:

(i) Understand the quality, quantity, frequency and sources of liquid effluents in its installations. This includes knowledge about the locations, routes and integrity of internal drainage systems and discharge points
(ii) Plan and implement the segregation of liquid effluents principally along industrial, utility, sanitary, and storm water categories, in order to limit the volume of water requiring specialized treatment. Characteristics of individual streams may also be used for source segregation.
(iii) Identify opportunities to prevent or reduce wastewater pollution through such measures as recycle/reuse within their facility, input substitution, or process modification (e.g. change of technology or operating conditions/modes).
(iv) Assess compliance of their wastewater discharges with the applicable: (i) discharge standard (if the wastewater is discharged to a surface water or sewer), and (ii) water quality standard for a specific reuse (e.g. if the wastewater is reused for irrigation).

Wastewater Management:

85. Wastewater management includes water conservation, wastewater treatment, storm water management, and wastewater and water quality monitoring.

86. Details are provided in IFC Environmental, Health, and Safety Guidelines, General EHS Guidelines: Environmental Wastewater and Ambient Water Quality.

D. Bangladesh Environmental Policies and Standards

87. The technical committees of Department of Environment have published several standards that promote environmental safety. The impact of these efforts is felt in cleaner air and water, eco-friendly homes and office buildings; enhanced waste management and recycling programs; new innovations in oil spill response and improved environmental assessment processes.

88. A wide range of laws and regulations related to environmental issues are in place in Bangladesh. Many of these are cross-sectoral and several of them are directly related to environmental issues. The most important of these are the Environment Conservation Act, 1995 (ECA, 1995), and the Environment Conservation Rules (ECR, 1997). The ECA 1995 is primarily an instrument for establishing the Department of Environment (DoE), and for controlling industrial and project related pollution. The Act also defines in general terms that if any particular activity is causing damage to the ecosystem, the responsible party will have to apply corrective measures. Until the appearance of ECR, 1997, enforcement of the Act was not possible, as many of the clauses refer to specifications detailed in the Rules.

89. In addition to the Environmental Conservation Act and Rules, there are a number of other policies, plans and strategies which deal with the water sector, agricultural development, coastal area, protected area disaster management and climate change. These are the National Water Policy, 1999; the Forest Act 1927 (last modified 30th April 2000); National Forest Policy, 1994; the National Conservation Strategy1992;; National Environmental Management Action Plan (NEMAP), 1995; Coastal Zone Policy, 2005; Coastal Development Strategy, 2006; National Agricultural Policy, 1999; National Fisheries Policy, 1996; National Livestock Development Policy, 2007; Standing Orders on Disaster, 1999 (revised in 2010); Bangladesh Climate Change Strategy and Action Plan, 2009; National Plan for Disaster Management, 2010-2015. Some of these policies and legislations are described in this chapter for reference.

Air Quality

Table 4: Bangladesh Standards for Ambient Air Quality Schedule-2, Rule 12, Environment Conservation Rules of 1997 (Micrograms /Cubic Meter)

Sl. No	Area	Suspended Particulate Matter (SPM)	Sulphur Dioxide (SO_2)	Car bon Monoxide (CO)	Oxides of Nitro gen (NOx)
Ka	Industrial and mixed	500	120	5000	100
Kha	Commercial and mixed	400	100	5000	100
Ga	Residential and rural	200	80	2000	80
Gha	Sensitive	100	30	1000	30

90. Source: Schedule-2, Rule 12, Environment Conservation Rules of 1997 (Page 3123, Bangladesh Gazette, 28 August 1997) (Own authentic translation from original Bengali).

91. Note:

(i) Sensitive area includes national monuments, health resorts, hospitals, archaeological sites, educational institutions and other government designated areas (if any).

(ii) Any industrial unit located not in a designated industrial area will not discharge such pollutants, which may contribute to exceed the ambient air

quality above in the surrounding areas of category 'Ga' and 'Gha'.

(iii) Suspended particulate matters mean airborne particles of diameter of 10 micron or less.

92. Source: Department of Environment (DoE)

Noise

Table 5: Noise quality standards, by zone and time of day

Zone Class	Limits in dB (A)	
	Daytime (6 am – 9 pm)	Night-time (9 pm – 6 am)
Silent zone	45	35
Residential zone	50	40
Mixed (residential/commercial/industrial) zone	60	50
Commercial zone	70	60
Industrial zone	75	70

93. Source: Schedule 4, Rule-12, Environment Conservation Rules, 1997. (Page 3127, Bangladesh Gazette, 28 August 1997). Own authentic translation from original Bengali

94. Note:

(i) Daytime is reckoned as the time between 6 a.m. and 9 p.m.
(ii) Night-time is reckoned as the time between 9 p.m. and 6 a.m.
(iii) Silent zones are areas up to a radius of 100 m around hospitals, educational institutions, or special establishments declared or to be declared as such by the government. Use of vehicular horn, other signals, and loudspeakers is prohibited in silent zones.

95. Source: Department of Environment (DoE), Bangladesh

Drinking Water Quality

96. National Environment Quality Standards: At present, there are environmental standards in operation in Bangladesh also promulgated under the Environment Conservation Rules of 1997. There are standards prescribed for varying water sources, ambient air, noise, odor, industrial effluent and emission discharges, vehicular emissions, etc. The standards, commonly known as Environmental Quality Standards (EQS), are legally binding. The Bangladesh standards for ambient air, noise, odor, sewage, industrial effluent, and emission are furnished here. These are all in an authentic translation from original Bengali, citing the specific source (Table 6, Table 7, Table 8, Table 9).

Table 6: National Standard for Inland Surface Water

Best Practice-Based Classification	pH	BOD (mg/l)	DO (mg/l)	Total Coliform Number/100
a. Source of drinking water for supply only after disinfecting	6.5-8.5	2 or less	6 or above	50 or less
b. Water usable for recreational activity	6.5–8.5	3 or less	5 of more	200 or less

Best Practice-Based Classification	pH	BOD (mg/l)	DO (mg/l)	Total Coliform Number/100
c. Source of drinking water for supply after conventional treatment	6.5–8.5	6 or less	6 or more	5,000 or less
d. Water usable by fisheries	6.5–8.5	6 or less	5 or more	---
e. Water usable by various process and cooling industries	6.5–8.5	10 or less	5 or more	5,000 or less
f. Water usable for irrigation	6.5–8.5	10 or less	5 or more	1,000 or less

97. Source: Department of Environment (DoE)

98. Notes:

(i) In water used for pisciculture, maximum limit of presence of ammonia as Nitrogen is 1.2 mg/l.

(ii) Electrical conductivity for irrigation water – 2250 µmhoms/cm (at a temperature of 25°C); sodium less than 26%; boron less than 0.2%.

Table 7: National Standard of Drinking Water

Parameter	Unit	Standards	Parameter	Unit	Standards
1. Aluminium	mg/l	0.2	26. Hardness (as CaCO3)	mg/l	200 – 500
2. Ammonia (NH3)	mg/l	0.5	27. Iron	mg/l	0.3 – 1.0
3. Arsenic	mg/l	0.05	28. Kjeldahl nitrogen (total)	mg/l	1
4. Barium	mg/l	0.01	29. Lead	mg/l	0.05
5. Benzene	mg/l	0.01	30. Magnesium	mg/l	30 – 35
6. BOD5 20°C	mg/l	0.2	31. Manganese	mg/l	0.1
7. Boron	mg/	1.0	32. Mercury	mg/l	0.001
8. Cadmium	mg/l	0.005	31. Manganese	mg/l	0.1
9. Calcium	mg/l	75	32. Mercury	mg/l	0.001
10. Chloride	mg/l	150 – 600*	33. Nickel	mg/l	0.1
11. Chlorinated alkanes			34. Nitrate	mg/l	10
Carbon tetrachloride	mg/l	0.01	35. Nitrite	mg/l	<1
1.1 dichloroethylene	mg/l	0.001	36. Odor	mg/l	Odorless
1.2 dichloroethylene	mg/l	0.03	37. Oil and grease	mg/l	0.01
tetrachloroethylene		0.03	38. pH	--	6.5 – 8.5
trichloroethylene		0.09	39. Phenolic compounds	mg/l	0.002
12. Chlorinated phenols			40. Phosphate	mg/l	6
pentachlorophenol	mg/l	0.03	41. Phosphorus	mg/l	0
2.4.6	mg/l	0.03	42. Potassium	mg/l	12

Parameter	Unit	Standards	Parameter	Unit	Standards
trichlorophenol					
13. Chlorine (residual)	mg/l	0.2	43. Radioactive materials (gross alpha activity)	Bq/l	0.01
14. Chloroform	mg/l	0.09	44. Radioactive materials (gross beta activity)	Bq/l	0.1
15.Chromium (hexavalent)	mg/l	0.05	45. Selenium	mg/l	0.01
16. Chromium (total)	mg/l	0.05	46. Silver	mg/l	0.02
17. COD	mg/l	,, 4	47. Sodium	mg/l	200
18. Coliform (faecal)	n/100 ml	0	48. Suspended particulate matters	mg/l	10
19. Coliform (total)	n/100 ml	0	49. Sulphide	mg/l	0
20. Color	Hazen unit	15	50. Sulphate	mg/l	400
21. Copper	mg/l	1	51. Total dissolved solids	mg/l	1,000
22. Cyanide	Mg/l	0.1	52. Temperature	℃	20-30
23. Detergents	mg/l	0.2	53. Tin	mg/l	2
24. DO	mg/l	6	54. Turbidity	NTU	102
25. Fluoride	mg/l	1	55. Zinc	mg/l	5

[2] The FS advises producing treated water that conforms to WHO guidelines and Bangladesh drinking water quality ECR 1997. One of the two most important parameters reduced by the WTP is turbidity (the other is microbiological matter, by providing a multi-stage barrier). In Section 10.3, the FS quotes WHO and Bangladesh standards of 10 and 5 NTU respectively. We recommend that the turbidity in the treated water leaving the WTP should never exceed 1.0 NTU and that the operational guideline should be set at 0.5 NTU, to be achieved 95% of the time. The design of the process units and their controls should accommodate these recommendations. Operational procedures must be devised to achieve these recommendations. Computerized monitoring equipment must be provided and staff trained in its use to display real-time trends and record events. Laboratory staff must monitor, record, and report treated water quality parameters to review past trends and predict operational changes, if required.

SUMMARY OF SELECTED INTERNATIONAL WATER QUALITY STANDARD AND GUIDELINE

Table 8: Selected drinking water quality guideline

WHO Categories	Parameters	Units	Bangladesh	WHO, 1993	EU, 1993	US-EPA
Bacteriological quality	Total coliforms Total coliforms	Counts/100 ml Number of samples/months	0	0	0 (i)	5%
	Faecal coliforms	n/100ml	0			
Inorganic Chemicals (of health significance)	Arsenic	mg/l	0.05	0.01(p)	0.01(c)	0.05
	Barium	mg/l	0.01	0.7		2
	Boron	mg/l	1	0.5 (p)	1 (c)	
	Cadmium	mg/l	0.005	0.003	0.005(c)	0.005
	Chromium	mg/l	0.05 (hexa) 0.05 (Total)	0.05(p)	0.05 (c)	0.1
	Copper	mg/l	1	2 (p)	2 (c)	1.3 (r:1.0)
	Cyanide	mg/l	0.1	0.07	0.05 (c)	0.2
	Fluoride	mg/l	1	1.5	1.5 (c)	4.0(r: 2.0)
	lead	mg/l	0.05	0.01	0.01 (c)	0.015
	Nickel	mg/l	0.1	0.02	0.02 (c)	
	Nitrate-NO3	mg/l	10	50	50 (c)	10
	Nitrite-NO2	mg/l	<1	3	0.5 (c)	1
	Manganese	mg/l	0.1	0.5 (p)	0.05 (l)	0.05 (r)
	Mercury	mg/l	0.001	0.001	0.001 (c)	0.002
	Selenium	mg/l	0.01	0.01	0.01(c)	0.05
Pesticides	Dieldrin	µg/l		0.03	0.03 (c)	
	Atrazine	µg/l		2	0.03 (c)	3
	DDT	µg/l		2	0.1 (c)	
	Gamma-HCH(Lindane)	µg/l		2	0.1 (c)	0.2
	Permethrin	µg/l		20	0.1 (c)	
	Pesticides total	µg/l			0.5 (c)	
Disinfectants and disinfectant by-products	Chlorine	mg/l		5		
Radioactive constituents	Gross Alpha activity Gross Beta activity	Bq/litre Bq/litre	0.01 0.1	0.1 1		
Aesthetic guidelines	Turbidity	NTU	10	5 (a)		
	Aluminium	mg/l	0.2	0.2 (a)	0.2 (i)	0.05-0.2(r)
	Ammonia - N	mg/l	0.5	1.5 (a)	0.5 (i)	
	Chloride	mg/l	150-600	250 (a)	250 (i)	250 (r)
	Copper	mg/l	1	1		
	Hydrogen sulphide - H2S	mg/l		0.05(a)		
	Iron	mg/l	0.3-1	0.3(a)	0.2 (i)	0.3 (r)
	Manganese	mg/l	0.1	0.1	0.05 (i)	0.05 (r)
	Dissolved Oxygen	mg/l	6		>5 (i)	

WHO Categories	Parameters	Units	Bangladesh	WHO, 1993	EU, 1993	US-EPA
	pH		6.5-8.5	<8 (a)	6.9-9.5(i)	6.5-8.5 (r)
	Sodium	mg/l	200	200 (a)	200 (i)	
	Sulphate	mg/l	400	250 (a)	250 (i)	250 (r)
	Sulphides	mg/l	0		0.05(i)	
	Total dissolved solids	mg/l	1000	1000		500 (r)
	Electrical conductivity	µS/cm			2500 (i)	
	Zinc	mg/l	5	3 (a)		
	Residual chlorine	mg/l	0.2	0.6-1		
	Ca	mg/l	75			
	Detergent	mg/l	0.2			
	Magnesium	mg/l	30-35			
	Odor	mg/l	Odorless			
	Oil and grease	mg/l	0.1			
	Phenolic compound	mg/l	0.002			
	Colour	Hazen unit	15			
	Phosphate	mg/l	6			
	Phosphorus	mg/l	0			
	Potassium	mg/l	12			
	Temp.	OC	20-30			
	Tin	mg/l	2			
	Silver	mg/l	0.02			
	Suspended particular matter	mg/l	10			
	Hardness as CaCO3	mg/l	200-500			
	Kjeldhl Nitrogen total	mg/l	1			
	BOD5at 20 OC	mg/l	0.2			
	COD	mg/l	4			
	Benzene	mg/l	0.01			

Source: EU, 1998. Drinking water standards (EU Directive 98/83/EC). (i) Indicator parameter; (c) chemical parameter

US-EPA, 1974. Safe Drinking Water Act (SDWA), plus subsequent amendments. Maximum Contaminant Level (MCL) values (health, enforceable);

(r) Secondary Drinking Water Regulations (aesthetically recommended, but nonenforceable)

WHO, 1993. Guidelines for Drinking Water Quality. Second edition. (p) Provisional guideline value; (a) aesthetic guideline.

Table 9: Government, Laws, Regulations, Environmental Standards & ADB Requirement

Laws, Regulations, and Standards	Details	Relevance	Applicable permit/clearance required
Environment Conservation Act, 1995	Provides for the conservation of the environment, improvement of environmental standards and control and mitigation of environmental pollution. In line with these provisions of the Act, the Environment Conservation Rules, 1997 have been framed. This Act provides for (i) remedial measures for injury to ecosystem; (ii) provides for any affected person due to environmental pollution to apply to DOE for remediation of the damage; (iii) discharge of excessive environmental pollutants; (iv) inspection of any activity for testing any equipment or plant for compliance to the environment act, including power to take samples for compliance; (v) power to make rules and standards with reference to environment; and (vi) penalty for non-conformance to environment act under the various sections.	The provisions of the act apply to the entire Project interventions in the construction and operation stages.	DoE provides clearance
Environment Conservation Rules (ECR), 1997	The Rules outline the processes and requirements of environmental clearances for specific type of projects indicated therein and stipulates that "no industrial unit or project shall be established or undertaken without obtaining, in the manner prescribed by rules, an Environmental Clearance Certificate (ECC) from the Director General" of the Department of the Environment. Schedule 1 of the Rules classifies industrial units and projects into four categories according to their site and impact on the environment, namely (i) green, (ii) orange-A, (iii) orange–B, and (iv) red. The Rules specify the procedures for issuing ECC for the various categories of projects. For Red Category: (i) completed application for ECC, and the appropriate fee; (ii) report on the feasibility of the project; (iii) report on the IEE for the project, and Terms of Reference for the EIA; or EIA report prepared on the basis of TOR previously approved by DOE (Appendix 2), plus (in the case of an industrial project): layout plan showing location of ETP, process flow diagram, design and time schedule of the ETP; (iv) report on the EMP; (v) no objection certificate from the local authority; (vi) emergency plan relating to adverse environmental impact and plan for mitigation of the effect of pollution; and (vii) outline of the relocation and rehabilitation plan (where applicable).	The project activities are categorized under this rule and as per categorization required environmental assessments were done	NOC
Environment Court Act, 2000	Enacted to establish Environment Courts and make rules for the protection of environmental pollution. Environment Courts are situated at the District-level but Government may by notification in the official Gazette, establish such courts outside the districts. Environment Courts were given power to directly take into cognizance any offense relating to environmental pollution. Proceeding of Environmental Courts will be similar to Criminal Courts. One important feature of this Act is that it has been given the retrospective effect of any crime	The Court has jurisdiction over, in accordance with the Act provisions, the trial of an offense or for compensation under an environmental law, imposing	Not applicable

Laws, Regulations, and Standards	Details	Relevance	Applicable permit/clearance required
	committed under environmental laws and thus any crime previously committed but is not taken before any court can be taken before the Environment Court or any special Magistrate.	penalties for violation etc.	
National Policy for Arsenic Mitigation, 2004	Provides a framework for the provision of water supply for areas/aquifers with high arsenic levels. Roles for agencies are specified for development of water supply systems, certification of arsenic removal technology, and disposal of treatment sludge. Arsenic-prone area also identified.	Considered in design and project preparation. Water supply is considered under this policy.	Not applicable
Pourashava Ordinance (Second Amendments) 1988; Municipal Administration Ordinance 1960	These ordinances have clearly assigned responsibilities to the LGIs to ensure urban health for their residents. It has given them the mandate to ensure and provide a wide range of primary and public health services including primary health care, sanitation, water supply, drainage, food and drink, birth and death registration, vector and infectious disease control, etc. As independent autonomous bodies, the LGIs, as necessary, may take all required actions to ensure good health for tourist and concerned population within its jurisdiction. They have the authority to address all related issues with their legal and administrative mandate.	The Project integrated community and workers health and hygiene at the construction stage, and this will be taken forward during the operation and maintenance of the infrastructure facilities for tourists, local community and other concerned peoples.	NOC
National Forestry Policy, 1994	Rules related to forest protection, often a domain of environmental management, are found in the Policy. Due to the death of forests, afforestation is actively pursued with targets to "implement programs of tree plantation and afforestation on fallow and hinterland, the bank of the pond and homestead land, which are under private ownership."	It is desirable to incorporate tree planting in the Project (Where it is practical).	Not applicable, project not in forest area
Bangladesh Labor Act, 2006	The Act provides the guidance on employer's extent of responsibility and workers' extent of rights to compensation in case of injury by accident while working.	Provides for the safety of workforce during the construction period.	NOC
National Water Policy, 1999	The Policy explicitly states 6 main objectives: (i) address the use and development of groundwater and surface water in an efficient and equitable way; (ii) ensure the availability of water to all parts of the society; (iii) accelerate the development of public and private water systems through legal and financial measures and incentives, including appropriate water rights and water pricing rules; (iv) formulate institutional changes, encouraging decentralization and enhancing the role of women in water management; and (v) provide a legal and regulatory framework that encourages decentralization, consideration of environmental impacts, and private sector investment.	Water supply should be under this consideration	NOC, water allocation permit

Laws, Regulations, and Standards	Details	Relevance	Applicable permit/clearance required
Bangladesh Standard Specification for Drinking Water, 1990	Formulation and revision of national standards. Now it is incorporated into the schedule of ECR 1997	Water supply should be under this consideration	NOC
National Agriculture Policy, 1999	The act deals with the programs related to make the nation self-sufficient in food through increasing production of all crops, including cereals, and ensure a dependable food security system for all	Ministry of Agriculture	Not applicable
The National Water Policy, 1999	Protection, restoration and enhancement of water resources;	Ministry of Resources	NOC
National Biodiversity Strategy and Action Plan (2004)	Conserve, and restore the biodiversity of the country for well-being of the present and future generations; Maintain and to improve environmental stability for ecosystems; Ensure preservation of the unique biological heritage of the nation for the benefit of the present and future generations; Guarantee the safe passage and conservation of globally endangered migratory species, especially birds and mammals in the country; and Stop introduction of invasive alien species, genetically modified organisms and living modified organisms.	Ministry of Environment and Forest Bangladesh Wild Life Advisory Board	NOC
The Protection and conservation of Fish Act 1950 subsequent amendments in 1982	Deals with the protection/conservation of fishes in Government owned water bodies	Department of Fisheries	NOC
The embankment and Drainage Act 1952	Describe the protection of embankment and drainage facilities	Ministry of Water Resources	NOC
Inspection and Enforcement Manual 2008	This manual has been written to provide national standard and uniformity environmental sampling for the inspections, investigations in the Department of Environment (DOE) in Bangladesh.	Will be considered at the time of environmental monitoring during the implementation of EMP	NOC
Acquisition and Requisition of Immovable Properties Ordinance 1982	The government made rules in the exercise of the powers conferred upon by section 46 of the acquisition and requisition of the immovable property ordinance, 1982 (Ordinance No. II of 1982). ARIPO sets the Government rules and regulations governing all cases of land acquisition.	If any acquisition is required, this will be considered	NOC

EIA = Environmental Impact Assessment, EMP =Environmental Management Plan, ETP = effluent treatment plant, IEE = Initial Environmental Examination, km = kilometer, LGI = Local Government Institution, TOR = terms of reference.

VI. DESCRIPTION OF THE PROJECT

A. Existing Water Supply Situation and Need for the Project

99. At present DWASA provides around 2400 MLD 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.

100. The proposed other Packages are: P1 and P2 project intends to withdraw up to 1,050 MLD from Meghna River in two phases for transmission to Dhaka city and for distribution after treatment. The project consists of the following components:

(i) Construction of an intake at the village of Bishnondi from the Meghna River, with pumping and other facilities to deliver an uninterrupted supply of water into the transmission mains;
(ii) Construction of raw water transmission pipelines connecting the raw water intake with the Gandharbpur water treatment plant (WTP);
(iii) Construction of a 500-MLD surface water treatment plant at Gandharbpur; and
(iv) Construction of treated water transmission mains from the Gandharbpur treatment plant to the injection point connecting with the distribution system inside Dhaka.

101. However, this IEE deals with P.1 which includes the raw water intake at Megna River (Bishnondi), the raw water pipelines and the water treatment plant at Gandharbpur.

B. Project Area

102. This Updated IEE under package-1 of DESWSP includes the following items.

103. Package-1: Raw water intake at the Meghna river with structure with 1050 MLD capacity + 22 km Raw water pipeline + WTP at Gandharbpur (WASA Land) having capacity 500 MLD.

104. The project spread east-west through Araihazar and Rupganj Upazilla of Narayanganj District in Bangladesh. At the east end of the project, the intake is on the bank of Meghna River at Bishnanadi Union (adjacent GPS: N 23° 44' 45.821", E 90° 42' 45.186"), which is about 2km downstream (south) of Manikpur Ferry Ghat/crossing (Figure 1). The proposed pipelines and road are mostly through agricultural land and the pipeline will cross at Shezan Point at Dhaka-Sylhet Highway. West end of the Package-1, the Water Treatment Plant is located at Gandharbpur village of Murapara Union of Rupganj Upazilla (GPS: N 23° 45' 32.422", E 90° 30' 50.119").

Area:

105. A total of 197-acre land acquired for this part of the project. More information in detailed is provided in Table 10. The land area required for the WTP site was acquired by DWASA long ago, and hence, no new land acquisition for WTP is required.

Table 10: Land Acquisition Requirements

Sl.	Location	Length (km)	Width (m)	Land Area (Acres)
1	Shomvupura & Chetia mouja of Bishnandi Union at Araihazar Upazilla on the bank of Meghna river	-	-	21
2	From Meghna Bishnandi to Dhaka-Sylhet roads Shezan Juice point (Vulta union, Golakanda Mouja)	17.50	31.0	148
3	Shejan Juice points to Gandharbpur WTP	4.50	25.0	28
Total:				197

C. Project Components

106. The overall Gandharbpur project has four construction contracts. One of there is Package 1, a Design, Build, Operate contract with 3 components (Table 11).

Figure 1: Transmission line – intake to Dhaka-Sylhet highway junction

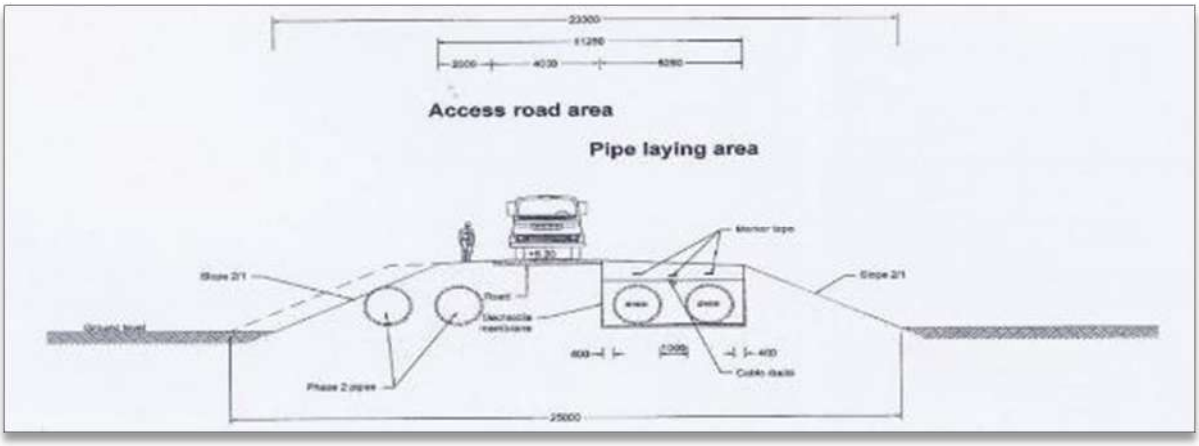


Table 11: Package 1 components

Component	Component name	Infrastructure
1	Water treatment plant at Gandharbpur	Capacity: 500 MLD at Gandharbpur
2	Intake structures at Meghna River	Capacity: 1,050 MLD Pump Station Capacity: 525 MLD
3	Raw water Transmission main from Intake to Gandharbpur WTP	17.2 km: Intake to Shezan Juice Factory 4.5 km: Shezan Juice Factory to Gandharbpur WTP

Water Treatment Plant at Gandharbpur

107. The 30.35-hectare (ha) site at Gandharbpur will accommodate the phase 1, 500 MLD facility as well as Gandharbpur 2, doubling the total capacity to 1,000 MLD for Gandharbpur 1 and Gandharbpur 2. The plant will be designed for a continuous output of 500 MLD. The treatment plant will include pre-chlorination, coagulation, flocculation, sedimentation, filtration, PPTA, and the 20-m width was found inadequate for construction purposes. Post-chlorination facilities. Recirculation of backwash water and dewatering of sludge are included. The following main components are proposed:

(i) Pre-chlorine, aluminum sulphate, lime, and polyelectrolyte dosing facilities for treatment;
(ii) Three lines of two rapid mixing chambers in series, each equipped with a mechanical rapid mixer;
(iii) Three lines of 2 x 2 flocculation chambers in series, each tank equipped with one mechanical flocculation;

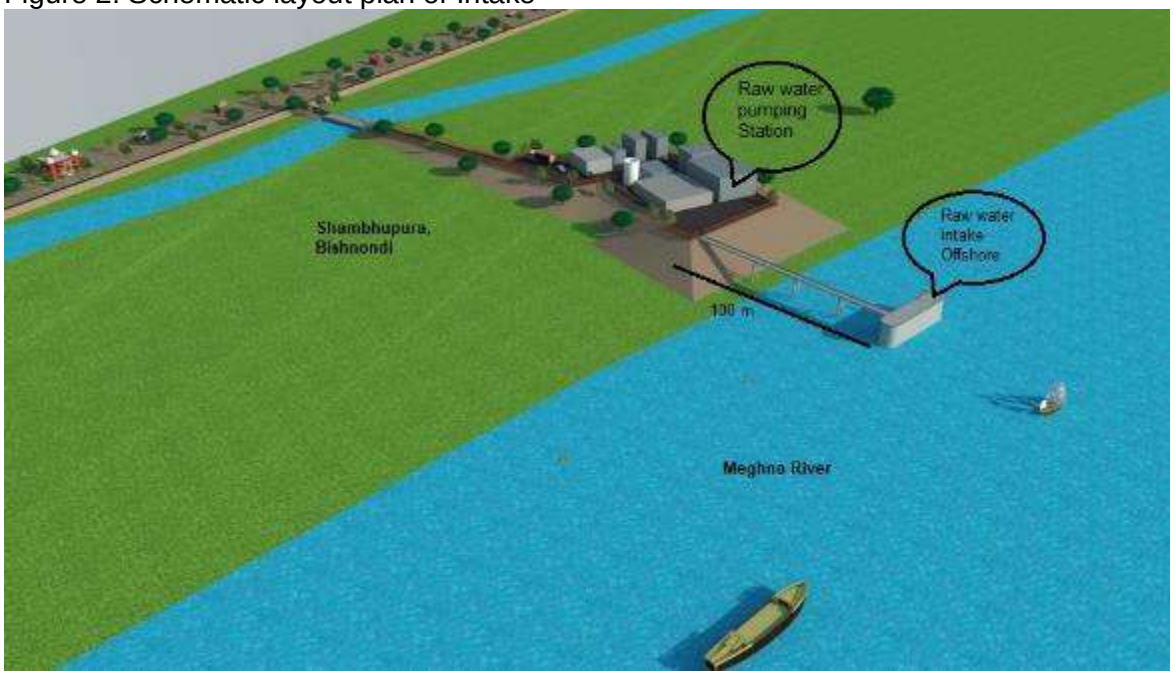
(iv) Three lines of two plate settlers in parallel, each settler equipped with a scraper and desludging valves;
(v) Three lines of eight rapid sand filtration units in parallel of the deep sand bed type, including air and water backwash facilities and a backwash water storage tank;
(vi) Post-chlorination and lime solution dosing facilities;
(vii) Three contact time reservoirs in parallel;
(viii) Two common storage reservoirs in parallel; and
(ix) One treated water pumping station.

108. There will also be a storage tank and pumping facilities for backwash water before recycling. Backwash water will be pumped through the process after temporary storage for flow equalization. Sludge from the sedimentation, after preliminary thickening in the sedimentation tanks themselves, will be pumped to sludge-drying beds for final disposal (Figure 5).

Intake Structure

109. The intake structure has been designed for the full design capacity of 1,050 MLD in the year 2030. The intake structure 100 m away from shore will receive raw water from the Meghna River, and the water will flow by gravity to the pump in the pumping station, located near the riverbank. The intake structure and the pump station shall be designed for the 100-year flood level and 50-year low levels in Meghna River. The intake structure serves as a pre-sedimentation chamber to settle larger particles. A pre-chlorination facility is also included in order to avoid organic growth in the transmission line. Coarse/Rough and fine screens will be included in the intake structure and at the inlet to the pump sump for removing coarse and fine suspended materials.

Figure 2: Schematic layout plan of Intake



Intake building (Pumping Station)

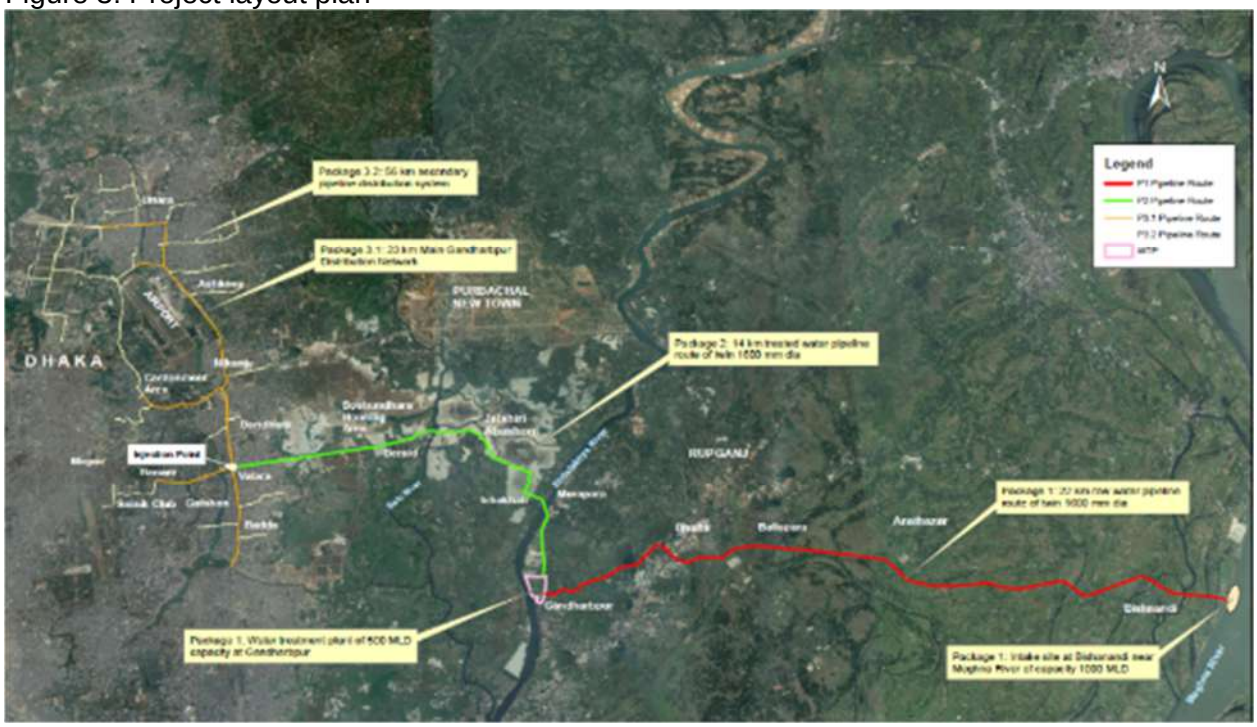
110. The pumping station structure will design for full capacity in the year 2030. The pumps will draw water from the pump sump (pre-sedimentation chamber), supplied by gravity through the intake channel from Meghna River. The pumping station includes a power supply and

necessary controls.

Transmission Mains

111. The proposed system will consist of one raw water transmission pipe (1,600 mm x 2) to convey 500 MLD to Gandharbpur WTP. The raw water pipe include will include two pipes of 1,600 mm each for a 17.2-km stretch from intake to Shezan juice factory on the Dhaka-Sylhet Highway. A 31 -m wide corridor is being acquired under the project, to accommodate a future total of four pipes and an access road (6.5 m-wide carriageway with 2 m-wide shoulders on either side) during construction and maintenance. Figure 3 & Figure 4 show the schematic of project components intake, treatment plant and raw water. Then it goes on for a length of 4.5 km from Shezan juice factory to the Gandharbpur WTP, to be accommodated within a 25 m-wide corridor through agricultural lands and open areas.

Figure 3: Project layout plan



112. Intake to Shezan juice factory on Dhaka-Sylhet Highway: This section of the transmission lines is a green field alignment for a length of 17.2 km through agricultural fields and open areas. One pipe with a diameter of 1,600 mm is proposed to be accommodated within the 31-m width of land to be acquired for the length of this corridor, to accommodate pipes and access road. While one pipe of 1,600 mm is proposed to be laid as part of the present project, the remaining pipe (s) will be laid at a subsequent phase. The transmission mains would require a width of 16 m, while construction of an access road (to transport pipes during construction, as well as excavated soil and bedding materials) would require 15 m. To minimize land take, sheet piling on the edges of the corridor is proposed. The road will provide continued access to the transmission mains during the project and allow access to the site during the laying of the pipes at a later phase.

113. Shezan Juice factory to Gandharbpur WTP: The transmission line along this 4.5-km stretch from Shezan to Gandharbpur WTP is proposed through agricultural fields and open areas. One pipe with a diameter of 1,600 mm is proposed to be accommodated within the 25-m width of land to be acquired. While one pipe of 1,600 mm is to be laid under the project, road reserve to accommodate an additional pipe is being secured for utilization at a later phase Table 12. & Figure 4.

Figure 4: Schematic project layout plan

Figure 5: Schematic project layout plan of WTP

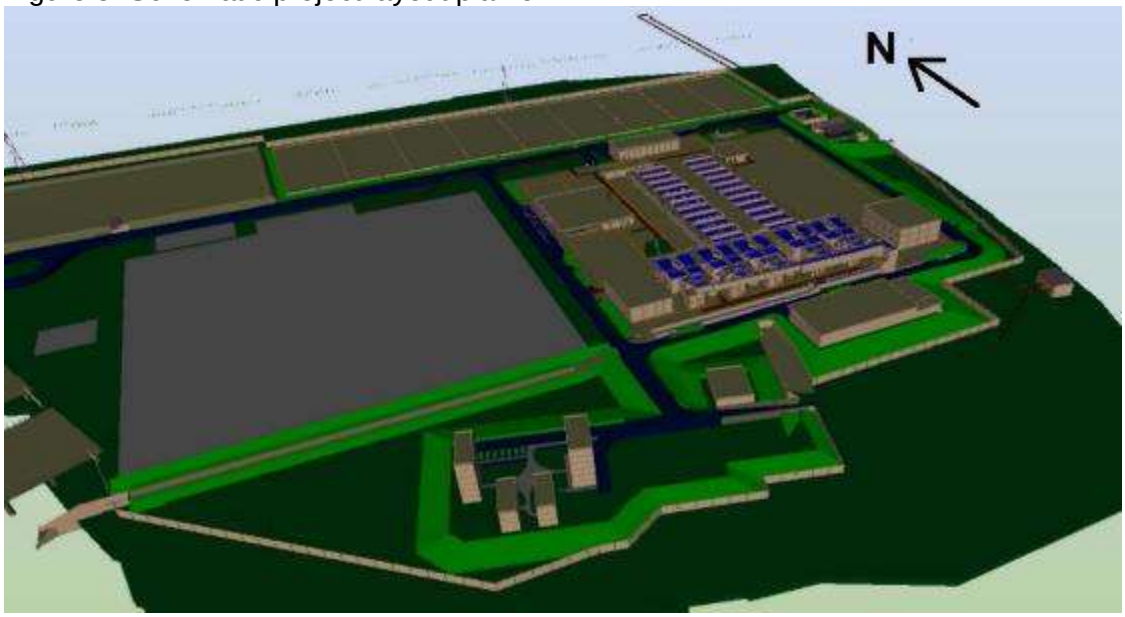


Table 12: Package 1 components

Zone	Name	Population	%	Amount, MLD
04	Mirpur	537,300	36%	178
05	Gulshan	253,050	17%	84

Zone	Name	Population	%	Amount, MLD
08	Badda	536,621	36%	178
09	Uttara	179,907	12%	60
Total		1,506,878	100%	500

D. Project Goals and Objectives

114. The objectives of the Dhaka Environmentally Sustainable Water Supply Project (DESWSP) Phase 1 are to:

115. Design and build modern, reliable WTP facilities to provide 500MLD of treated water.

116. Further to note, construct a 14km treated water transmission pipeline from the Gandharbpur WTP to the injection point of the existing distribution network (Package 2), and implement distribution reinforcements (Package 3.1, and package 3.2).

117. This IEE is concerned with the Package 1.

E. Field Description

118. The following Table 13 presents site description with corresponding photograph.

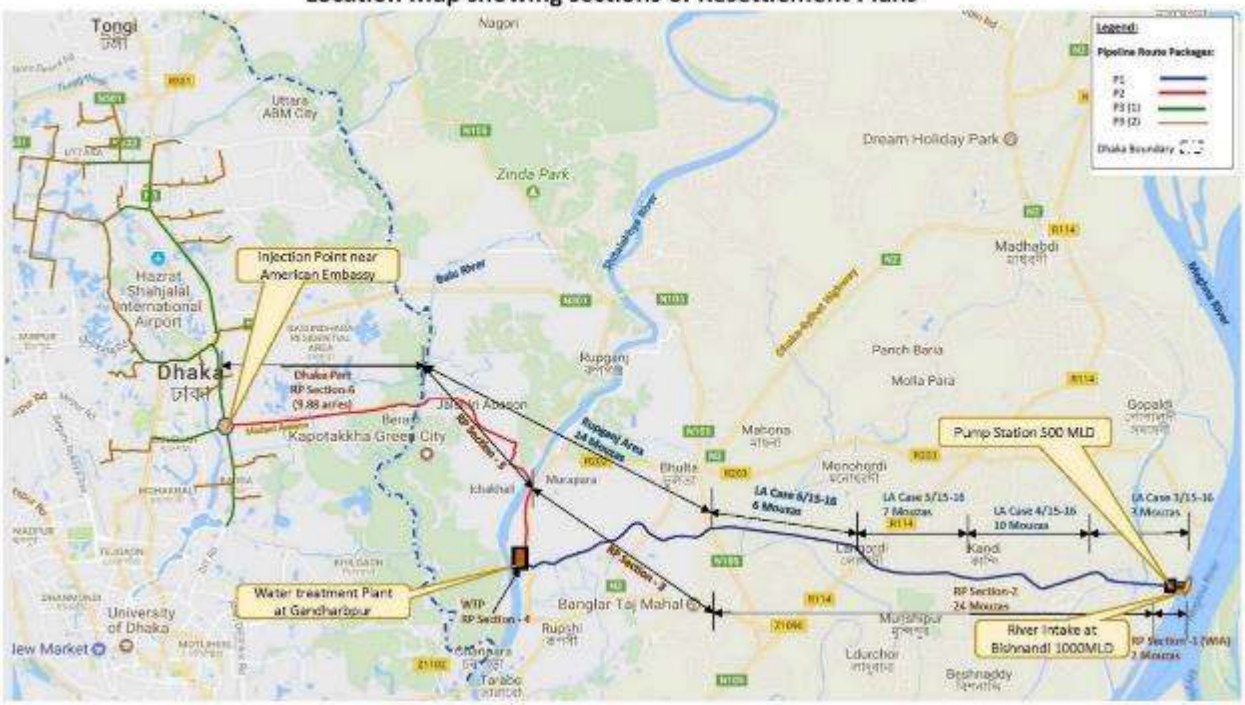
Table 13: Field Description P1 and WTP

1. WTP and Surroundings

Item	Photograph	Description
		Location: The construction of a 500-MLD surface water treatment plant is proposed at Gandharbpur, eastern side of Shitalakhya River. This WTP will be constructed in an area of 81 acres. The raw water pipes will join to the south-eastern part of the WTP. (Figure 5 Layout Plan of Water Treatment Plant at Gandharbpur, Murapara). Likewise, the construction of treated water transmission mains will exit from north-eastern part from the Gandharbpur treatment plant to the injection point connecting with the distribution system inside Dhaka (P3.1 and P3.2). The WTP is the official property of DWASA, currently used for vegetation cultivation by farmers. The environmental team reviewed the landscape in terms of surrounding areas. The WTP is located at a medium town with human settlements in leaner form exists along the north-south direction at the eastern part of WTP. The area shows already human impact. No impact on fauna and flora is expected. Environmental impacts refer to the construction phase and can be mitigated. (Figure 6: DESWSP Resettlement Plan)

Figure 6: Schematic project layout plan

Location Map showing sections of Resettlement Plans



F. Implementation Schedule

119. The implementation schedule of Package 1 is from mid-March 2019 to January 2022.

VII. DESCRIPTION OF THE ENVIRONMENT

A. Physical Resources in Project Area

120. As part of the IEE of the Package 1 (P1) project, an environmental baseline survey has been carried out in areas surrounding the project site. The specific objectives of the baseline study were to gather information on the existing physical environment, biological-ecological environment and socio-economic environment of the areas in and around the project site to gather and assess peoples' perception on different aspects of the proposed project in and around the project area. The baseline survey report provides a detailed description of the existing conditions of physical, biological as well as the socio-economic environment in and around the project area.

121. This Chapter describes the existing physical environment of areas in and around the project site based on the baseline survey and other studies carried out as a part of the present study. Relevant information on climate, topography and drainage, geology and soils, hydrology and water resources, air quality, noise level, and water quality have been described in this Chapter.

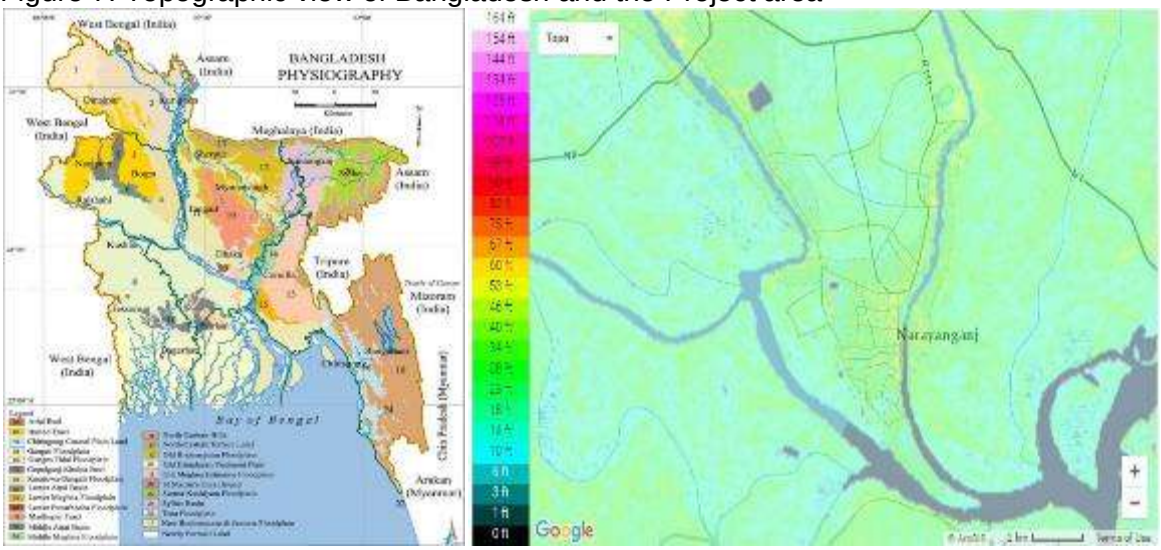
Topography

122. Dhaka and surrounding region are low-lying with elevations varying from +4m in the south to +18m in the north (PWD). Nearly 80 percent of the region is alluvial in origin and much of the remainder lying within the slightly uplifted Madhupur Tract (some 240,000ha) is also depositional in origin. The older Madhupur alluvium originated during a previous geological era. Much of the alluvium is unconsolidated, or poorly consolidated, and comprises poorly-cohesive particles. Thus, the landscape as a whole is easily erodible, and can be readily displaced, transported and otherwise re-arranged by the normal fluvial processes of the country.

123. The terraces are surrounded by the Ganges-Meghna floodplain in the south, the old Brahmaputra floodplain in the east, and the Jamuna floodplain in the west. The topographic elevation in the project area is reflected in specific landforms as highlands, lowlands, depressions, and abandoned channels. Around the outskirts of Dhaka, the rivers Buriganga, Turag, and Balu drain a complex of low areas, which are a system of low-lying alluvial plains. The average elevation here is less than 2 m above mean sea level. Broad streams cut through the central high area and fall into this unit. The broad streams are locally known as khals, and the broad depressions are called beels.

124. The project area is spread over the Madhupur tract and old Brahmaputra Flood plain. Figure 7 shows the topographic view of Bangladesh and the project area.

Figure 7: Topographic view of Bangladesh and the Project area



Project Location

125. The package 1 of the project is raw water intake at the Meghna River with structure with 2000 MLD capacity along with 22 km raw water pipeline and new WTP at Gandharbpur having capacity 500 MLD. The project location is shown in the following Figure 8: Project location showing intake at Bishnondi, Meghna River to Gandharbpur WTP.

Figure 8: Project location showing intake at Bishnondi, Meghna River to Gandharpur WTP

Climate

126. Bangladesh has a sub-tropical monsoon climate with more sharply defined seasons than the much of the rest of the country. The water year is defined as beginning on April and ending on March. It is divided into four more-or-less distinct seasons, corresponding to by a twice-yearly reversal of air movement over the region.

(i) Pre-monsoon : April to May
(ii) Monsoon : June to September
(iii) Post-Monsoon : October to November
(iv) Dry season : December to March.

127. For about four months in winter (December through March) air flows from the north-east, while for about four months in summer (June through September) it flows from the south-west. These airflows (monsoons) are respectively the “north-east monsoon” and the “south-west monsoon”. Agricultural activity is closely linked to the monsoon periods, rabi crops (mainly boro rice) being cultivated with irrigation during the dry north-east monsoon, while kharif crops (almost exclusively aus and aman rice) are grown during the south-west monsoon when the rainfall is abundant.

128. The first inter-monsoon reversal occurs in April-May, when the change of wind direction is from north-east to south-west via the north-west. The second occurs in October-November, when the change is from south-west to north-east via the south-east. These periods of changing wind direction correspond to the pre-monsoon and post-monsoon seasons.

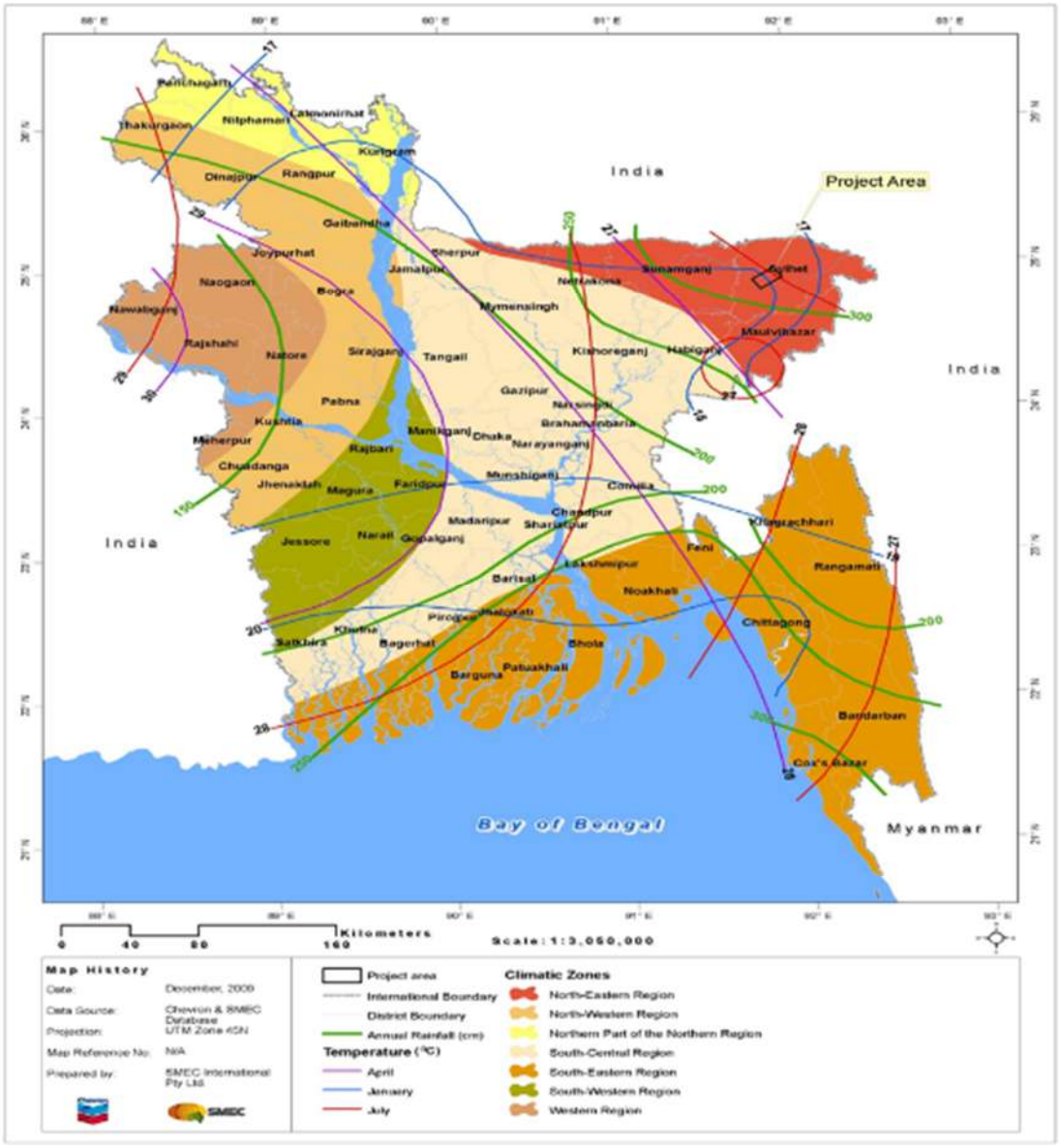
129. The pre-monsoon hot season is characterized by high temperatures and thunderstorms. April is the hottest month in the country with mean temperatures ranging from 27°C in the east and south, to 31°C in the west-central part of the country. After April, increasing cloud-cover reduces the temperature. Wind direction is variable during this season, especially during the early part. Rainfall, mostly caused by thunderstorms, at this time can account for 10 to 25 percent of the annual total.

130. Southerly or south-westerly winds, very high humidity, heavy rainfall and long periods of consecutive days of rainfall characterize the rainy season, which coincides with the summer monsoon. This is caused by the tropical depression that enters the country from the Bay of Bengal. About 80% of the annual precipitation occurs during the four months monsoon season from June to September.

131. Low temperatures, cool air blowing from the west or northwest, clear skies and low rainfall characterize the cool dry season. The average temperature in January varies from 17°C in the northwest and north-eastern parts of the country to 20°C to 21°C in the coastal areas. Minimum temperatures in the extreme northwest in late December and early January reach between 3°C to 4°C.

132. Several climatic zones occur within Bangladesh. The study area occurs within the north-central zone as illustrated in Figure 9. This region includes most of east Dhaka. Mean maximum temperature is rarely above 32°C but mean minimum is 10°C and below. Average humidity is relatively high and winter rain is minor.

Figure 9: Climatic Zones of Bangladesh



Geology

133. Dhaka is situated on the southern tip of a Pleistocene terrace, the Madhupur Tract. Two characteristic geological units cover the city and surrounding areas; the Madhupur Clay of the Pleistocene age and alluvial deposits of recent age. The Madhupur Clay is the oldest sediment exposed in and around the city area and characterized by reddish plastic clay with silt and very fine sand particles. This Madhupur Clay unconformable overlies the Dupi Tila Sand of Plio-Pleistocene age, which is composed of medium to coarse yellowish-brown sand and occasional gravel.

134. The channels and depressions within the city are floored by recent alluvial floodplain deposits and are subdivided into Lowland Alluvium and Highland Alluvium. The alluvial deposits are composed of fine sand, silt and clay in different combinations.

135. The alluvial soils of these floodplains mainly consist of ridges of loamy material like silty clays and silty sands with large areas of shallow clays in the basins. The soil pattern can become more irregular close to river channels due to more recent deposits. With regard to the youngest activities (natural as well as anthropogenic) organic soils of swamps may be

found locally as well as areas where the ground level has been raised using loose sands (hydraulic sand filling) dredged and pumped from nearby rivers.

136. This region is characterized by the following Agro-Ecological Zones:

137. AEZ 16: Middle Meghna River Floodplain.

138. AEZ 16 comprises low-lying basins with surrounding low ridges along the Meghna River banks, inter-ridge depressions, old channels and the highest sandy ridges. River bank erosion occurs locally on a small scale.

Air Quality

139. Within the P1 sites and its area of influence (Intake, raw water transmission line and WTP), there are no major industries that could be sources of significant air emissions, such that air quality is considered relatively clean. However, ambient air quality on-site investigation was carried out under the EIA Study.

140. Further, reference is made to EIA of December 2018, where, SO2, NOx CO and O3 ambient gases were collected through absorbing reagent by using attachment of high-volume sampler (Model AAS 271 mini and attachment AAS 118). The samples were analysed following colorimetric method in Enviro Quality Laboratory. CO was measured by digital CO meter. The environmental quality parameters test report is attached in (Appendix-8 of EIA Report).

141. In order to identify the baseline condition-4 major location of the projected area has selected. The monitoring locations are Chaitankanda (Bishnandi), Shejan Point, Gandharbpur, and Murapara near LGED Bridge.

Water Resources

142. The region is bounded by the River Brahmaputra-Jamuna to the west, the Padma to the south and the Old Brahmaputra-Lakhya-Meghna system to the north-east. The Brahmaputra-Jamuna River carries runoff from the Himalayan mountain chain, passing through Nepal, Bhutan, and Tibet before flowing into Bangladesh. The river has a broad braided bed with large sand shoals and islands. It is very unstable morphologically, with severe bank erosion. The mean annual peak discharge of the river, calculated from at Bahadurabad is approximately 67,000 cumecs, with the 1 in 100-year flood discharge estimated at 108,000 cumecs (m3/sec, FAP 25, 1992).

143. The river system in the Dhaka watershed includes Dhaleswari, Turag, Tongi Khal, Buriganga, Balu, Bangshi, and Shitalakhya Rivers. Dhaka is primarily surrounded by three rivers: Buriganga on the southwest, Turag in the northwest, and Balu in the northeast. The Shitalakhya River flowing by the southeastern part of Greater Dhaka is also included in the surrounding river system. More than 40 canals within the city were originally used for drainage.

144. Dhaka region is in the natural floodplain of various rivers in the area and functioned as an important breeding ground for many aquatic species in the past. This function is still evident in the seasonal flooding that affects large parts of the city. The floodplain function has been further degraded by the construction of embankments to protect the city from flooding, and particularly from infilling to reclaim land, which reduces the water retention capacity of these areas and increases flooding both upstream and downstream.

145. Most of the canals are non-functional due to disposal of solid and liquid wastes, as such,

several areas of the city have become vulnerable to water logging. All the rivers receive untreated sewage and industrial liquid wastes and municipal waste through the major canal systems, as well as from direct disposal. The surface water quality in the two river systems and other surface water bodies, e.g. khals and ponds, is quite poor with very high biological oxygen demand (BOD5), chemical oxygen demand (COD), and E-coli content, indicating discharge of untreated industrial effluents and domestic sewage. The organic pollution of the rivers is mainly caused by the poor state of sewerage and sanitation systems of the Dhaka urban area (EIA, Enviro Consultants; February 2018).

B. Ecological Resources in Project Area

Habitats

146. With the exception of the Madhupur uplands the region can be broadly described as a semi-aquatic, deltaic environment, which is regularly inundated by the rivers Meghna and the Brahmaputra. The ecology of the region involves the interaction between a large number of faunal and floral species and a range of different types of habitat. The habitat also includes both aquatic and terrestrial environment, the main types being as follows:

147. Char lands: Island chars on the Meghna and Old Brahmaputra rivers are the main feature of the braided channels. They have a unique ecosystem, with distinct successions of natural and homestead vegetation, settlement and land use patterns. They form an important habitat for birds, both local and migratory.

148. Homesteads: Throughout the P1 project area, there is a distinct habitat type, which can be found in the immediate vicinity of homesteads, comprising a managed agro-forestry and pond environment.

149. Homestead vegetation is of particular environmental importance as it provides one of the major sources of biodiversity in the extensively cultivated, lower-lying areas.

150. Homesteads are also important for providing the main environment for humans and livestock, nutritional and medicinal crops, fruit and timber producing trees. The habitat provides nesting, breeding, and feeding grounds for a host of locally important insects, birds and other fauna.

151. Wetlands: Wetlands in the region comprise natural and man-made water bodies. The natural system includes different aquatic environments and ecologies, which cover perennial and seasonal drains river channels, beels, khals, and floodplains. The man-made areas are composed of borrow pits, ponds and impeded drainage areas on low lying ground. Wetlands are rich in aquatic seasonal flora and fauna. They contain important habitats for fish and migratory birds. Fish species include rui, katal, thai puti, minar carp, silver carp, pabda, sheatfish. None of these species are listed in IUCN Red List.

152. Terrestrial: Terrestrial flora is classified according to their habitats. In the study areas, terrestrial floras are present mainly in the homestead regions, roadsides, village groves and cultivated lands. Homesteads and orchards include: betel nut, kadam, coconut, date palm, sofeda, mango, jackfruit, guava, grapefruit, pomelo, lemon, blackberries, plum, toddy palm, koroi, shisoo, shirish, rain tree, evcaiytta, bamboo, babla, jeol, neem, tamarind, banana, ipil-ipil, papaya, mehgani, debdaru, shimul, akashmoni, khai babla, jamrul, chalta, bel, amra, amloki, segun, etc. Roadside plantations include: datepalm, road chambol, koroi, rain tree, banyan, shisoo, babla, akashmoni, eucalyptus, mango, blackberries, raj koroi, etc.

C. Economic Development

Demography

153. Population of Araihazar Upazila: Total 331566; male 171482, female 160084; Muslim 319854, Hindu 116553, Buddhist 22, Christian 28 and others 9.

154. Population of Rupganj Upazila: Total 403629; male 215019, female 188610; Muslim 379879, Hindu 23466, Buddhist 106, Christian 59 and others 119.

155. Administration of Araihazar Thana was formed in 1921 and it was turned into an Upazila in 1983. Administration of Rupganj Thana was turned into an Upazila in 1983.

156. The proposed pipelines and road are mostly through agricultural land. West end of the project, the Water Treatment Plant is located at Gandhrabpur village of Murapara Union of Rupganj Upazilla (GPS: N 23° 45' 32.422", E 90° 30' 50.119").

157. Araihazar Upazila (Narayanganj district): area 183.35 sq. km, located in between 23°40´ and 23°53´ north latitudes and in between 90°35´ and 90°45´ east longitudes. It is bounded by Narsingdi Sadar Upazila on the north, Homna Upazila on the south, Banchharampur Upazila on the east and Rupganj and Sonargaon Upazilas on the west.

158. Rupganj Upazila (Narayanganj district): area 176.16 sq. km, located in between 23°42´ and 23°54´ north latitudes and in between 90°28´ and 90°37´ east longitudes. It is bounded by Kaliganj (gazipur) and Palash Upazilas on the north, Sonargaon Upazila on the South, Araihazar and Narsingdi Sadar Upazilas on the east, Demra, Khilgaon, Badda and Khilkhet Thanas on the West.

Economic Activity

159. Main sources of income of Araihazar: Agriculture 28.48%, non-agricultural labourer 8.29%, commerce 20.19%, transport and communication 4.84%, industry 15.13%, service 5.96%, construction 1.40%, religious service 0.26%, rent and remittance 3.44% and others 12.01%. Main crops are paddy, jute, wheat, potato, mustard seed, and vegetables. Ownership of agricultural land of Araihazar: Landowner 50.89%, landless 49.11%; agricultural landowner: urban 54.11% and rural 50.76%.

160. Main sources of income of Rupganj: Agriculture 22.72%, non-agricultural laborer 3.14%, industry 9.19%, commerce 21%, transport and communication 6.58%, service 19.75%, construction 1.98%, religious service 0.18%, rent and remittance 3% and others 12.46%. Main crops are paddy, jute, wheat, sugarcane, mustard, vegetables.

161. Ownership of agricultural land of Rupganj: Landowner 44.07%, landless 55.93%; agricultural landowner: urban 46.97% and rural 43.44%, (Source: Banglapedia, Census and Upazila).

VIII. SOCIO CULTURAL RESOURCES

162. The archaeological heritage and relics at Araihazar include that, the two-storied building with 108 rooms (Sadasardi), mazars of Hazrat Garibullah Shah (R) and Jangali Shah (R) at Haizadi, colored glass decorated Durga Mandir, house of Zamindar Birendra Roy Chowdhury, Dighipar Math (Araihazar), single-domed Jami Mosque (Uchitpur).

163. Archaeological heritage and relics at Rupganj: Bajra Mosque, residence of Mura Para Zamindar, Mura Para Shahi Mosque, At-ani Mosque and Tara Mosque at Gandharbapur, Brahmangaon Jami Mosque, Golakandail Kalim Shah Jami Mosque.

164. (Source: Banglapedia, Census and Upazila)

165. The project sites are not located within any sensitive historical, cultural, and archaeological areas. Though it is not a major religious/cultural destination, there is a small graveyard at the location of the water treatment plant, as well as religious properties along the transmission alignments (located about 500m from intake site beside the road is Shree Shree Lakhi Narayan Mandir). Efforts to avoid and minimize impacts on these areas and structures through slight alignment shifts shall be taken up as part of the detailed design. If unavoidable, impacts shall be addressed in consultation with the affected groups as per the provisions of the RP for common properties.

A. Archaeology, Cultural and Historical Places

166. The following Table 14 presents archaeological and cultural sites of Dhaka City. Proposed P1 Project does not affect these places.

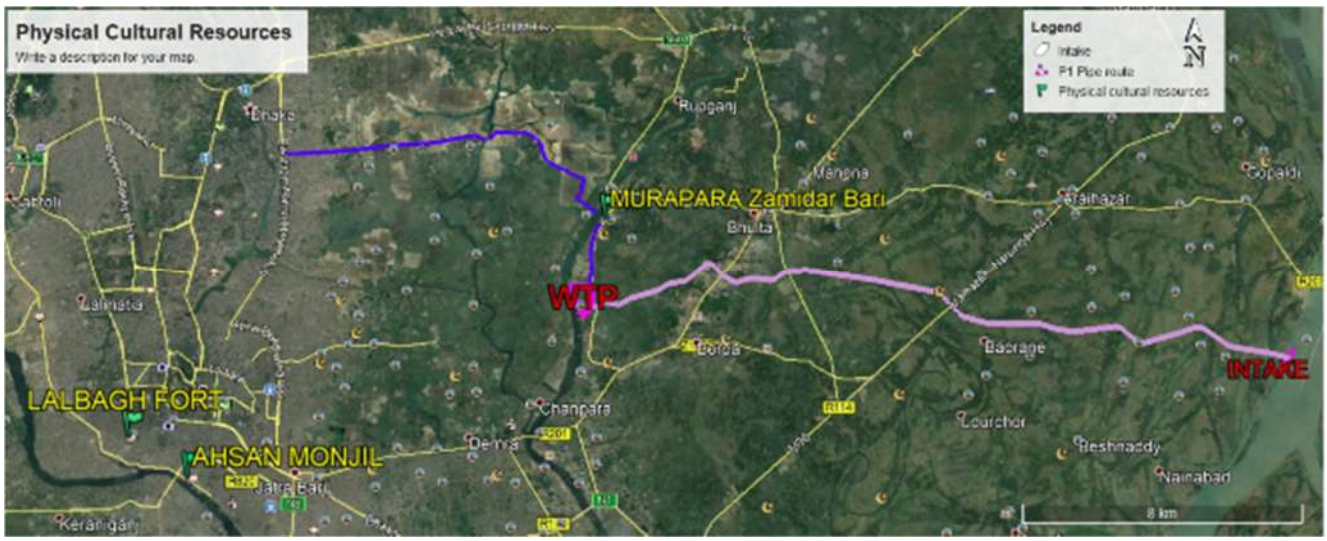
Table 14: Cultural and Historical Places

Name of Establishment	Description	GPS coordinates	Distance
Murapara Zamindar, Rupganj Upazila	The Murapara Zamindar is located in Rupganj Upazila, 330m east of Shitalakhya tunnel shaft site, and 2.5 km north of water treatment plant Ramratan Banarjee built zamindar Palace is 1890. During the war 1971, people plundered many ornate portions of the palace.	**Latitude:** 23° 47′ 1.32″ N **Longitude:** 90° 31′ 23.16″ E	From Intake:20 km From WTP: 2 km
Lalbagh Fort	Lalbagh Fort (also Fort Aurangabad) is an incomplete 17th century Mughal fort complex that stands before the Buriganga River in the southwestern part of Dhaka, Bangladesh. The construction was started in 1678 AD by Mughal Subahdar Muhammad Azam Shah who was son of Emperor Aurangzeb and later emperor himself. His successor, Shaista Khan, did not continue the work, though he stayed in Dhaka up to 1688.	**Latitude:** 23° 43′ 8.4″ N **Longitude:** 90° 23′ 17.16″ E	From Intake: 33 km From WTP: 13 km
Ahsan Manzil	Ahsan Manzil was the official residential palace and seat of the Nawab of Dhaka. The building is situated at Kumartoli along the banks of the Buriganga River in Dhaka, Bangladesh. Construction was started in 1859 and was completed in 1872. It was constructed in the Indo-Saracenic Revival architecture. It has been designated as a national museum.	**Latitude:** 23° 42′ 30.95″ N **Longitude:** 90° 24′ 21.81″ E	From Intake: 32 km From WTP: 12 km

167. Source: Field observation, March 2018, and personal visit to Cultural sites of Dhaka Mega City 2009, Banglapedia-National Encyclopaedia of Bangladesh revised Second

Edition, 2012 & Wikipedia.

Figure 10: Map showing physical cultural resources



B. Rapid Environmental Assessment Checklist

168. Checklists comprehensive lists of environmental effects and impacts indicator designed to stimulate the analysts to think broadly about possible consequences of contemplated actions (Munn, 1979).

169. The REA checklist has been revised for P.1 and adapted to the detailed design.

Annex A represents the REA checklists developed for the present plant.

IX. Anticipated Environmental Impacts and Mitigation Measures

A. Planning and Design Phase

170. The detailed design shall identify suitable locations for construction work camps, stockpile areas, storage areas, and disposal areas and other facilities near to the project locations or DNCC disposal sites. However, if it is deemed necessary to locate elsewhere, sites to be considered shall not promote social instability and result in destruction of property, vegetation, irrigation, and water bodies.

171. None of these temporary facilities shall be located (i) within 500 m of residential areas and rivers identified as ecologically critical areas (ECA), and (ii) within 100 m of other water courses and canals (khals). Though the contractor will be free to decide locations, a list of feasible locations shall be included in the design specifications and plan drawings for approval by the PMU.

B. Construction Phase

172. The impacts during construction will include typical construction-related impacts associated with intake structure, laying of raw water transmission pipe lines, and the WTP. While the nature of these impacts is not expected to be significant, the magnitude is, given the size and scale of the proposed facilities. However, these impacts are known and can be addressed through good engineering practices and specific mitigation measures for minimization of construction impacts on sensitive receptors and communities in the vicinity of locations and alignments.

Intake Facility requirements

173. The Intake Facility comprises:

(i) Intake structure
(ii) Conveyance of Raw Water from intake structure to shore
(iii) Coarse screening
(iv) Provision for pre-sedimentation if required and silt disposal
(v) Protection again collisions from shipping
(vi) A jetty for heavy vehicle access to intake
(vii) River erosion training works
(viii) Onshore flow control chamber and fine screens
(ix) Raw Water Pumping Station
(x) Surge protection equipment
(xi) Flow measurement
(xii) Incoming power and step-down transformers
(xiii) Standby power generation
(xiv) Fuel storage
(xv) Office & administration building
(xvi) Maintenance workshop
(xvii) Site roads and infrastructure.
(xviii) Guard house
(xix) Staff accommodation
(xx) Site storm /flood drainage

174. The Contractor shall ensure that the Works facilitate the design and construction of future phases of work.

175. All site facilities, structures, equipment and access shall be designed to cope with flooding.

Intake Structure

176. The offshore intake structure shall be designed to supply both phase 1 and phase 2 of the project. The method of conveyance of the 1050 MLD from the intake structure to shore can be by gravity pipes or pumped. If a pumped solution is adopted, then mechanical and electrical (M&E) equipment shall be designed for the full design flows of 1050 MLD but M&E equipment not required for the phase 1 treated water output flow of 500MLD need not be supplied. However, space must be provided under this contract for future installation of the M&E equipment needed to double output flow and the contractor shall design the works to facilitate the future installation of phase 2 M&E equipment from a range of different suppliers. The intake structure shall be designed to meet the following requirements:

(i) It shall provide screened water to the pumps at all river levels between the Minimum Water Level and the Maximum Flood Level

(ii) There shall be at least two independent but inter-connected hydraulic compartments with separate inlets in each hydraulic structure, controlled via penstocks, so individual compartments can be hydraulically isolated and emptied for cleaning /maintenance while full design flow is maintained.

(iii) Stoplogs shall be provided to isolate penstocks where required to allow penstocks to be removed for repair.

(iv) A low-level inlet opening shall be provided for use when the river is at Minimum Water Level. It shall be at least 2m above the existing bed of the river to reduce inflow of more turbid water near the river bottom. Raw Water shall be abstracted from at least 0.5m below the prevailing river water level to avoid entraining oil and floating material. Meeting these criteria while the river is at Minimum Water Level will dictate how far offshore the intake structure has to be located

(v) Another higher inlet will be provided about 0.5m below Normal Water Level so that less turbid water can be drawn when the river is higher than that,

(vi) The inlet openings shall be sized to ensure the approach flow velocity through the coarse screens is slower than required for fish to escape.

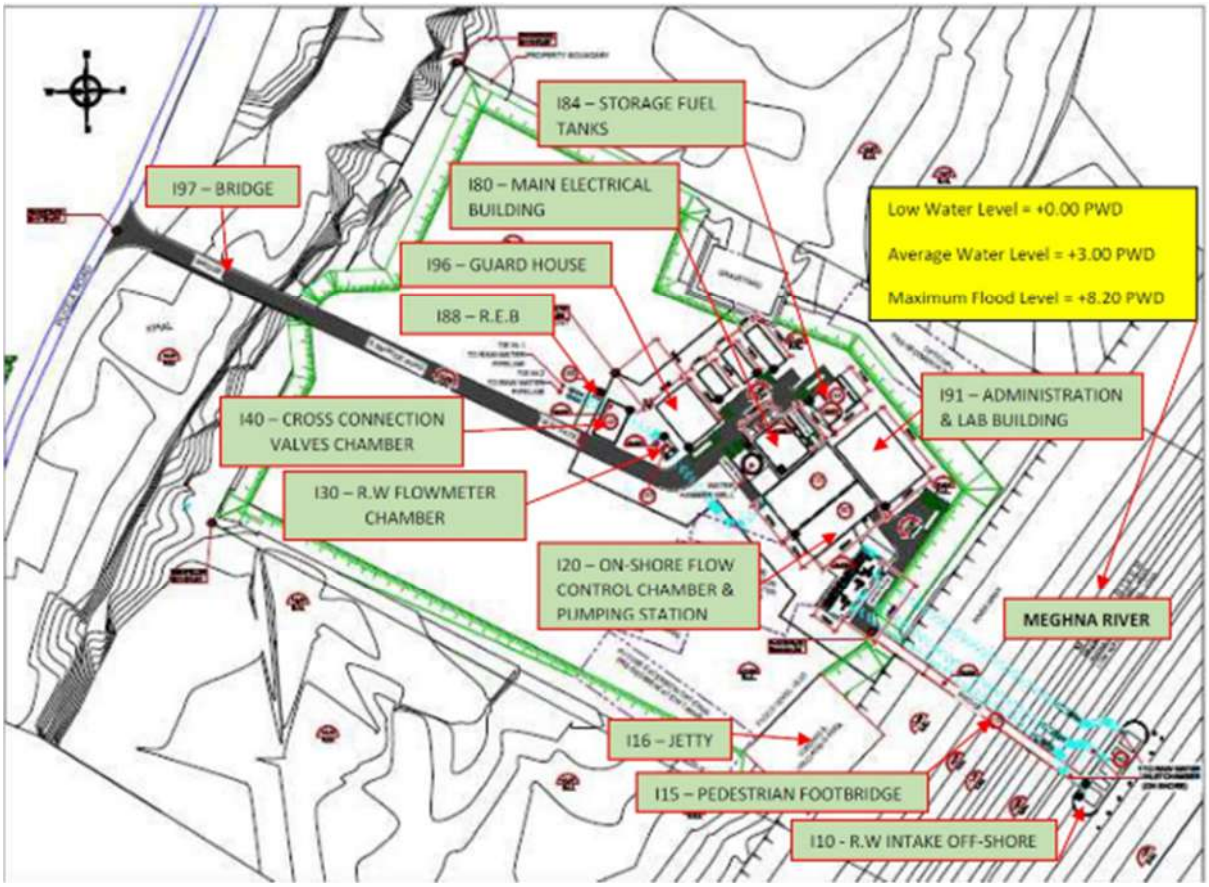
(vii) All plant and equipment shall be able to be safely removed and replaced with either permanent or easily available lifting equipment.

(viii) A minimum of two pipes shall link the intake structure to an onshore pipeline flow control and valve chamber. Each pipe shall have facilities to allow full isolation, emptying and safe human access for internal maintenance, inspection and cleaning in empty conditions.

(ix) The intake structure shall be divided into at least two cross connected compartments sized so that the full design flow can be passed with any one of the compartments isolated and dry for maintenance. The compartments shall have provision so that each can be fully isolated from other(s) for maintenance and inspection. There shall be provision for pumps to allow the drain down of any compartment within a 24-hour period.

177. The layout of proposed intake structure is below:

Figure 11: Intake layout Plan



178. Foundations for the offshore intake structure and inlet opening levels shall be designed to protect against annual changes in river bed level and the anticipated maximum river bed scour when the river is at Maximum Flood Level.

179. Protection against collision from shipping

The Intake Facility shall be provided with protection against collision from the ships commonly using this part of the Meghna. The Contractor shall propose, for approval by the Engineer, the type of protection including at least warning buoys, deflection barriers, and warning lights, in accordance with international best practice.

180. Jetty

A jetty shall be anchored to the shore. It shall be provided to connect the Intake Facility to the Raw Water Pumping Station to allow all equipment to be delivered and removed safely by barge and all defined water levels. The jetty shall be designed such that it can accommodate a mobile crane carrying any piece of equipment that is part of the Intake Facility. Such equipment includes:

(i) Pumps
(ii) Motors
(iii) Screens and penstocks
(iv) Transformers and standby power plant.

(v) Pipes

181. The jetty structure shall be designed to be operable at all river levels between Minimum Level and Maximum Flood Level. The structure shall be designed to support all mechanical and electrical services required for the safe and reliable operation of the Intake.

182. The jetty shall be designed to be able to function fully when the Intake Facility is operating at 1050 MLD.

183. Construction works of the jetty require dredging and sheet piling on the shore of Meghna River. Short-termed turbidity of the river water downstream of the construction site is expected. No impact on fish breeding grounds is expected since no such breeding grounds are existing in the vicinity of the intake according to information received from DoF. Turbidity will disappear and the river water will become clear after dredging and sheet-piling. The work area will be screened by double layer geotextile screen supported on floats and securely anchored on the riverbed by way of weights and stitched into the length required completely encircle the working spaces all around the structure. In addition, the jetty will be installed progressively from the shore to the river. All works will be carried out from the jetty surface. The mitigation measures during operation of the jetty are discussed in Table 18.

184. Dredging shall be undertaken only during the mid-days within a phase of the new and the full moon days. During these days, the tidal amplitude is the lowest in the particular moon phase. As the water movement is the least, siltation on marine biota can be minimised. Advanced technology for dredging shall be utilised.

Raw Water Pipeline

185. The Raw Water Pipeline together with the Raw Water Pumping Station shall transfer the required flow from the River Meghna to the WTP. The Raw Water Pipeline shall be located at the eastern edge of the site. For the purpose of bidding and bid price, the Contractor shall assume the length of the Raw Water Pipeline from the outlet flange at the Raw Water Pumping Station to the inlet flange at the Water Treatment Plant is 22 km.

186. The maximum working pressure and test pressure shall be determined by the Contractor through surge analysis for the system, which is to be carried out by the Contractor and submitted to the Engineer for approval.

187. The surge analysis, design and test pressures shall also have to satisfy the design scenario where interconnections, as described below, with the future phase 2 parallel pipeline will, in the event of a phase 2 pipe burst, carry the full 1050MLD flow through the phase 1 pipe/s for any one section between adjacent interconnections.

188. Further to note, main civil works in the P1 Project route include laying of 22 km pipelines, will be confined to twin pipe installation trench of 5m width and 3.4m depth linear trenches sites, and construction will include general activities like site clearance, excavation for pipeline foundations. Raw water pipelines of 22km will cover agricultural land, all habitations, and will be buried using open cut method.

189. Since these works are confined to the boundary of identified sites, there is no direct interference of construction work with the surrounding land use. However, construction dust, noise, use of local roads for transportation of construction material, waste, labour camps etc., will have negative impacts, which needs to be avoided or mitigated properly.

190. Open cut trenching method of pipe laying involves excavation for laying pipes, placing pipes in the trench, jointing and testing, and refilling with the sand-gravel mixed and excavated

soil. The trenches will be of 5m wide and 3.4m deep. Earthwork excavation will be undertaken by machine (backhoe excavator) or manually, while pipe laying works will include laying pipes at required gradient, fixing collars, elbows, tees, bends and other fittings including conveying the material to work spot and testing for water tightness. Sufficient care will be taken while laying so that existing utilities and cables are not damaged while crossing the roads and pipes are not thrown into the trenches or dragged, but carefully laid in the trenches. As trenches are only 3.4m deep, there risk of collapse of trenches or damage to surrounding structures is minimal or negligible. However, necessary precautions will be taken depending on the soil conditions, and if required measures such as bracing or shoring in the trench will be provided. Once they are laid, pipes will be joined as per specification and then tested for any cracks of leakages.

191. Although pipe laying work involves quite simple techniques of civil work, the invasive nature of excavation and pipeline alignment in the non-built-up areas where there is mostly agricultural land, will not result in impacts to the environment and sensitive receptors. These anticipated impacts are temporary and for short duration, however, needs to be mitigated.

192. Other anticipated impacts during the construction phase are discussed below along with appropriate mitigation measures to avoid, minimize or mitigate those impacts to acceptable levels.

193. Air Quality: Construction work, especially from earthwork activities, coupled with dry and windy working conditions, material and debris transport, and works over agricultural land have low potential to generate dust. Also, emissions from construction vehicles, equipment, and machinery used for excavation and construction will induce impacts on the air quality. Anticipated impacts include dust and increase in concentration of vehicle-related pollutants such as carbon monoxide, sulphur oxides, particulate matter, nitrous oxides, and hydrocarbons. Dust generation will be significant during pipeline laying on land. Increase in dust/ particulate matter in ambient air is detrimental and may have adverse impacts on people and environment. To mitigate the impacts, construction contractors will be required to:

194. For Pipeline Works:

(i) Barricade the construction area
(ii) Initiate site clearance and excavation work only after barricading of the site is done
(iii) Confine all the material, excavated soil, debris, equipment, machinery (excavators, cranes etc.), to the barricaded area
(iv) Limit the stocking of excavated material at the site; remove the excess soil from the site immediately to the designated disposal area (Status of existing DNCC and DSCC designated disposal sites at Matuail, Gabtoli and Uttara Transfer Station are presented in Appendix L).
(v) Undertake the work section wise. However, none of the three landfills is suitable for disposal of construction waste including spoiled soil from P1 construction site because of the following reasons:
(vi) Landfills of Gabtoli (Amin Bazaar) and Matuail do not have capacity anymore. In addition, Gabtoli Landfill is operated in an unsanitary manner and the environment (ground water, air, soil) is heavily polluted due to unsafe and improper dumping of waste.
(vii) Uttara landfill is a secondary waste transfer station without sufficient capacity. DoE, DWASA, MDSC and contractors have to discuss and to find out alternative options for proper waste disposal.
(viii) Conduct work sequentially - excavation, pipe laying, backfilling; conduct pipe testing section-wise (for a minimum length as possible) so that

backfilling, stabilization of soil can be done.

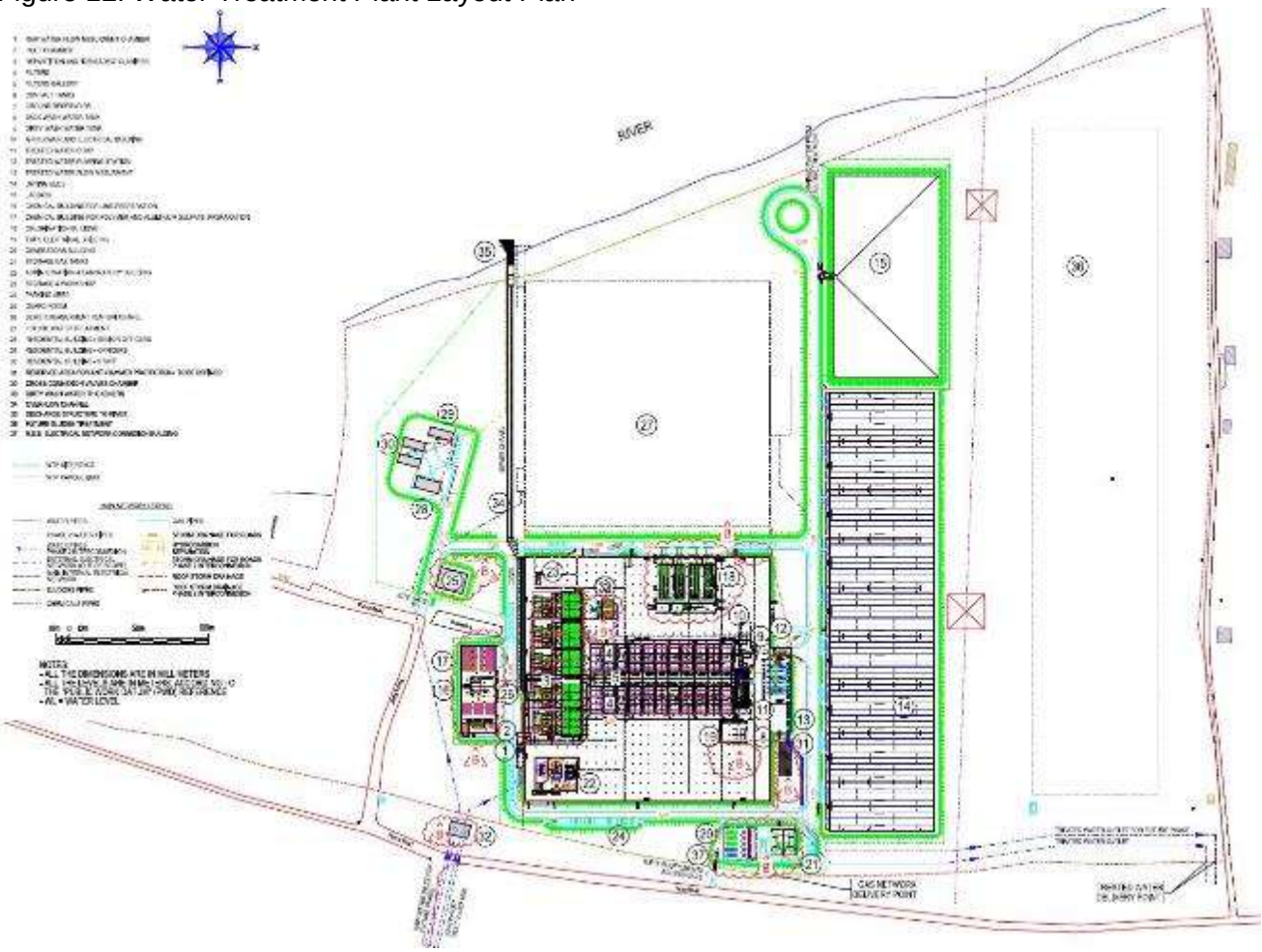
(ix) Remove the excavated soil of first section to the disposal site; as the work progresses, sequentially, by the time second section is excavated, the first section will be ready for back filling. Backfilled trench at any completed section after removal of barricading will be the main source of dust pollution. The traffic, pedestrian movement and wind will generate dust from backfilled section. Road restoration shall be undertaken immediately.

Water Treatment Plant Facility requirements

195. The Water Treatment Plant comprises:

(i) Flow measurement chamber
(ii) Inlet structure
(iii) Clarification process units
(iv) Filtration process units
(v) Disinfection
(vi) Waste water treatment plant
(vii) Thickener feed tanks
(viii) Sludge thickeners
(ix) Sludge drying beds
(x) Chemical storage and dosing
(xi) Inter-process pipework
(xii) Treated Water reservoir
(xiii) Treated Water Pumping Station
(xiv) Flow measurement and control
(xv) Surge protection equipment
(xvi) Incoming power and step-down transformers
(xvii) Standby power generation
(xviii) Fuel storage
(xix) Office & laboratory
(xx) Maintenance workshop
(xxi) Site roads and infrastructure
(xxii) A guard houses
(xxiii) Staff accommodation
(xxiv) Recreation facilities
(xxv) Site drainage

Figure 12: Water Treatment Plant Layout Plan



196. The Contractor shall ensure that the Works are designed and constructed to facilitate the future design and construction of Phase 2.

197. All site facilities, structures, equipment and access shall be designed to cope with flooding up to the Maximum Flood Level of the Meghna and Sitalakhya Rivers.

198. The sludge drying beds must be able to operate with floods up to Max Flood level -2.0m

199. Suitable drainage on the site shall be provided and the drainage design shall ensure that all discharge points have no negative social or environmental impacts.

200. All elements of the hydraulic conveyance systems including pipework and channels and all elements of the process streams shall be designed so individual sections can be fully isolated and there is sufficient cross-connectivity and design capacity to allow the full design flow to be maintained with any single section isolated

201. The design life of all Water Treatment Plant Facility civil structures shall be not less than 50 years, all mechanical equipment not less than 20 years and electrical equipment not less than 15 years, unless stated otherwise elsewhere.

202. Surface Water Quality. Run-off from stockpiled materials and chemicals from fuels and lubricants during construction works can contaminate surface water quality of the water bodies, streams, Meghna, and Shitalakhya Rivers. Project area receives considerable

rainfall, although mostly confined during the monsoon months. There are a number of water bodies/ponds in agricultural land, also along roads crossing where raw water pipelines will be laid. It is important that runoff from the construction areas, which may contain silt and chemical traces do not enter these water bodies. Impact will be temporary but needs to be mitigated. Construction contractor will be required to:

(i) All earthworks be conducted during the dry season to prevent the problem of soil run-off during monsoon season;
(ii) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets;
(iii) Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, only designated disposal areas shall be used
(iv) vii Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies
(v) Place storage areas for fuels and lubricants away from any drainage leading to water bodies
(vi) Store fuel, construction chemicals etc., on an impervious floor, also avoid spillage by careful handling
(vii) Dispose any wastes generated by construction activities in designated sites; and
(viii) Conduct surface quality inspection according to the Environmental Management Plan (EMP).

203. Groundwater Quality. Another physical impact that is often associated with excavation is the effect on drainage and the local water table if groundwater and surface water collect in the voids. In the project area, groundwater depth is shallow, there are numerous water bodies and ponds, and it also receives high rainfall during the monsoon. Conducting excavation works during non-monsoon season will certainly help, but due to high water table, water may collect in pits as they are excavated. To avoid this the contractor needs to be implement the following measures:

(i) Pump out the water collected in the pits / excavations to a temporary sedimentation pond; dispose of only clarified water into drainage channels/streams after sedimentation in the temporary ponds
(ii) Consider safety aspects related to pit collapse due to accumulation of water

204. Generation of Construction Wastes. Solid wastes generated from the construction activities are excess excavated earth (spoils), discarded construction materials, cement bags, wood, steel, oils, fuels and other similar items. Domestic solid wastes may also be generated from the workers' camp. Improper waste management could cause odour and vermin problems, pollution and flow obstruction of nearby watercourses and could negatively impact the landscape.

205. The following mitigation measures to minimize impacts from waste generation shall be implemented by the contractor:

(i) Prepare and implement a Construction Waste Management Plan
(ii) As far as possible utilize the debris and excess soil in construction purpose, for example for raising the ground level or construction of access roads etc.,
(iii) Avoid stockpiling any excess spoils at the site for long time. Excess excavated soils should be disposed to designated areas immediately (preferably at DNCC designated sites, Detailed in Appendix-L DNCC Meeting Note of 26 May 2019). In general, excess soil can be used for construction purposes if not contaminated.
(iv) If immediate disposal is required, the site shall be selected preferably from

barren, infertile lands; site should be located away from residential areas, water bodies and any other sensitive land uses.

(v) Domestic solid wastes should be properly segregated in biodegradable and non-biodegradable for collection and disposal to designated solid waste disposal site; create a compost pit at workers' camp sites for disposal of biodegradable waste; non-biodegradable / recyclable material shall be collected separately and sold in the local recycling material market.

(vi) Residual and hazardous wastes such as oils, fuels, and lubricants shall be disposed of in disposal sites approved by DNCC;

(vii) Prohibit burning of construction and/or domestic waste;

(viii) Ensure that wastes are not haphazardly thrown in and around the project site; provide proper collection bins and create awareness to use the dust bins.

(ix) Conduct site clearance and restoration to original condition after the completion of construction work; PMU to ensure that site is properly restored prior to issuing of construction completion certificate

206. Noise and Vibration Levels. Most of the works are to be implemented in rural setting, with thickly populated habitation areas and surrounding extensively cultivated agricultural lands. Noise and vibration impacts are likely to be minimal as most of the pipeline route sites located outside habitation in agricultural lands. The sensitive receptors are the general village population in these areas. Increase in noise level may be caused by breaking of bitumen roads crossings for laying of pipelines, operation of construction equipment like concrete mixers, and the transportation of equipment, materials, and people. Vibration generated from construction activity, for instance from the use of pneumatic drills, will have impact on nearby houses/buildings. This impact is negative but short-term, and reversible by mitigation measures. The construction contractor will be required to:

(i) Plan activities in consultation with PMU so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance;

(ii) Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, and use portable street barriers to minimize sound impact to surrounding sensitive receptor;

(iii) Identify any house, buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity;

(iv) Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach;

(v) Consult local communities in advance of the work to identify and address key issues, and avoid working at sensitive times, such as religious and cultural festivals.

207. Accessibility. Excavation along the roads for laying of raw water pipelines, hauling of construction materials and operation of equipment on-site can cause traffic problems. Roads connecting Intake site at Araihazar to WTP at Murapara are secondary roads, but are narrow and carry considerable local traffic, mainly comprise bicycles, 2 wheelers, Mini trucks, auto rickshaws, tempo service, private cars etc. Works related to pipeline laying will be confined to the selected sites, therefore there is minimum or no direct interference of these works with the traffic and accessibility. Hauling of construction material, equipment, construction waste, etc., to and from the work site may increase the road traffic on local roads, which are not in good condition. This will further inconvenience the local community and road users. Potential impact is negative but short term and reversible by mitigation measures.

208. Further to note that, in most cases river transport will be used to carry materials and equipment. However, the construction contractor will be required to:

(i) Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites
(ii) (ii) Drive vehicles in a considerate manner
(iii) Notify affected public by public information notices, providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints.

209. Pipeline Works

(i) Confine work areas mostly in agricultural land to the minimum possible extent; all the activities, including material and waste/surplus soil stocking should be confined to this area. Provide barricading; avoid material/surplus soil stocking in congested areas – immediately removed from site/ or brought to the as and when required;
(ii) Leave spaces for access between mounds of soil to maintain access to the houses / properties;
(iii) Provide pedestrian access in appropriate locations; provide wooden/metal planks over the open trenches at each house to maintain the access;
(iv) Inform the affected local population 1-week in advance about the work schedule;
(v) Plan and execute the work in such a way that the period of disturbance/ loss of access is minimum;
(vi) Keep the site free from all unnecessary obstructions;
(vii) Coordinate with Police for temporary road diversions, where necessary, and for provision of traffic aids if transportation activities cannot be avoided during peak hours.

210. Socio-Economic – Employment. Manpower will be required during the construction stage. This can result in generation of temporary employment and increase in local revenue. Thus, potential impact is positive and long-term. The construction contractor will be required to employ local labor force as far as possible.

211. Occupational Health and Safety. Workers need to be mindful of the occupational hazards which can arise from working in excavation works. Potential impacts are negative and long-term but reversible by mitigation measures. The construction contractor will be required to:

(i) Comply with national labor laws;
(ii) Develop and implement site-specific occupational health and safety (OHS) Plan which will include measures such as: (a) excluding public from the site; (b) ensuring all workers are provided with and use personal protective equipment; (c) OHS Training for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents;
(iii) Ensure that qualified first-aid is provided at all times. Equipped first-aid stations shall be easily accessible throughout the site;
(iv) Provide medical insurance coverage for workers;
(v) Secure all installations from unauthorized intrusion and accident risks;
(vi) Provide health and safety orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers;
(vii) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;

(viii) Ensure moving equipment is outfitted with audible back-up alarms;
(ix) The use of hearing protection shall be enforced actively;
(x) Provide supplies of potable drinking water;
(xi) Provide clean eating areas where workers are not exposed to hazardous or noxious substances

212. Agriculture

213. The alignment of the pipelines travels through a predominantly agricultural landscape, with much of the land in arable production, with some small areas of orchard and seasonal pasture.

214. During the construction phase there are a number of potential impacts which could occur, such as dust soiling of crops, especially fruit crops, changes in hydrological regimes and accidental encroachment of construction equipment and staff onto agricultural land causing loss of crop production. Potential loss of fruit trees and crops will be subject to the resettlement plan.

215. During the operational phase no significant adverse effects are predicted on agricultural resources. There may be marginal benefit to local people who are working the land in improving access to their fields and markets through improvement of the road condition.

216. Land Use, Impact and Risk Analysis

217. The analysis of project impacts and risks is the technical heart of the environmental assessment process, providing a comprehensive net appraisal of the project's effects on the environment and socioeconomic conditions. Potential impacts and risks have been evaluated according to laws and regulations of Bangladesh and ADB's requirements as set out in the safeguard policy statement (SPS 2009).

218. Type and Scope of Impacts and Risks

219. Impact analysis considered potential environmental impacts and risks of the project, while focusing on the major ones identified through scoping exercise. The analysis has covered both adverse and beneficial effects over time to fully describe the net project effect. Adverse environmental impacts are negative impacts on physical, biological, socioeconomic (including impacts on livelihood through environmental media, health and safety, vulnerable groups, and gender issues), and cultural resources, these impacts are temporary in nature.

220. Impact analysis should consider the following features when they are potentially affected by the project,

(i) Physical – surface and ground water, air, soil, land use, landform/topography, noise, vibration, geology, seismicity and other natural hazards, resource use, waste, greenhouse gases, etc.
(ii) Biological – terrestrial and aquatic flora and fauna, habitat and ecosystems, endangered or critically endangered species, protected areas, etc.
(iii) Socioeconomic – occupational health and safety, community health and safety, impacts on vulnerable groups and gender issues, impacts on livelihoods (e.g. river pollution or river flow reduction decreases downstream fishing yields)
(iv) Physical cultural resources – movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance (Appendix-E).

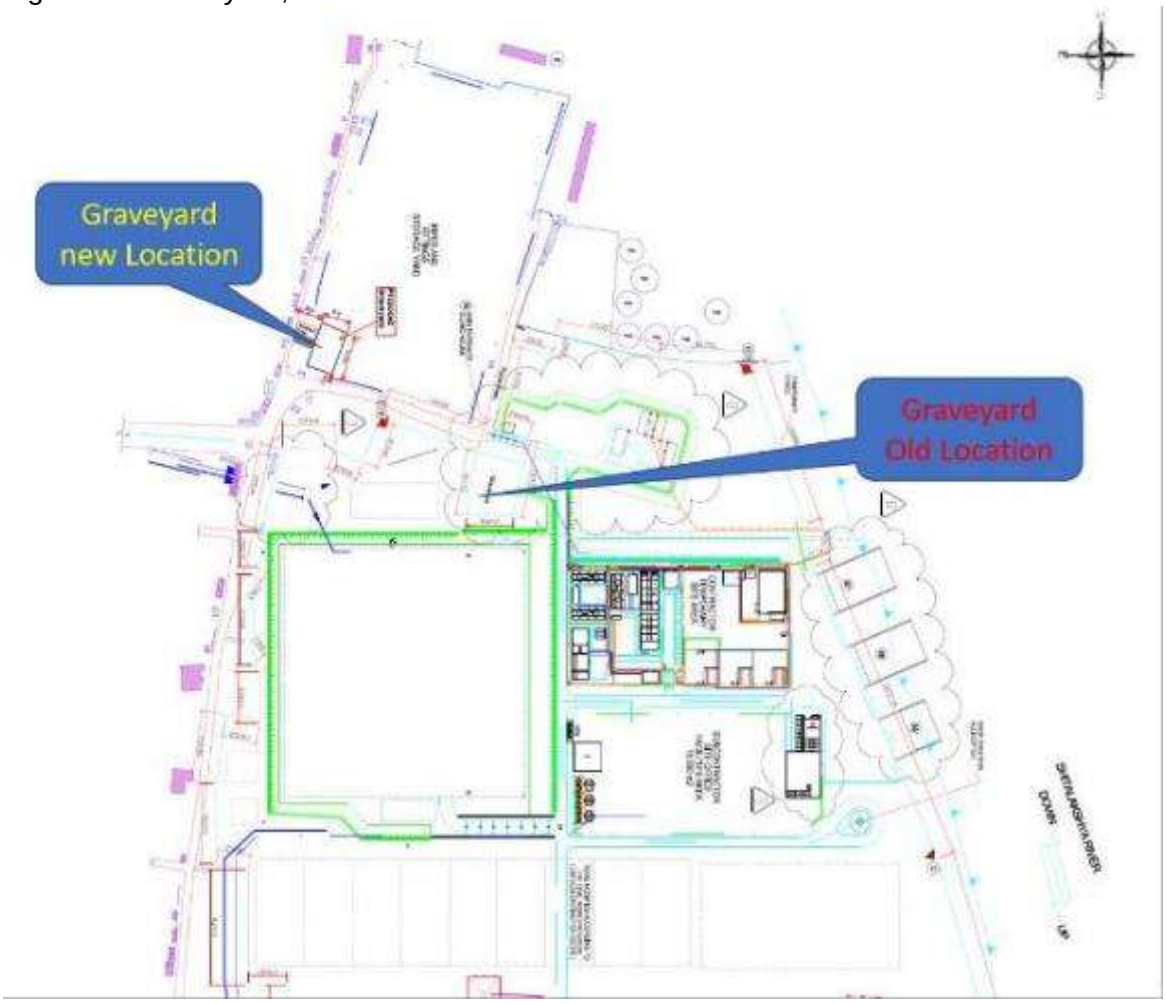
221. Archaeology and Cultural Heritage

222. Bangladesh has a rich archaeological resource throughout the country. For the current project the national database of known archaeological resources was consulted. This showed that there are no known extant registered archaeological sites within area of influence of the project. The adjacent land use of predominantly agricultural land also means that, and surface attributes such as grave mounds will have been removed or damaged by regular ploughing and working of the soils.

223. However, within the south-east corner of WTP premises, there is a grave which shall be relocated (23°45'24.1"N 90°30'56.2"E) at 120m further south east side after mutual understanding with local people. There was discussion with local graveyard committee to resolve the issue and agreed to relocation and the construction is nearly finished. The meeting minutes and mutual agreement of relocation is attached in Appendix B.

224. The location is shown in Figure 13.

Figure 13: Graveyard, Old and New location



225. The Murapara Zamindar Bari is 2.5 km north of WTP site.

226. In theory any excavations could encounter previously unknown archaeological resources. For the current project which will involve 5.1 m wide and 3.4 m depth excavations for 22km raw water pipelines and for WTP site within the already acquired, it is considered that the risk of encountering archaeological resources is very low.

227. Further to note, utilities are not present at P1 as this area is plain cultivation land. The section-wise information is summarizing bellow.

Table 15: Section-wise information raw water pipeline

Sl	Length	Diameter	Length of pipeline (km)	Width required for excavation (m)	Width of available ROW (m)	Vegetation to be cleared? (Y/N)	Number of trees to be cut	Utilities to be shifted (Y/N)	Area for materials storage (Y/N)	Amount of excess materials to be disposed
1	Shomvupura & Chetia mouja of Bishnandi Union at Araihazar Upazilla on the bank of Meghna river	2.2	Inside Intake area	5.1	31.0	Y	9	N	Y	31500 m^3 based on preliminary design (Approx.).
2	From Meghna Bishnandi to Dhaka-Sylhet roads Shezan Juice point (Vulta union, Golakanda Mouja)	1.6	17.5	5.1	31.0	Y	10146	N	Y	2.7M m^3 based on preliminary pipe corridor (Approx.).
3	Shejan Juice points to Gandharbpur WTP	1.6	4.5	5.1	25.0	Y	561	N	Y	0.6M m^3 based on preliminary pipe corridor (Approx.).

C. Operation Phase

Environmental flow

228. An environmental flow is defined as a system for managing the quantity, timing, and quality of water flows in a river, with the goal of sustaining freshwater and estuarine ecosystems and the human livelihoods that depend on them (source: https://www.internationalrivers.org).

229. The value of the lean flow of the Meghna River, that is the flow of a river which is exceeded on average 95% of the time (Q95), is 3,815 m3/sec. This is based on data taken at the Bhairab Bazar gauging station on the Meghna River from 2000 to 2009 as discussed in the

EIA dated April 2018, Section 4.9 ‘Baseline: levels of abstraction at the intake’. The proposed abstraction accounts for approximately 0.30% of the lean flow of Meghna River for the ultimate intake capacities of 1,050 MLD (2035). Therefore, no impacts on downstream uses or impairment of ecological flows in Meghna River is envisaged since abstraction of 0.30% during lean flow is negligible and will not impact on annual flow fluctuation, oxygen content and spawning grounds. This data is present in EIA dated April 2018, named as Section 4.9 Baseline: Levels of abstraction at the intake.

230. Calculation of the environmental flow requires a detailed environmental study including hydraulic calculations on Meghna River to clarify how much water will reach different sections and habitats of the river. The study would include hydraulic calculations for the whole river, mapping of relevant aquatic habitats and assessment of the ecological requirements of indicator species. Such a study is not required from the ecological and environmental point of view because (i) no protected area and endangered species near or adjacent to the intake; (ii) based on the consultation with the DoE and Fisheries Department documented in the IEE dated August 2013.

231. The indicator fish species - Hilsha Fish - is increasing at Bishnondi intake according to information received from Upazila Fisheries Officer in August 2017. No impact on fish population is expected. Bishnondi water intake is not located in a protected area. The nearest Hilsa sanctuary is Chandpur, about 130 km downstream of the proposed intake location. Impact on this sanctuary due to water abstraction can be excluded.

Biodiversity Conservation

232. Only 0.30% of the lean flow will be needed for water supply and no impact on biodiversity and aquatic ecology is expected. The mesh size of strainer will be only 5mm to reduce impact on fingerlings. The strainer will be placed downstream in flow direction. The intake screens have been designed according to the swimming characteristics of Hilsa (the key species in the Meghna), to ensure that the impacts on Hilsa as well as the smaller fish is minimized. Therefore, 8 cm/sec approach velocity for screen mesh has been applied to avoid such impact. These measures have been agreed with the Department of Fisheries.[3] In general, no policy on screen size exists.

233. During operation period water quality data will be recorded daily at the intake (many parameters, even hourly) by the operator to analyse the status of Intake Water quality. Implementing general periodic maintenance of the intake including fine screen, the fisheries resources will be protected.

234. The Meghna river floodplain landscapes in area of intake having a smooth, almost level relief, and deep, predominantly silty, alluvial sediments, and from tidal floodplain landscapes at lower Meghna lacking a close network of tidal channels and creeks. Hilsha habitats mostly concentrated at Lower Meghna and estuary and the intake location is not a significant Hilsha habitat.

Environmental Impacts and Mitigation Measures

235. The mitigation measures for environmental impacts on pre-construction, construction and operation phase are shown below.

Table 16: Pre-construction Phase Environmental Impacts and Mitigation Measures

[3] Ms. Shila Roy, Upazila Fisheries Officer, Reserve, Posted in Dhaka, Department of Fisheries, 4 April 2019

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
Existing Utilities	Impact on Telephone lines, electric poles and wires, water lines within proposed P1 site	(i) Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction phase; and (ii)Require construction contractors to prepare a contingency plan to include actions to be taken in case of unintentional interruption of services.	DBO Contractor in collaboration with and approval of PMU	(i) List of affected utilities and operators; (ii) Bid document to include requirement for a contingency plan for service interruptions	Project cost
Construction intake, work camps, stockpile areas, storage areas, and disposal areas.	Conflicts with local community; disruption to traffic flow and sensitive receptors	(i) Prioritize areas within or nearest possible vacant space in the project location; (ii) If it is deemed necessary to locate elsewhere, consider sites that will not promote instability and result in destruction of property, vegetation, irrigation, and drinking water supply systems; (iii) Do not consider residential areas; (iv) Take extreme care in selecting sites to avoid direct disposal to water body which will inconvenience the community. (v) prepare Layout plan of the work camp including description of precautionary measures (vi) prepare sewage management plan, e.g. installation of (temporary) cesspits, safe disposal of sewage from the camp (vii) prepare waste management plan, collection, segregation and disposal of waste, combustible waste to be burnt at designated burn pit only as demarcated by Resident Engineer. non- combustible, non-recyclable garbage sent to the designated landfill site, (viii) prepare layout plan of equipment maintenance area, lubricant and fuel storage area, car wash area must be at least 50m away from surface water	DBO Contractor to finalize locations in consultation and approval of PMU	(i) List of selected sites for construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas. (ii) Written consent of landowner/s	Project cost

236. Abb.: temp – temporary; mod – moderate; perm – permanent

Table 17: Construction Phase Environmental Impacts and Mitigation Measures

Location	Potential Impact	Duration/ Extent	Mag	Mitigation Measures	Responsibility
All construction sites	Impact on river fish, ponds	perm	mod	Designs standard for fine screen to prevent fingerlings in to intake, ensure cross-drainage through the provision of balancing culverts and sufficient cross-movement, including movement of fishes, shall be done to minimize severance impacts on khals and fish ponds cut across by the alignment.	Design Build Contractor, and CSC
	Assets/facilities lost, including common property resources and religious structures	perm	mod	Designs to be worked out to minimize impacts on these assets. Compensation and assistance will be provided in accordance with the provisions of the RP.	Design Build Contractor, and CSC

Location	Potential Impact	Duration/ Extent	Mag	Mitigation Measures	Responsibility
	Soil erosion	perm	mod	The measures to address soil erosion at the proposed facilities will consist of measures as per design, or as directed by the SC to control soil erosion, sedimentation, and water pollution. All temporary sedimentation, pollution control works, and maintenance thereof will be deemed incidental to the earthwork or other items of work.	Design-Build Contractor and CSC
	Agricultural and private land acquisition	perm	perm	Cutting of trees in private lands will be minimized. Compensatory plantation for trees lost at a rate of 10 trees for every tree cut will be implemented by the design-build contractor, who will also maintain the saplings for the duration of his contract.	PMU and RAP implementation NGO
	Construction Stage				
All construction sites	- risk of accidents - risk of diseases (dengue fever, HIV Aids)	temp	mod	At every workplace, a readily available first aid unit, including an adequate supply of sterilized dressing material and appliances, will be provided as per the factory rules. Suitable transport will be provided to facilitate the transfer of injured or ill persons to the nearest hospital. At every workplace and construction camp, equipment and nursing staff will be provided. The contractor will, at his own expense, conform to all disease prevention instructions given to him by the CSC. All relevant provisions of the Bangladesh Labor Act, 2006 and Bangladesh National Building Code, 2006 will be adhered to, concerning the provision of adequate safety measures during construction. The contractor will comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, trenches, and safe means of entry and egress.	Design Build Contractor and CSC
	Insufficient Hygiene in the construction camps and sites	temp	mod	All temporary accommodations will be constructed and maintained in such a fashion that uncontaminated water is available for drinking, cooking, and washing. Safe drinking water in sufficient quantity for the workforce will be provided at the construction site as well as at the construction camps. Adequate toilets, separate for women and men, shall be provided at the construction sites, with septic tanks. Sewage management plan for the work camp has to be prepared by the contractor and agreed with the construction supervision. Garbage bins will be provided in the camps and regularly emptied, and the garbage disposed of in a hygienic manner. A waste management plan for the work camp has to be prepared by the contractor and agreed with the construction supervision.	Design Build Contractor and CSC
				Adequate health care will be provided for the workforce. Unless otherwise arranged for by the local sanitary authority, the local medical health or municipal authorities will make arrangement for disposal of excreta. On completion of the works, all such temporary structures will be cleared away, all rubbish disposed, excreta tank and other disposal pits or trenches filled in and effectively sealed off, and the outline site left clean and tidy, at the contractor's expense. The site will be restored to pre-project conditions through the removal of all extraneous material on site.	Design Build Contractor and CSC

Location	Potential Impact	Duration/ Extent	Mag	Mitigation Measures	Responsibility
	Risk caused by force majeure	temp	Minor	All reasonable precaution will be taken to prevent danger to the workers and the public from fire, flood, drowning, etc. Specifically, the contractor will (i) provide medical and accident insurance for workers; (ii) provide first aid in the construction campsite; and (iii) provide access to hospitals/clinics within the project site that can be accessed in case of emergency by arranging necessary transport for safe carriage of the injured.	Design Build Contractor and CSC
	Risk of contractors or subcontractors hiring child labor in the construction activities.	temp	Minor	National laws on child labor will strictly followed. No child labor will be allowed by the contractors or subcontractors in any of the project activities.	Design Build Contractor and CSC
	Risk of injury			Awareness of workers about hazardous materials and proper handling methods. Warning signs, labels and signals. Provide helmets, safety shoes and other PPE for workers in accordance with accident prevention and work safety procedures	
	Dust Pollution • Impact Sources Emissions from construction related traffic and machinery. • Dust from works, carrying machinery equipment to the site, and traffic from trucks and vehicles.	temp	mod	The contractor will (i) take every precaution to reduce the levels of dust at construction sites, and not exceeding the pre-project ambient air quality standards; (ii) fit all heavy equipment and machinery with air pollution control devices that are operating correctly; (iii) reduce dust by spraying stockpiled soil, excavated materials, and spoils; (iv) cover with tarpaulin vehicles transporting soil and sand; and (v) cover stockpiled construction materials with tarpaulin or plastic sheets. • Implement measures in Environmental Code of Practice of Air Quality Management. Dust generation will be restricted as much as possible and water sprinkling carried out as appropriate, especially where earth moving and excavation are carries out. • Emissions during bore logs digging, excavations, use of equipment and traffic will comply with ADB EHS guidelines and will be monitored. Spray of water is suggested in the road and construction sites	Design Build Contractor and CSC
	Air pollution (SPM, PM2.5, PM10, SO_2, NOX and CO) • Impairment of air quality may have an impact on workers, local residents and surrounding environment Air pollution generated from exhaust of engines, during bore logs work, excavations, emission from drilling vehicle and construction machinery			• Drilling and transport vehicles shall move only in-designated areas and roads. • Water dry drilling areas and access roads to reduce dust emissions • Minimize traffic in villages and other residential areas • Reduce vehicle speed in construction areas and access roads to 10 km/h • Machines and vehicles must be regularly examined and maintained to comply with requirements of technical specifications Repair and maintain access roads, as necessary	Design Build Contractor and CSC
	Noise and Vibration from construction equipment	temp	mod	The contractor will ensure (i) regular maintenance of vehicles, equipment, and machinery to keep noise from these at a minimum; and (ii) all vehicles and	Design Build Contractor and CSC

Location	Potential Impact	Duration/ Extent	Mag	Mitigation Measures	Responsibility
				equipment used for construction will be fitted with exhaust silencers. During routine servicing operations, the effectiveness of exhaust silencers will be checked, and if found to be defective, will be replaced.	
	Disturbance to business, people, activities and socio-cultural resources due to construction work	temp	mod	The contractor will provide the following measures during the laying of transmission mains for sections in the vicinity of habitations and commercial and institutional areas, to minimize access and livelihood disruption: (i) place walkways and metal sheets where required to maintain access across trenches for people and vehicles; (ii) increase workforce in front of critical areas such as institutions, places of worship, business establishments, hospitals, and schools; (iii) consult businesses and institutions regarding operating hours and factoring this into work schedules; and (iv) provide signboards for pedestrians to inform them of nature and duration of construction works and contact numbers for concerns/complaints (v) schedule construction works in consultation with construction supervision, institutions and the traffic police	Design Build Contractor and CSC
	Socio-economic benefits from employing local people in construction work	temp	mod	To the extent possible labour force should be drawn from the local community	Design Build Contractor and CSC
	Safety and health risk – public and worker	temp	mod	• Follow standard and safe procedures for all activities – such as provision of shoring in deep trenches (>2 m) • Exclude public from the site – enclose construction area, provide warning and sign boards, security personnel • Provide adequate lighting to avoid accidents • Ensure that all workers are provided with and use appropriate Personal Protective Equipment - helmets, hand gloves, safety boots, masks, safety belts (while working at heights etc.); • Maintain accidents records and report regularly • Avoid appearance of pools and standing water during construction phase to prevent water borne diseases and dengue fever • Introduce social guidelines to minimise tensions between workers and local people • The contractor has to ensure that his workers are healthy before the construction phase • Implement health check-up and screening • Ensure that workers are provided with drinking water of good quality	Design Build Contractor and CSC
	Emission from construction vehicles, equipment, and machinery	temp	mod	All vehicles, equipment, and machinery used for construction will be regularly maintained to ensure that pollution emission levels comply with the relevant requirements of DoE. Copies of conformance will be submitted regularly to the CSC.	Design Build Contractor and CSC
	Soil contamination due to leakages with mineral oil	temp	Mod	• Provide double walled fuel tanks or store single walled fuel tanks in collecting basin for refuelling construction engines • Provide modern non-leaking equipment • Provide mineral oil adhesive agent • Collect contaminated soil and dispose it on a landfill	Design Build Contractor and CSC

Location	Potential Impact	Duration/ Extent	Mag	Mitigation Measures	Responsibility
	Contamination of ground water and surface water			• Prevent pollutants from contaminating the soil and the ground water • Storage of lubricants and fuel at least 50 m from water bodies • Storage of fuel and lubricants in double hulled tanks • Daily control of machinery and vehicles for leakages • Collection of waste during construction activities • Provide uncontaminated water for dust suppression • Enclose the construction area to prevent unauthorized access	Design Build Contractor and CSC
	Dust pollution and water pollution due to stockpiling of construction materials and excavated earth, construction waste	temp	mod	Due consideration will be given to material storage and construction sites such that it doesn't cause any hindrance to daily traffic movement. The contractor will (i) consult with implementing agency on the designated areas for stockpiling of clay, soils, gravel, and other construction materials; (ii) avoid stockpiling of earth fill, especially during the rainy season, unless covered by tarpaulins or plastic sheets; (iii) prioritize reuse of excess spoils and materials in the construction works; and (iv) protect surface water bodies from any source of contamination, such as oily wastes, debris, and spoils that will degrade its quality. • Excavated material shall not enter surface waters, surface water banks or impede flows - in particular, the following shall be done: • do not dump material in surface waters, at river banks or in flooding areas, in case rivers have been blocked remove the material • mitigation of turbidity at borrow pits through application of geotextile bags during excavation works	Design Build Contractor / CSC
	Disturbance of residents and local business	temp	mod	The movement of construction materials and equipment, to the extent possible, will be planned along major roads, with the exception of access roads to the site. In the event of movement of construction vehicles and equipment on the narrow roads, strengthening of these roads will be carried out, and timing of movement of heavy vehicles worked out to avoid peak hours and night time, and to ensure minimal disturbances to the communities and the resident population along these roads. Construction traffic has to be consulted with traffic police and local affected institutions.	Design Build Contractor and CSC
	Disturbance/nuisance/noise due to construction activity including haulage of material/waste	temp	mod	• Plan transportation routes in consultation with rural authorities, road department, and Police • Schedule transportation activities by avoiding peak traffic periods • Clean wheels and undercarriage of haul trucks prior to leaving construction site • Educate drivers: limit speed between 20-25 km/h in settlements and avoid use of horn • Earmark parking place for construction equipment and vehicles when idling; no parking shall be allowed on the roads, that may disturb the traffic movement • Provide prior information to local people about work; • No night time construction activities including material/waste haulage	

Location	Potential Impact	Duration/ Extent	Mag	Mitigation Measures	Responsibility
				• Construction activities must be prohibited from 9pm to 7am Noise barriers must be installed in housing areas to reduce the noise level.	
	Pollution of soil and water with hazardous substances (mineral oil, grease and lubricant)	temp	mod	Maintenance of machinery will be conducted at safe distance (at least 50m) from watercourses so that no oil spills can enter the water. Contaminated soil should be excavated and disposed properly in a confined place outside inundation areas	Design Build Contractor and CSC
	Contamination of soil and water resources			For effluents to be discharged from work place, camps, and offices, treatment arrangements such as retention ponds and septic tanks will be incorporated in the facility designs. A sewage management plan has to be prepared by the contractor and agreed with the construction supervision.	Design Build Contractor and CSC
	Impact on archaeological sites - chance findings	perm	mod	In the event of an archaeological chance find at the construction site, the contractor will prevent workmen or any other persons from removing and damaging any chance find artefacts and will, immediately upon discovery thereof, inform the SC of such discovery and carry out the CSC's instructions for dealing with the same, awaiting which all work will be stopped for 100 m in all directions from the site of discovery.	Design Build Contractor and CSC
				The CSC will seek direction from the Department of Archaeology before instructing the contractor to resume work on the site.	
	Loss of access to residents, businesses, and Institutions during construction.	temp	mod	The contractor will provide safe and convenient passage for vehicles and pedestrians through diversions to and from side roads, and property access connecting the project roads. The contractor will ensure that (i) the construction works do not interfere with the convenience of the public or access to, use, and occupation of public or private roads, or any other access to properties, whether public or private. Temporary access to properties adjacent to the construction site will be provided through the construction of ramps with concrete slabs for use of pedestrians and light vehicles; (ii) in critical areas such as institutions, operating hours are factored into work schedules and workforce is increased for speedy completion; (iii) advance information on works to be undertaken including appropriate signages, is provided; and (iv) the diversion is done in coordination with the traffic police division for necessary rerouting of traffic and traffic management.	Design-Build Contractor and CSC
	Damages to utilities and services during construction	perm	Moderate	The contractor will be required to: (i) plan for immediate attendance by the service providers to any damages to utilities during construction; (ii) replace (or compensate for) public and private physical structures damaged due to construction or vibration; and (iii) provide prior public information about the likely disruption of services. In consultation and with support from DWASA, the contractor will provide alternative arrangements for water supply in the event of disruption beyond a reasonable time, for instance, through tankers.	Design-Build Contractor and CSC
	Loss or impairment of private property	temp	mod	written compensation arrangement and consent between property owner and contractor	Design-Build Contractor and CSC
		temp	mod		

Location	Potential Impact	Duration/ Extent	Mag	Mitigation Measures	Responsibility
All construction sites	Impact on construction site / work camp / borrow areas			The contractor will prepare site restoration plans for approval by the CSC. The plan will be implemented by the contractor prior to demobilization. On completion of the works, all temporary structures will be cleared away, all rubbish properly disposed by authorized contractor, excreta or other disposal pits or trenches filled in and effectively sealed off, and the site left clean and tidy, at the contractor's expense. The site will be restored to pre-project conditions through the removal of all extraneous material on site. During the site clearance and earthwork, it the necessary to be careful about the following: ● No soil erosion occurs, plantation can be done to protect soil erosion ● No landslides occur ● No siltation occurs at the disposal site of soil and debris. ● Application of geotextile (200mm thick grout-filled mattress) will be used for stabilization of the embankment at borrow areas	Design-Build Contractor and CSC
	Impact on soil and topography due to abstraction of construction material / due to construction activities	perm	mod	Responsibility of the contractor to- (i) obtain approval of implementing agency if new quarries and borrow sites are necessary, abstract construction material like gravel and sand from licensed quarries only (ii) store stripped materials as not to disrupt natural drainage and protect them to prevent erosion and migration of soil particles into surface waters; (iii) provide temporary ditches and/or settling basins to collect run-off water and to prevent erosion and contamination of surface water; (iv) plant exposed areas with suitable vegetation at the earliest opportunity and prevent ponding of water through temporary drains discharging to natural drainage channels; (v) restore sites after construction activities by stabilizing contours and slopes, spreading stripped materials to promote percolation and re- growth of vegetation, and draining any standing water. Land utilized for quarry sites access roads will also be restored,	Design-Build Contractor and CSC
	Disposal of bituminous wastes / construction waste / debris / cut material / hazardous substances	temp	mod	For project components involving demolition of structures, the contractor will prepare and implement a waste management plan. Safe disposal of the extraneous material will be ensured in the pre-identified disposal locations. To enable minimization of waste disposal and do this in an environmentally safe manner, the waste management plan will cover the following: (i) store used oil and lubricants in adequate storage facilities, reuse or remove from the site; (ii) manage solid waste according to the following preference hierarchy: reuse, recycle, or dispose of in designated areas; reuse bituminous waste generated in road construction, based on its suitability for reuse, to the maximum extent possible. Cut material generated because of construction will be utilized as filling material. Remaining material if any will be disposed of safely at the disposal sites; (iv) remove all wreckage, rubbish, or temporary structures that are no longer required; and (v) restore pre-project environmental conditions through the implementation of environmental restoration work.	Design Build Contractor and CSC
	Impacts due to excavation and	temp	mod	surplus soil for beneficial purposes such as in construction or to raise the ground-level of low-lying sites	Design Build Contractor and CSC

Location	Potential Impact	Duration/ Extent	Mag	Mitigation Measures	Responsibility
	generation of surplus soil				
	Erosion due to excavation/refilling	temp	mod	• Ensure proper compaction of refilled soil and there shall not be any loose soil particles on the top; the material shall be refilled in layers and compacted properly layer by layer • •Avoid scheduling of excavation work during the monsoon season • Confine construction area including the material storage (sand and aggregate) so that runoff from upland areas will not enter the site • Ensure that drains are not blocked with excavated soil	Design Build Contractor and CSC
	Stripping, stocking, and preservation of topsoil	temp	mod	The topsoil from productive agricultural lands, borrow areas, and areas to be permanently covered will be stripped to a specified depth of 200 mm and stored in stockpiles. The stockpile will be designed such that the slope does not exceed 1:2 (vertical to horizontal), and the height of the pile will be restricted to 2 m. Stockpiles will not be surcharged or otherwise loaded, and multiple handling will be kept to a minimum to ensure that no compaction will occur. The stockpiles will be covered with gunny bags or tarpaulin. It will be ensured by the contractor that the topsoil will not be unnecessarily trafficked, either before stripping or when in stockpiles. Such stockpiled topsoil will be returned to cover the disturbed area and cut slopes.	Design-Build Contractor and CSC
	impact on khals and on ponds	perm	mod	Trenching and backfilling operations at the stream crossings will be carried out in the lean seasons when the flow will be minimum. In case of crossings at existing minor bridges and culverts, the contractor will ensure that there is no impact/ disturbance to the bridges/culverts due to the crossing of the raw water pipelines.	Design-Build Contractor and CSC
Intake	River composition, local fish and amphibian population, and surrounding areas by dredging for Jetty and intake offshore.	temp	Mod	• Dredging should be undertaken only during the mid-days within a phase of the new & the full moon days. During these days, the tidal amplitude is the lowest in the particular moon phase. As the water movement is the least, siltation on marine biota can be minimised. • Choose advance technology for dredging. For example, CSD technology	Design-Build Contractor and CSC

237. Abb.: temp – temporary; mod – moderate; perm - permanent

Table 18: Operation Phase - Environmental Impacts and Mitigation Measures

Location	Potential impact	Duration / Extend	Mag	Mitigation Measures	Responsibility
	Environmental conditions	perm	mod	DWASA will undertake seasonal monitoring of air, water, noise, and soil quality through an approved monitoring agency. The parameters to be monitored, frequency and duration of monitoring, as well as the locations to be monitored will be as per the monitoring plan prepared.	DWASA, O&M Contractor

Location	Potential impact	Duration / Extend	Mag	Mitigation Measures	Responsibility
P1 area	No direct disturbance will be caused to the environment, Human activity increase on site, possible dangers due to rise of water level and cyclonic weather condition	temp	temp	• General precautionary measures will be taken not to cause any disturbance to the environment • Excessive manoeuvring of boats towards and away from the jetty. • Elastic anchor ropes will be used as a safety measures which can easily adopt to wave, tidal variations and water level fluctuations.	
	Check for blockage and leakage problems reducing the water losses	temp	mod	leak detection and water auditing to reduce the water losses	DWASA
	Environmental conditions due to sludge	perm	Mod	• Mechanical treatment: e.g. sedimentation, thickening • Physic Physical/chemical treatment: e.g. use of ferrous sulphate, lime and polyelectrolyte in coagulation, flocculation, • Ozonation, chemical oxidation (wet oxidation or wet peroxidation), adsorption of non- biodegradables on activated carbon • Biological treatment: e.g. (aerobic) activated sludge treatment, anaerobic digestion • Further sludge treatment: e.g. dewatering and drying by use of several aggregates (filter presses and centrifuges). • Final disposal of sludge on DNCC landfill (Matuail and Amin Bazar) and future landfill sites of DNCC	DWASA, O&M Contractor

238. Abb.: temp – temporary; mod – moderate; perm – permanent

X. Public Consultation and Information Disclosure

A. Public Consultation

239. Consultation with persons interested in or affected by project activities, forms a critical part of best practice project planning and environmental assessment. The active participation of stakeholders including local community, NGOs, etc., in all stages of project preparation and implementation is essential for successful implementation of the project. It will ensure that the P1 Project is designed, constructed, and operated with utmost consideration to local needs, ensures community acceptance, and will bring maximum benefits to the people. Public consultation and information disclosure are a must as per the ADB policy.

240. Most of the main stakeholders have already been identified and consulted during preparation of this IEE, and any others that are identified during project implementation will be brought into the process in the future. The stakeholders of P1 Project are: residents, shopkeepers, NGOs and business people who live and work near sites where facilities will be built (intake, 22 km raw water pipelines, and WTP).

241. On 18 May 2019, a public consultation meeting chaired by Mr A. Rahman Ex-Member, UP, Chaitankanda was held at village Chaitankanda. Discussion was held on environmental safeguard issue to GWT and sub-contractor Shangdong, Menard to care about environmental impact of sound, dust, water, and other impact to the project area. Md. Zakir Hossain, MDSC engineer provided a short briefing about the P1 Project activities.

242. Mr Saidur Rahman, DWASA environmental safeguard officer introduced the general environmental issues and expected beneficial impacts by DAWSA project.

243. Syed Latif, environmental expert of MDSC describes the environmental safeguard issue to the audience and explained that the ADB guidelines and GoB environmental policies and regulations must follow at the time of implementing the projects.

244. Dr Rafeza, MDSC LARP expert wanted to know from the local community if they apprehend any kind of problems with regard to land use, traffic movement, social disturbance to women and children due to mobilization of contractors in the field. They did not assume any kind of disturbance.

245. Last year, in 13 February 2018 similar consultation meeting was held at proposed WTP premises chaired by Mr Abdul Gani Mollah. Mr Iqbal of DORP delivered introductory speech followed by project familiarization. Other speakers were Mr. Imtiazul Haque, Syed Latif, Dr. Thomas Balling, Dr. Rafeza from the Consultant team, Mott MacDonald. The participants shared their ideas on different issued, detailed in social LAR section. Details are provided in Appendix-B.

246. During IEE consultations with the DoF and BFRI officials at the research station at Chandpur confirmed that (i) there are no areas identified as significant breeding grounds along Meghna near to the proposed intake, and the nearest breeding ground is the Chandpur sanctuary about 130 km downstream from the site; (ii) the proposed abstraction rates of less than 0.30% of the leanest flow shall not significantly impact the fish population or the livelihood of the fishermen communities; and (iii) suitable screens have to be designed at the intake location to minimize impacts on fishes, especially during the lean season. Screen size has been designed as 5mm accordingly.

B. Involvement of NGOs, CBOs and Women's Organizations

247. The active involvement of NGOs, and organizations representing women and other

vulnerable groups is seen by DWASA as essential in fostering positive community participation in the program and ensuring that the views and wishes of the disadvantaged are heard and acted upon. NGOs will perform a number of key roles in the project, in particular:

(i) An NGO named “DORP” has been appointed by the PMU to organize and implement the consultation and disclosure activities described above, and the various awareness raising campaigns;
(ii) The concern consultant and resettlement expert engaged for monitoring the activities, with the help of the NGO, may fulfil the role of Training Coordinator in the PMU. They will organize training for DWASA staff, environment and resettlement cells, and CBOs in community level;
(iii) DORP NGOs will be assisted to the PMU with other technical tasks.

248. The consultation process so far has solicited inputs from a range of stakeholders, including elected representatives, residents at the project locations, and project affected persons. The number of participants were:

Table 19: Summery of PC meetings

PC Meeting Date	% Female	Total Participants
13.02.18	14	72
18.05.19	4	47

249. Details of Consultation meetings are provided in Appendix-B.

C. Information Disclosure

250. Executive summary of the IEE will be translated in Bengali and made available at the offices of PMU- DWASA, and also displayed on their notice boards. Hard copies of the IEE will be accessible to citizens as a means to disclose the document and at the same time creating wider public awareness. Electronic version of the IEE in English and Executive Summary in Bangla will be placed in the official website of the DWASA, PMU and ADB after approval of the IEE by ADB. Stakeholders will also be made aware of grievance register and redress mechanism.

251. Public information campaigns to explain the project details to a wider population will be conducted. Public disclosure meetings will be conducted at key project stages to inform the public of progress and future plans. Prior to start of construction, the PMU will issue Notification on the start date of implementation in local newspapers A board showing the details of the project will be displayed at the construction site for the information of general public.

252. Local communities will be continuously consulted regarding location of construction camps, access and hauling routes and other likely disturbances during construction.

XI. Grievance Redress Mechanism

A. Complaints and Grievance Mechanism

253. A Grievance Redress Committee (GRC) has been formed at PMU level and will be established at the community level in each Union to resolve complaints and grievances informally through community participation. The GRC formed with representatives from the DWASA, local elected representatives from the Local Government Institutions (LGI), NGO AHs, women AHs to allow voices of the affected communities to be heard and ensure a participatory decision-making process. The representative of the INGO will have the responsibility as Member Secretary of GRC. The GRC decision will be disposing up on a priority basis and be publicized among the local communities. Where the complaining parties are not satisfied with the GRC decisions, they can file their cases in the court of law.

254. The GRC will be established at the community level at Union Parishad through a gazette notification from the Ministry of Local Government, Rural Development and Cooperatives (MLGRDC).

255. The Member Secretary of GRC will be regularly available and accessible for AHs to address concerns and grievances. Female member of GRC and the female APs of the AHs will participate in the grievance redress session when the complainants will be a female. Legal advisor and DORP will support the GRC regularly and assist the APs to formulate their complaints. The grievance cases will be recorded with details and results of the cases for review. Further to note, the affected people can also go to the GRC for any environmental concern.

B. Scope and Jurisdiction of GRC

256. The scope of work and Jurisdiction of GRC are:

(i) The Grievance Redress Committees (GRCs) will be established to ensure stakeholders' participation in the implementation process and fair compensation to affected persons.
(ii) The APs can also call upon the resettlement NGO to assist them in presenting their grievances or queries to the GRC.
(iii) The GRCs will receive grievance cases from the affected persons through the resettlement implementation NGO.
(iv) Other than disputes relating to ownership right and award of compensation by the Deputy Commissioner under the Court of Law, GRCs will review grievances involving all resettlement assistances, relocation, and other supports. Grievances will be redressed within 21 days from the date of lodging the complaints. In cases of complicated cases requiring additional investigations it will be resolved within a period of one month.
(v) Grievances of indirectly displaced persons and/or persons displaced during project implementation will also be addressed by the GRC.
(vi) Where land acquisition will not be involved but relocation of structures or vacating land for cultivation will be required, the GRCs will facilitate resolution of complaints regarding categorization of vulnerable affected persons, types of structures, and eligibility for compensation and assistance within the set guidelines and provisions of the resettlement plan.
(vii) Any complaints of ownership or other suits to be resolved by the judiciary system will not be resolved in GRCs. GRC will resolve all complaints, grievances related to compensation entitled by affected persons.
(viii) The decisions of the GRC should be ideally be arrived at through consensus, failing which resolution will be based on majority vote. Any

decision made by the GRC must be within the purview of social, resettlement and environmental policy framework.

(ix) A minimum of 4 (four) members shall form the quorum for the meeting of GRC.

(x) If needed the GRC members may undertake field visit to verify and review the issues at dispute, including titles/share, reasons for any delay in payment or other related matters.

(xi) In case the resolution is not accepted by the AP, the grievance will be forwarded to Project Director for final decision.

(xii)

C. Filling Grievance Cases and Documentation

257. APs will be able to file their grievances without any fear and intimidation. Where required, the implementing NGO will assist the APs in drafting the grievances. All grievances must be submitted in writing to the Convener, GRC. The complainant may be represented by APs him/herself or appointed agent such as locally elected officials/legal advisors. The judgment made by the GRC will be communicated to the concerned AP in writing. If dissatisfied, and with the agreement of the GRC, the AP may request a further review of the judgment of GRC by the Project Director. In such case, the case will be forwarded to the PD with all documents. If the disputant still remains unsatisfied, he/she can go to the court of law.

258. GRC procedures and operational rules will be publicized widely through community meetings and pamphlets in the local language so that APs are aware of their rights and obligation, and procedures of grievance redress.

259. To ensure access and fast response to any project-related grievances from the affected people and communities, contact numbers and names of focal persons in the DWASA PMU/SIU responsible for any complaints and grievances will be posted in public areas, contractor's field offices, UP offices, and NGO field offices.

260. All GRC documents will be maintained by the INGO for review and verification by MDSC and ADB. DWASA field offices will act as secretariat to the GRCs. As a result, the record will be up-to-date and easily accessible on-site.

261. The GRC meeting will be held in the respective field office of DWASA, DORP Office or other location as agreed by the Committee. If needed, the GRC members may take field visits to verify and review the issues at dispute, including ownership/shares, reasons for any delay in payments or other relevant matters. The complaints and grievances from the AHs will be addressed through the process described in the Table 20 below.

Table 20: Grievance Resolution Process

Steps	Action Level	Process
Step 1	Counselling	The NGO will recommend that the DPs submit their complaints to the GRC. NGO staff assists the DPs filing the complaints (maximum 7 days); Complaints and grievances from displaced person will first be heard during personal contact and focus group discussion at the village level with the involvement of the SIU social safeguard officer. If not resolved within 14days; The DORP will counsel AHs for gaps in information about the policy and eligibility for compensation and resettlement assistances. The DPs will sign and formally submit the written report to the GRCs at the office of the NGO assisting DWASA in implementing the RP; If the complaint found outside the mandate of the GRC, the DORP will advise the aggrieved AHs to lodge their complaints in the court of law at the district level. If the complaint is within the jurisdiction of GRC, the DORP will advise the aggrieved AHs to formally lodge their complaints with the GRC.
Step 2	GRC Resolution	Member Secretary of the GRC will scrutinize the complaints and prepare case file for hearing and resolution. A formal hearing will be held before the GRC at a date fixed

Steps	Action Level	Process
		by the Member Secretary of GRC in consultation with the convener and other aggrieved AHs. On the date of hearing, the aggrieved AHs will appear before the GRC at a place set in consultation with the AHs and DWASA and procedure proof in support of his/her claim. The Member Secretary will note down the statement of the complainants and documents with all proofs. GRC will deliver its decision on complaints/grievances within 21 days from the date of grievance received. The decisions from majority of the members will be considered final from the GRC and will be issued by the Convener and signed by other members of the GRC. The case records will be updated and the decision will be communicated to the complainant AHs by the Member Secretary of the GRC at the village level.
Step 3	Decision from PMU, DWASA	If any aggrieved AHs is not satisfied with the GRC decisions, the next option will be to lodge grievances to the Project Director of the DESWSP at Dhaka within two weeks after receiving the decision from the GRC. The AHs, in the complaint, must produce documents supporting his/her claim. The PD with the assistance of the Resettlement Experts, MDSC will review the proceedings of the GRC hearing and convey its decisions to the aggrieved AHs within two weeks after receiving the complaint.
Step 4	Decision from PD	If the resolution from PMU fails to satisfy the aggrieved AHs, they will facilitate to forward their case for further review and settlement with the office of the Chief Engineer, DWASA at Dhaka. The aggrieved AHs will submit the petition with all documentary evidences of complaints and the resolution proceeding of step 2 and 3 within two weeks after the decisions from the PMU.
Step 5	GRC Minutes Communicating	The GRC minutes, approved by the project director, will be received at the conveners' office. The approved verdict is communicated to the complainant DP in writing.
Step 6	Decision from Court	If the grievance redress system fails to satisfy aggrieved AHs, they can go/pursue further action by submitting their case to the appropriate court of law at the District level.

D. Approval of GRC and Entitlements of GRC Members

262. Upon formation, all GRC members will attend a training and orientation meeting prior to commencement of their work. The training will be conducted by the project staff and consultants/Resettlements Experts.

263. The GRC members (except DWASA and DORP representative) will be entitled to Tk.1000/meeting as honorarium from the implementing budget. Light snacks/refreshments will be provided during the meetings under the RP budget. DORP will make necessary stationery and other logistic available.

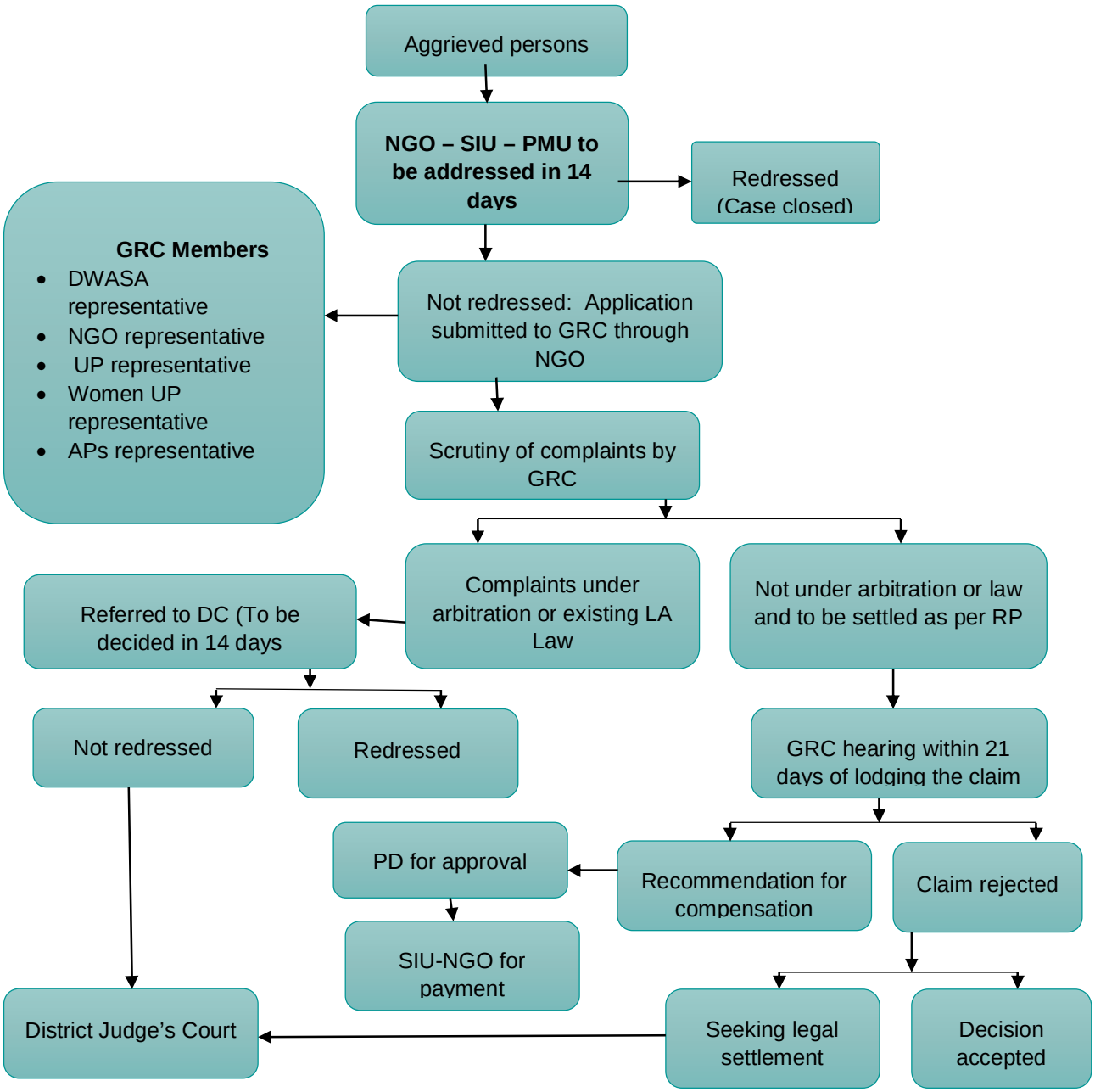
264. The Project Director, PMU, DESWSP will finally approve any decisions and proceeding of the GRC meetings. The approved GRC decisions will be implemented on site within the framework of the Resettlement Plan.

265. The details procedures for redress of grievances and the appeals process will be shared and documented.

266. The GRC could hear the grievances once in 15 days. Since the entire resettlement, process has to be completed before construction works starts. The GRC could meet more than once in every 15 days depending upon the number of such cases. The GRC will inform the concerned AHs of their decisions within 21 days of the hearing of the grievances. The GRC will continue during the whole construction period.

267. Appendix K provides the composition of GRC members at PMU level.

Figure 14: Grievance Redress Mechanism (GRM)



E. Grievance Redress Monitoring

268. The Deputy Project Director (Resettlement), PMU, DESWSP will keep records of all the grievances and their redress in monthly cumulative formats, which are to be signed by the Convener of the GRC. The format will contain information on the number of grievances received, resolved, and number of unresolved grievances. The monitoring information and findings on grievances will be included in the quarterly report to ADB.

F. Summary

269. The basic concern of the affected people is to get proper compensation for their lost land

and livelihoods in a smooth manner without the interference of any middlemen. The discontents of the locals can be mitigated following proper resettlement plan, which has already been prepared as a separate document.

270. The overall objective of the GRM is to create an effective communication channel between stakeholders to ensure a timely and effective bilateral feedback mechanism to address any environmental (terrestrial and aquatic) grievance redress submitted for the project, including from community members, construction workers and staff, local enterprises and other stakeholders, and awareness-raising the public about P1 project and the availability of the GR mechanism. The procedure for resolving grievance requires their resolution, conducted in the spirit of mediation between the parties, and must comply with the spirit of ADB standards and practices. The workers can also go the GRC for any issues and concerns during P1 project implementation.

XII. Environmental Management and Mitigation

A. Environmental Management Plan

271. An environmental management plan (EMP) has been developed to provide mitigation measures to reduce all negative impacts to acceptable levels. The EMP will guide the environmentally-sound construction of the P1 Project and ensure efficient lines of communication between DWASA, project management unit (PMU), consultants and contractors. The EMP will (i) ensure that the activities are undertaken in a responsible non-detrimental manner; (i) provide a pro-active, feasible and practical working tool to enable the measurement and monitoring of environmental performance on site; (ii) guide and control the implementation of findings and recommendations of the environmental assessment conducted for the subproject; (iii) detail specific actions deemed necessary to assist in mitigating the environmental impact of the Project; and (iv) ensure that safety recommendations are complied with. The EMP includes a monitoring program to measure the environmental condition and effectiveness of implementation of the mitigation measures. It will include observations on- and off-site, document checks, and interviews with workers and beneficiaries.

272. The contractor will be required to submit to PMU, for review and approval, a site-specific environmental plan (SSEP) including (i) proposed sites/locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes; (ii) specific mitigation measures following the approved EMP; (iii) monitoring program as per SSEP; and (iv) budget for SSEP implementation. No works are allowed to commence prior to approval of SSEP.

273. A copy of the EMP/approved SSEP will be kept on site during the construction period at all times. The EMP included in the bid and contract documents. Non-compliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance.

274. For civil works, the contractor will be required to (i) carry out all of the mitigation and monitoring measures set for in the approved SSEP; and (ii) implement any corrective or preventative actions set out in safeguards monitoring reports that the environmental inspectors will prepare from time to time to monitor implementation of this IEE and SSEP. The contractor shall allocate budget for compliance with these SSEP measures, requirements and actions.

275. The following Tables show pre-construction phase and construction phase potential environmental impacts, proposed mitigation measures and responsible agencies for implementation and monitoring.

276. Further to conclude, the environmental management will cover following activities:

(i) Preparation of a detailed Environmental Management and Monitoring Plan (EMMP) but with sections, which deal with any additional matters relating to specific project activities. The EMMP will address fully the nature and extent of other related agencies/departments involvement in environmental management, and will provide cost estimates for environmental management and monitoring;
(ii) Preparation of detailed designs which give due consideration to minimization of adverse impacts and benefit enhancement;
(iii) Preparation of tender and construction contract documentation which contains appropriate clauses to allow control of impacts arising from construction activities;
(iv) Acquisition of land and property to accommodate the proposed works.

277. Responsibility for reviewing of IEE, preparation of the EMMP, detailed design, and the preparation of tender and contract documentation lies with the study and design consultants, who are providing this service to DWASA. Overall responsibilities for environmental management in these respects will, therefore, lie with the consultant's Team Leader, supported by his environmental team, and the contract document specialist.

278. The management, design and supervision consultant will be responsible for preparing site plans showing the extent of land that will have to be acquired in order to accommodate the project works, together with an estimate of land and property acquisition costs, for inclusion in the project budget. Appendix-C presents recommendations for tender documents (Appendix-D Workers Health and safety). Other recommended documents are (a) Package 1 Bidding Document, DESWSP, (b) Condition of Contract for Construction, Multilateral Development Bank Harmonized Edition, General Conditions, Clause 4.18 Protection of Environment, FIDIC, June 2010.

Salient Features of Contract Clauses P1:

D&B part 3A-specification-Civil cluse 1.4.2: Interference with access to properties and services

"Before interfering with access to any property, contractor shall provide alternative arrangement for such access"

Section 6-D&B part 2E- Access Roads and Crossing Requirements, Clause 1.3 Pipeline Access Road- Para 3 :

"Culverts and other appropriate means of drainage shall be provided such that the pipeline access road shall not interface with natural drainage paths"

D&B part 3A-specification-Civil Clause 1.4.7: Works affecting watercourse and surface water drains-

2nd para:

"The Contractor shall maintain watercourses and drains within the site in effective working condition at all time"

4th para

"The Contractor shall take all reasonable precautions to ensure that no work in any water course or drain is done in such a manner as to cause unnecessary damage. And if any damage is done he will repair such immediately and for such repair no payment will be made to the Contractor."

B. Reporting

279. Construction: During construction phase, the contractor will supply regular package-specific monthly and quarterly monitoring reports to the MDSC-DESWSP Engineer (Construction Supervision Consultant (CSC-MML) covering all aspects of site-specific EHS activities. The monitoring reports will include data and information on environmental and social protection such as spill and non-compliance, health and safety such as, accidents and incidents, status of contractor's engineers and unskilled labor (numbers, grades, problems), community relations (complaints, issues), and relevant training. The CSC-MML will check the contractor's report and forward them to

the Employer (PMU, DESWSP, and DWASA), including any additional records concerning implementation of the EMP. DWASA will check the reports and forward to ADB. Semi-annual reports will be compiled in addition and summarize results of monthly and quarterly monitoring reports.

280. Operation: During P1 operation, reporting will be developed and circulated to the DESWSP, DWASA by the O&M Contractor and Consultant.

281. Monitoring during operation includes monitoring and reporting of the quality of the treated water being supplied to the community, routine operation and maintenance of the components of the WTP, water quality parameters include microbiological, physical and chemical parameters. Parameters and frequency of tests are listed in Annex "Section 6 – O&M Schedule 4 – Monitoring and Metering" (tables 4.2, 4.4). Treated water requirements for these parameters are listed in Annex "Section 6 – O&M Schedule 01 - Service Requirements", (tables 2.1, 2.2, 2.3). A laboratory will be established at the WTP for the implementation of water quality testing.

282. As described, the EHS monitoring reports will include mitigation measures undertaken, monitoring activities undertaken, details of monitoring data collected, and analysis of monitoring results, environmental and social training conducted, and EHS regulatory violations. The EHS monitoring reports will be submitted to ADB twice annually (as Semi-annual Environmental Monitoring Report) during project implementation (a) at pre-construction-should set up a program of sampling, testing, parameters, frequency, location, (b) actual detailed reporting during construction by MDSC, and (c) less reporting-set up a program during operation by PMU, and annually for three years after completion of construction.

283. Project Completion Environmental Monitoring Report: Regular reporting and final reporting after completion of construction, the Executing Agency (EA) shall submit a Project Completion EHS Monitoring Report to ADB which will summarize the overall EHS impacts from the project.

284. The Table of Content of reporting format is in Appendix H.

Table 21: Construction Stage Environmental Monitoring Plan

Monitoring Field	Monitoring Location	Monitoring Parameters	Frequency	Responsibility	Cost and Source of Funds
Construction disturbances, nuisances, public and worker safety	All work sites	Implementation of dust control, noise control, traffic management, and safety measures. Site inspection checklist to review implementation is appended at Appendix-N	Weekly during construction	Supervising staff and safeguards specialists	No costs required
Ambient air quality	10 locations (to be selected during implementation to represent the overall project area)	PM10, PM2.5 NOx, SO_2, CO	Once before start of construction Quarterly (yearly 4-times) during construction (2-year period considered)	Contractor	part of construction costs

Monitoring Field	Monitoring Location	Monitoring Parameters	Frequency	Responsibility	Cost and Source of Funds
Ambient noise	10 locations (same as air quality monitoring)	Day time and night time noise levels (24 hours)	Once before start of construction Quarterly (yearly 4-times) during construction (2-year period considered)	Contractor	Part of construction costs
Water quality (River crossings required for the transmission lines at various canals at RWP alignment)	Gandhabpur At 150 m downstream of river / stream crossings and intake location	TDS, TSS, pH, Hardness, BOD and Fecal Coliform)	Once before start of construction. Twice a year (pre monsoon and post monsoon) for the entire period of construction	Design-Build Contractor to be monitored through approved monitoring agency and PMU (DWASA and SC)	Part of construction costs

Table 22: Operating Stage Environmental Monitoring Plan

Monitoring Field	Monitoring Location	Monitoring Parameters	Frequency	Responsibility	Cost and Source of Funds
Surface water quality	WTP	23 parameters defined in the National Standards for Drinking Water Quality	Daily, during the operation of the facilities	DWASA, O&M Contractor	Part of O&M costs
Leachate monitoring	At the location of the sludge-drying bed at the treatment plant	Leachate quality, TDS, TSS, pH, hardness, BOD, fecal coliform	Twice a year before, during and after the monsoons	DWASA, O&M Contractor	Part of O&M costs
Survival rate of landscaping, tree plantation	In the areas where plantation/ landscaping proposed	Survival rate	Twice a year for 2 years	DWASA, O&M Contractor	Part of O&M costs
sludge management	WTP	Day time and night time noise levels (24 hours)	Once before start of construction Quarterly (yearly 4-times) during construction (2-year period considered)	DWASA, O&M Contractor	Part of O&M costs
Socioeconomic monitoring	DPs impacted due the project components	Income levels livelihood options	Once a year for 5 years from the completion of the project	DWASA	

C. Sludge Management

285. This section presents information in reference to EIA approved by DoE in December 2018. The consultant prepared the sludge management system as per DoE Guideline specified in the “Standards and Guidelines for Sludge Management, February 2015.

286. The project authority prepared Sludge Management Plan and submit to DoE as part of the environmental clearance information require for water treatment plant.

287. Depending on the origin of the wastewater sludge the present project sludge can be classified as Category A as per guideline: Municipal Sludge Including Comparable Sludge.

288. 1. The sludge management plan submitted to the Department of Environment which include:

(i) Name and address of project authority: Company and address of the producer, if the wastewater originates in industry, company and address of the industry or in the case of central effluent treatment plants the same from industries producing the wastewater,
(ii) The amount of sludge that is to be expected per year in tonnes dry matter (t DM/yr),
(iii) The amount of sludge produced in the previous year in tonnes in dry matter (t DM/ yr)
(iv) The origin of the wastewater classified as in Annex 2B,
(v) The classification of sludge as described in Chapter 2 of guideline,
(vi) Planned option for safe disposal or uses as described in Chapter 3 of guideline,
(vii) Documentation on fulfilment of requirements relevant for this option as described in Chapter 3,
(viii) DoE Registered company/vendor and address of further parties involved in sludge management including collection, transport, recovery and disposal of sludge, including the supervision of such operations and after-care of disposal sites,
(ix) Documentation on suitability of recovery or disposal plant or site,
(x) Company and address of the laboratory accredited by the appropriate authority

Sludge management options

289. Pre-Treatments

290. Before the sludge is disposed of, it is required to apply pre-treatment in order to implement the “3R-principle” (reduce, reuse and recycle) which is a central component of the National 3R Strategy for Bangladesh (DoE). The main goal of pre-treatment is to minimize the volume and the organic matter of the sludge in order to reduce waste volume that must be disposed of and to enable a safer disposal. If the waste has to be transported e.g. to a central disposal facility, a pre-treatment would ensure better characteristics.

291. Possible treatment types for industrial wastewater and sludge from industrial wastewater are the following:

(i) Mechanical treatment: e.g. sedimentation, thickening
(ii) Physical/chemical treatment: e.g. use of ferrous sulphate, lime and polyelectrolyte in coagulation, flocculation,

(iii) Ozonation, chemical oxidation (wet oxidation or wet peroxidation), adsorption of non- biodegradables on activated carbon
(iv) Biological treatment: e.g. (aerobic) activated sludge treatment, anaerobic digestion
(v) Further sludge treatment: e.g. dewatering and drying by use of several aggregates (filter presses and centrifuges).

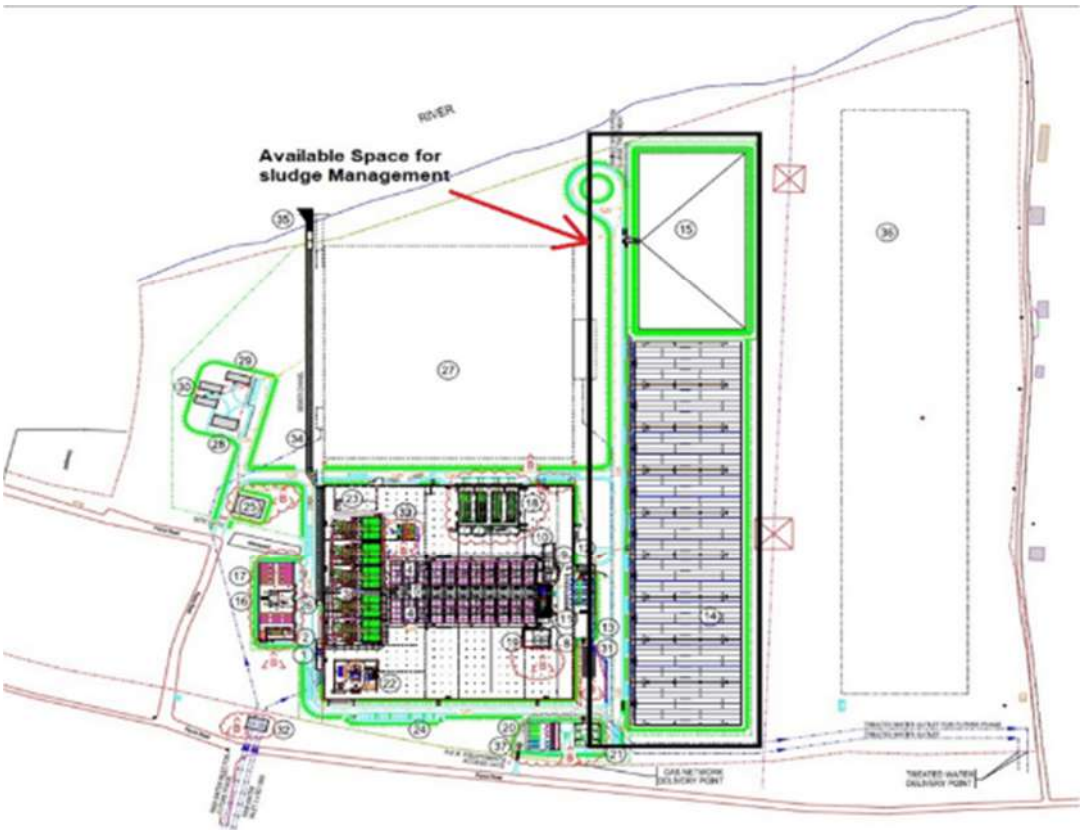
Sludge Management System

292. The sludge line is composed of drying beds for the sludge dewatering. When dewatering in drying beds is not possible (for example because of climatic conditions), sludge is stored in a lagoon until more favourable conditions appear. All waste shall be disposed to designated and approved dumping area no more than 10km from the boundary of the Site of the Water Treatment Plant. The Employer shall identify and provide the Contractor with this location. Matuail Waste Treatment Plant is located approximately 10 km from the project's WTP site but is at full capacity, there alternative sites are to be found.

293. The areas for phase 1 and for phase 2 (dotted line) are clearly separated. Thus, the construction of the second phase of the project shall have little impact on the well-functioning of the phase now proposed. The water treatment plant shall be located and constructed in parallel to the first phase. The sludge treatment can be constructed entirely in the other side of the electric line.

294. Ensuring the protection of the equipment regarding maximum flood level: indeed, the motors and equipment which are not submersible are placed on the top slab of the treated water tanks, whom level is above the maximum flood level (8.5 m PWD).

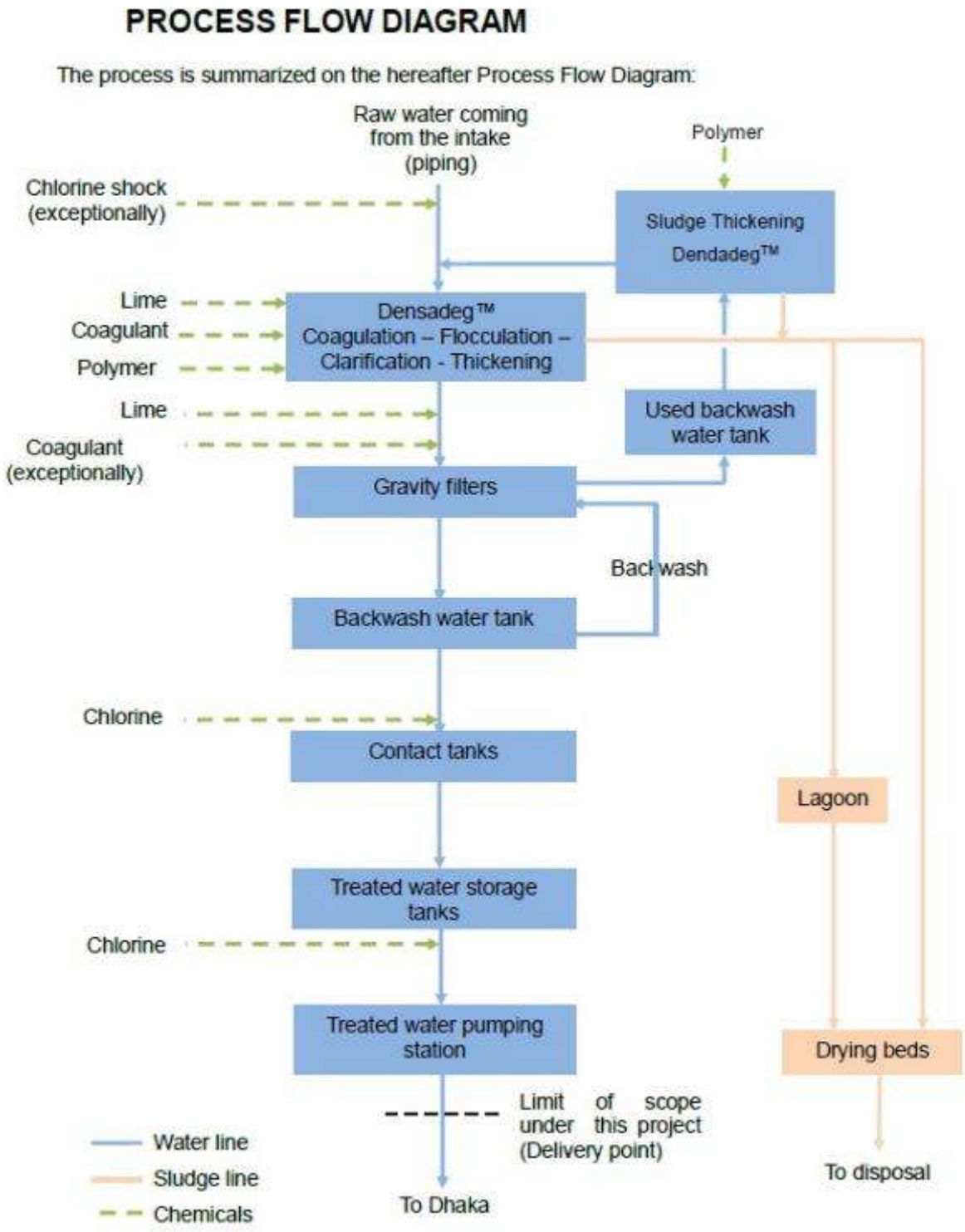
Figure 15: Available Space for Sludge Management



Process Flow Diagram of Sludge Treatment

295. The process is summarized on the hereafter Process Flow Diagram:

Figure 16: Process Description of the Sludge Treatment Line



Design Philosophy

296. As described previously, the Densadeg™ allows the thickening of the sludge inside the clarifier. The concentration of the sludge from the Densadeg™ clarifiers is between 20 and 40 g/L, depending on the raw water quality. It is higher than conventional clarifiers,

which usually produce sludge with concentration about 5 g/L and close to concentration obtained using conventional thickener.

297. As described previously, the suspended solids contained in the used backwash water, from the filtration stage, are concentrated in two Densadeg TM thickeners. The sludge will be sent to the sludge treatment line too.

298. Consequently, the sludge can be treated directly on drying beds without intermediate thickening.

299. Since the performance of drying beds is strongly linked to the weather, the consultant made a study of the climatological conditions of Dhaka (data from the licensed database METEONORM).

300. The conclusion of this study is that the sludge cannot be dried from April to October because the evaporation rate is negative or too slightly positive to be significant. It means that the amount of precipitation is more important that the amount of evaporated water: the water accumulates instead of being removed.

301. Hence, the consultant has chosen the following operating principle:

(i) During the 7 wet months (April to October), the sludge is stored in lagoons where thickening occurs.
(ii) During the 5 dry months (November to March), the sludge from the clarification stage and the settled sludge from the lagoon are treated on drying beds to reach the required dryness and consequently evacuated from the site.

302. The design of the sludge line is based on the average value of suspended solids in raw water, that is to say 10.3 mg/L

Filtration step sludge thickening

303. Advantages of Densadeg ™

304. As said previously in the clarification step, the Densadeg ™ is very well adapted in thickening.

305. It is a work which associates clarification of the influent and thickening of the sludge. For this use only flocculation will be necessary.

306. The same equipment will be used for clarification in the water line and for thickening of the used backwash water. Instead to recirculate water with more than 100 mg/l of SS to the inlet of clarification step, the recycled water will have a concentration of 10 m/l. And the removed suspended solids will be concentrated at 30 g/l.

307. As previously said for the clarification, the advantages of the DENSADEG™ are various compared to usual thickening methods:

(i) A compact solution and a reduced footprint thanks to a high clarification velocity allowed by high density flocs,
(ii) The formation of homogenous and very dense flocs due to performant flocculation: the sludge recirculation allows permanent high floc concentration in the flocculation chamber. This system increases the probability for tiny floc made during coagulation to meet each other and to grow in a bigger floc,
(iii) A combined clarification of the water and thickening of the sludge

blanket in the same tank,

(iv) A clarified water with a good quality thanks to lamellar clarification decreasing Hazen velocity at the top of the clarifier to let residual particles sediment and ensure low turbidity at the outlet,

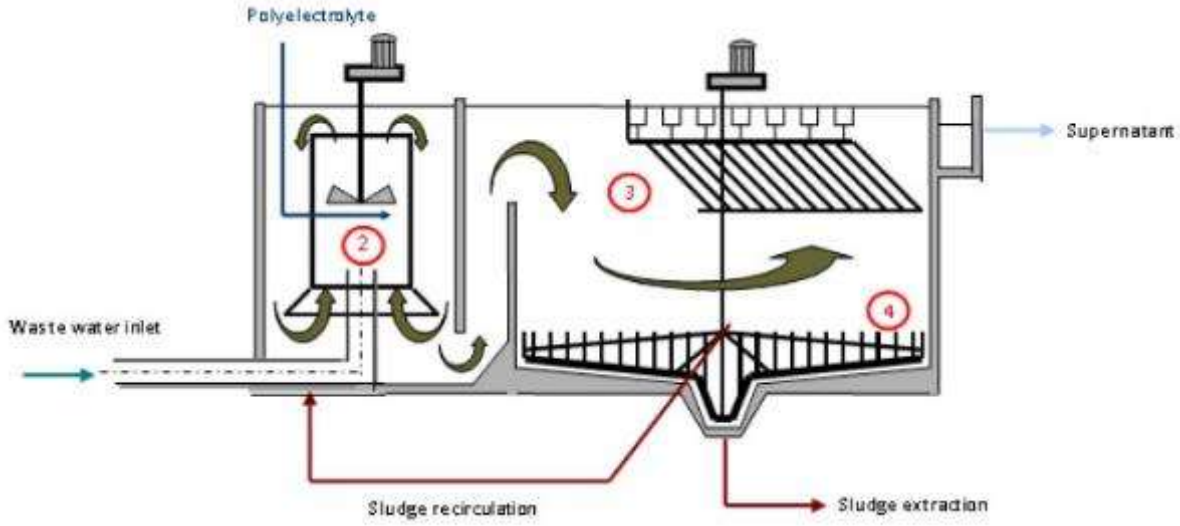
(v) A good response to water quality fluctuations and a large scale of flow range operation thanks to sludge recirculation flow rate which can be adjusted in order to keep constant concentration in the flocculation chamber.

Densadeg ™ principles

308. The thickening of the used backwash water is equipped with 2 Densadeg™ units running in parallel. In case of maintenance of one or both thickeners, a by-pass pipe allows to send the 50% or 100 % of the used backwash water to the clarification step. As said in our previous technical offer, this case doesn't' alter the operation of the clarification step.

309. As the water coming from the filtration backwash has already received a coagulation and flocculation treatment, for the thickening only polymer will be added (Figure 17).

Figure 17: Densadeg™ Thickener



Flocculation

310. The used backwash water enters the system and is transferred into the reaction zone and introduced through the base of the reactor basin and discharged beneath an axial flow impeller. Inside this draft tube, polymer is injected through a distribution ring to aid in the flocculation and settling ability of the particles. Recycled solids are introduced in the inlet pipe to the reactor to aid in flocculation. The movement of the impeller provides sufficient energy for the mixing of the chemicals and raw water. It additionally acts as an axial flow pump by drawing previously formed solids, which settle external to the flume, into the base of the flume. This internal recycling of previously formed solids enhances the solids contact process and increases the speed of the reactions.

Settling and thickening

311. Next, the densely structured precipitate is transitioned from the reactor basin through a piston flocculation zone to the clarification and thickening zone. As the water flows under the baffle and upwards into the tubes, the solids downward momentum carries them to the bottom of the thickener basin. Here the solids are allowed to thicken with the aid of a slowly rotating scraper mechanism that pushes the sludge into a sludge

hopper located at the bottom of the clarifier/thickener basin. The thickened sludge (2-4%) is periodically discharged from the hopper.

312. A part of the sludge inventory is recycled back to the reactor basin, thereby increasing the solids in the reactor and improving the performance of the process. Clarified water proceeds beneath the aforementioned baffle into the clarification zone. Additional solids removal is achieved by the use of tubes incorporated into the top of the clarification zone. Moving through the tubes, finished water is collected through a series of launders or laterals which discharge treated water into the effluent trough.

Polymer dosing system

313. Polymer is dosed at the inlet of the flocculation zone of each thickener to achieve a good floc and to ensure the settling of the sludge. To increase the settling by improving flocculation, polymer is also dosed in the sludge recirculation loop. This double injection ensures an optimal flocculation.

314. The polymer dosing pumps will be added to the “existing” two preparation stations. The capacity of these two-preparation station will be adjusted to deliver the excess polymer quantity.

315. A total of three progressive cavity pumps are provided:

316. 3 pumps (2 in duty + 1 stand-by) for the feeding of polymer at the inlet of the flocculation zone of each clarifier and on the recirculation loops.

317. That means we shall have one (1) dosing pump per thickener. A flowmeter is installed at the discharge of the pump and another one at the injection point of the reaction zone. The adjustment of the polymer in the recirculation loop is achieved by an “adjustment valve”, located just before the connection at the recirculation loop. If, for example, we want to distribute the polymer as follow:

318. 60% for reaction zone

319. 40% for recirculation loop

320. We shall set the adjustment valve to have 60% of the dosing pump flow at the reaction zone.

Clarified water pumping station

321. The clarified water is collected in a pumping pit. This pit is equipped with three (1 duty + 1 stand-by) pumps. The discharge pipe sends the water upstream of the clarification step. The bypass pipe of the thickeners is connected on the discharge pipe.

322. Lagoons are usually used to dewater sludge both by:

(i) Gravity settling,
(ii) Evaporation from the surface exposed to the air, after removal of the clear water-phase.

323. In our case, the separation is only based on gravity settling. In dry season, a removable pump is installed to extract settled sludge to drying beds after removal of the clear water-phase.

324. The lagoon is open air, an overflow will allow to evacuate the surplus rain water to the river.

325. The clear water phase sent to the river is measured by flowmeter.

Drying Bed Design

326. Drying beds are used to dewater sludge both by:

(i) Draining through the sludge mass (percolation),
(ii) Evaporation from the surface exposed to the air.

327. Drying beds consists of two layers of sand with a different granulometry, which are placed over a layer of gravel. A geomembrane liner assures the waterproofing of the drying beds. Filtrate is collected by an underdrain piping system and discharged to the river.

328. The total beds area is 22 500 m2, divided into 9 individual drying beds.

329. Beds are filled one after the other. The indicative duration of a complete cycle is one month, including approximately:

(i) 3 or 4 days of filling/percolation,
(ii) 22 days of drying,
(iii) 2 days left for the removal of the sludge.

330. The number of beds and the duration of the filling phase allow the succession of the cycles: when the ninth bed is full, the first bed is available again.

Figure 18: Sludge Drying Bed layout

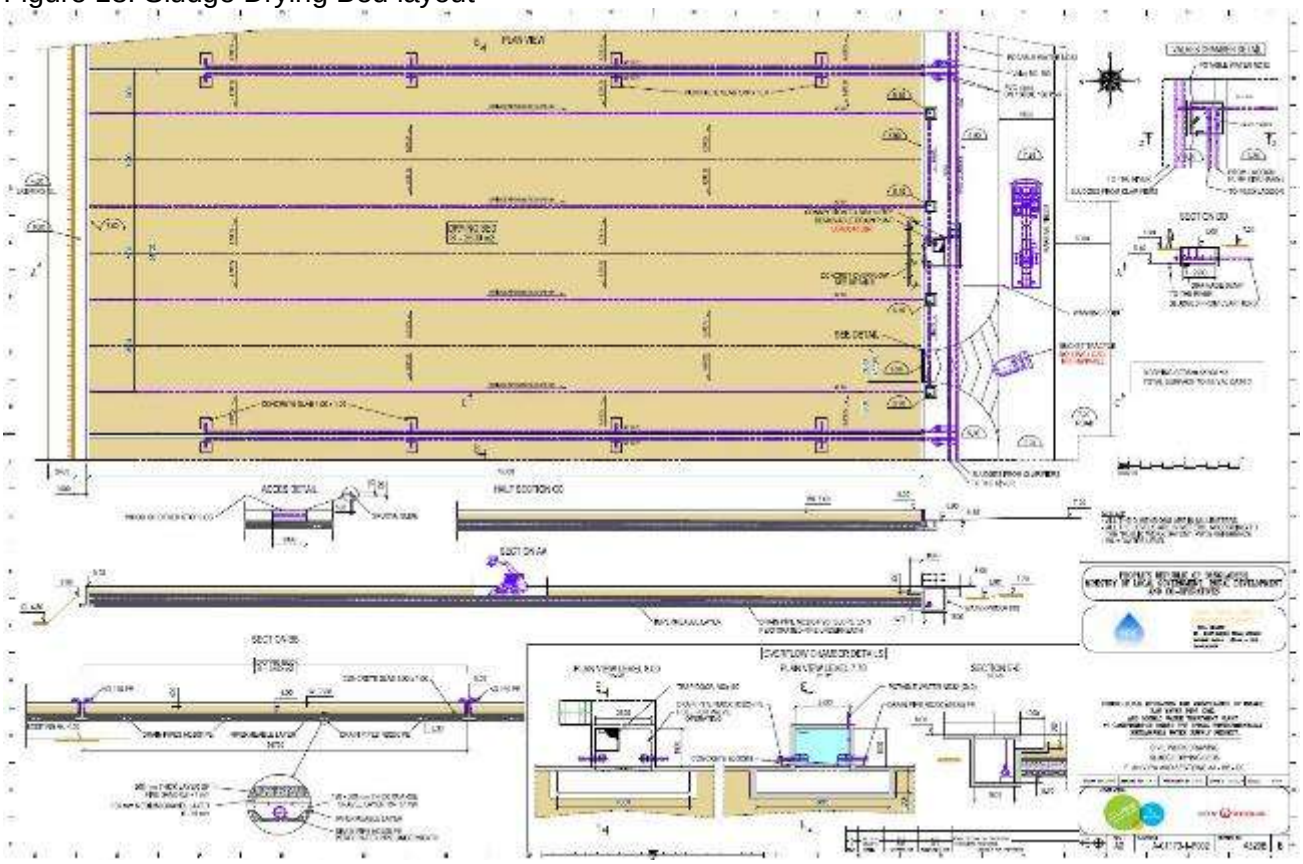
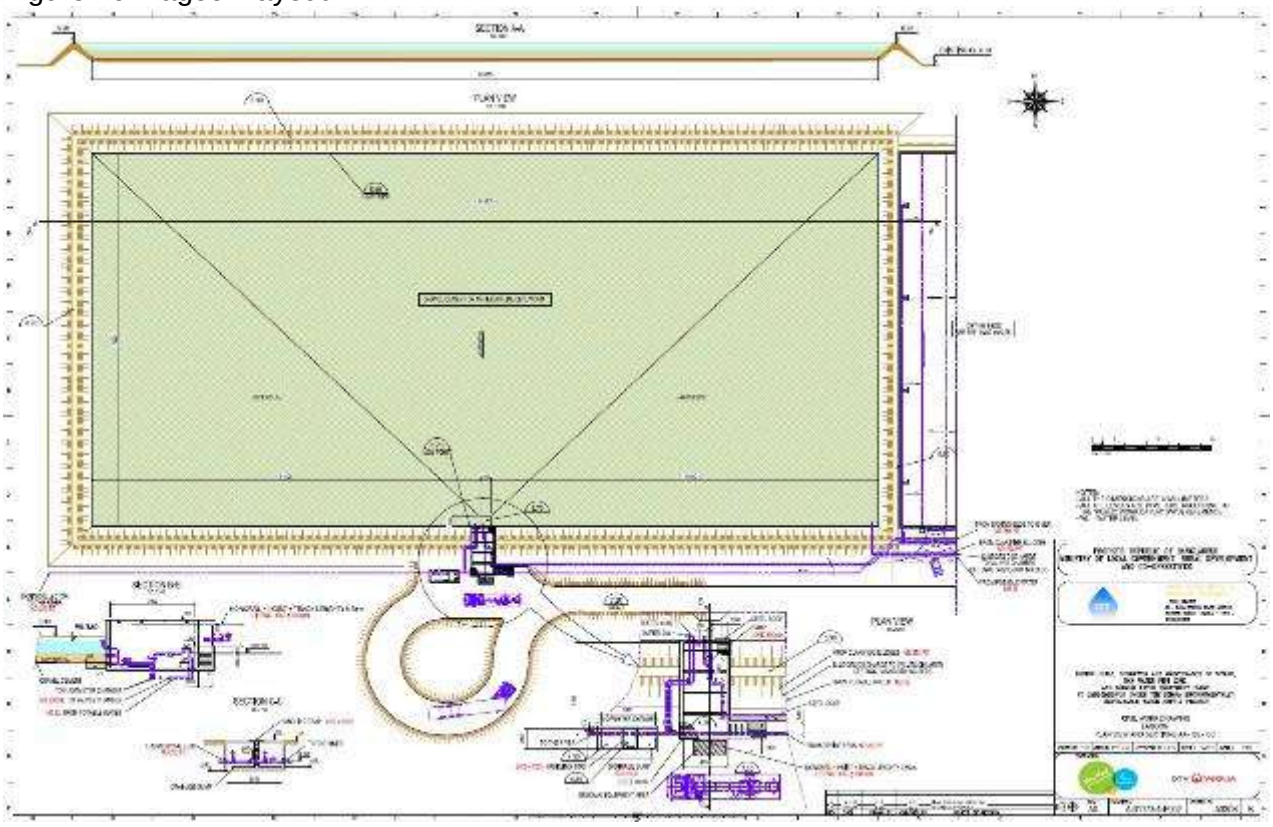


Figure 19: Lagoon layout



Calculation notes

331. The hereunder calculation note brings the following information:

332. The figures indicated in this calculation note are the ones on which our design is based. The guarantees are indicated in the table related to treated water quality.

333. Sludge production for sludge treatment line

334. Average sludge production

335. Daily sludge production

336. Hourly sludge production

Sludge production for drying beds		
Average sludge production	kg/d	1291,0
Daily sludge flow	m^3/d	43,1
Hourly sludge flow	m^3/d	1,8

Process description	Unit	Design flow in O&M conditions
Characteristics of clarified water		
Hourly flow	m^3/h	423
Daily flow	m^3/h	10150
Running time	h/d	24
Suspended solids in water	mgSS/L	10
Suspended solids hourly flux	kgSS/H	4
Suspended solids daily flux	kgSS/H	101

SLUDGE COMING FROM DENSADEG		
Inlet data		
Suspended solids load coming from Densadeg (water line)	kgMS/d	5.564
Suspended solids flow coming from Densadeg (water line)	m^3/d	185
Suspended solids load coming from Densadeg (sludge line)	kgMS/d	1292
Suspended solids flow coming from Densadeg (sludge line)	m^3/d	43
Total Suspended Solids load	kgMS/d	6856
Total Suspended Solids flow	m^3/d	229
Sludge concentration	g/L	30
Sludge Treatment		

Sludge storage in lagoon (during 7 months)		
Storage duration	days	314
Suspended solids in lagoon after 7 months	kgSS	1467111.9
Sludge blanket concentration	g/L	60
Sludge blanket volume after 7 months	m^3	23610

Surface area of the lagoon	m^2	10.875.0
Height of the sludge blanket	m	2.2
Total height in the lagoon (sludge blanket and supernatant)	m	2.7

Sludge dewatering in drying beds (during 5 months)		
Number of days in drying beds	d	151
TSS coming from the Densadeg	kg/d	6856.7
TSS coming from the lagoon	kg/d	6990-11500
TSS sent to the drying beds coming from the lagoon+ Densadegs	kg/d	13852-18362
TSS concentration after percolation phase	g/L	135
TSS loading rate	kg/d/kg	13852+18362
TSS mass loading	SS/m^2/cycle	19-25
Cycles duration	days	30
Surface area	m^2	22500
Expected final TSS dryness	%	25% (5 months)

Installation

337. The design of the sludge area is thought to ease operation of sludge removal:

(i) Access ramp into each drying bed,
(ii) Dedicated parking area for truck next to each bed to avoid any traffic disturbance on site,
(iii) Turning area.

Disposal of Sludge

338. Option 1: The thickened sludge will be stored in a sludge lagoon mainly in the rainy season (April-October) and in the dry season (November-March) sludge will sent to directly sand drying bed for making cake. Finally building block/brick will be prepared by using the cake. This building block and/or brick will be used as a construction material. This building block/brick will be prepared in such a way that aluminium rich sludge will not leach aluminium because it will be trapped inside of the block and brick. After O&M contract and defect liability period DWASA will take over and ensure regular maintenance of the sludge drying beds at the WTP.

339. Option 2: Generated aluminium-based sludge during operation of the WTP will be disposed after making cake at the proposed landfill site at Matuail (or) Amin Bazar in Savar (after discussions with DNCC), Dhaka, about 10km to 25 km from the WTP at Gandharbpur.

340. Option 3: Until further landfill site develops, the project authority will store the dried sludge in their own land with proper lining near at Gandharbpur WTP plant.

341. Option 4: Reuse of sludge will be explored after field test for further use to meet the government standards. Extraction of aluminium from the chemical sludge shall be explored for reuse of aluminium in the process again or sale to the market.

D. Implementation Arrangements

342. DWASA is the Executing and Implementing Agency for the DESWSP, responsible for management, coordination and execution of all activities funded under this project. PMU, established within the DWASA, will implement the project. PMU will be headed

by a Project Director (PD). PMU with the support of MDSC Consultant will be responsible for planning, implementation, monitoring, supervision, and coordination of all activities under the DESWSP.

343. The DWASA will be responsible for day-to-day monitoring of project activities and will ensure compliance with the statutory and legal requirements of the Government, and ADB policy. The DWASA will prepare and submit an this updated IEE and future Project Monitoring Reports to ADB. The DBO contractor will bring responsibility of implementation of EMP. EMP implementation will be the part of the DBO contract document. All cost for implementing EMP will be the part of the civil works contract and to be quoted by the contractor in their proposal as per this IEE.

344. This IEE will be the part of the contract document. Environmental monitoring will be done during construction in three levels; namely:

(i) monitoring development of project performance indicators done by the Environmental Experts of the Design Supervision Consultant (Dr Thomas Balling, International Expert and Syed Latif, National Expert.
(ii) monitoring implementation of mitigation measures done by the Contractor
(iii) and overall regulatory monitoring of the environmental issues done by Safeguard Officer (Environmental Mr Saidur Rahman) and Safeguard Officer (Social and Gender, Mr Tofazzal Hossen), PMU of the DWASA.

345. The environmental monitoring plan for the Project is presented in **Error! Reference source not found.**. The table shows proposed monitoring of all relevant environmental parameters, with a description of the sampling stations, frequency of monitoring, applicable standards and responsible agencies. The monitoring of the environmental attributes in the first season (first year of implementation) will be carried out prior to the start of implementation works at the site and shall form a baseline for the environmental parameters. Monitoring will be the responsibility of civil works contractors who would likely outsource this responsibility.

E. Capacity Building

346. At DWASA, the present capacity on safeguards planning and implementation is not adequate to handle safeguard issues. To ensure effective implementation of environmental aspects as outlined in this IEE, a DWASA environmental safeguard officer/responsible person is already on board to oversee Environment Management Plan (EMP) implementation. The Design Supervision Consultant's Environmental Specialists is also on board, and working intermittently (as per project requirement). Further, he will train and assist the DWASA according to the training program outlined below, to ensure smooth implementation and monitoring of the EMP.

347. The proposed capacity building program will include (i) sensitization of DWASA staff and stakeholders on environmental management, including on the ADB, and Government of Bangladesh requirements on environment; (ii) capacity building programs to improve the capability of environment staff at all levels in carrying out/monitoring and implementing environmental management measures for the Project; and (iii) capacity building programs on environmental issues including quality monitoring. The Environmental Specialist of the Project Management Design and Supervision Consultant (PMDSC) will provide the basic training required for environmental awareness followed by specific aspects of infrastructure improvement projects along with environmental implications for projects. Specific modules customized for the available skill set will be devised after assessing the capabilities of the members of the Training Program and the requirements of the Project. The entire

training would cover basic principles of environmental assessment and management mitigation plans and programs, implementation techniques, monitoring methods and tools. The proposed training program along with the frequency of sessions is presented in Table 23Table 23. Further to note that, environmental training will be implemented before construction activities will start.

Table 23: Training Modules for Environmental Management

Program	Description	Participants	Form of Training	Duration	Trainer /Agency
Introduction And sensitization to environment issues	Sensitization on Environmental Concerns Environmental impacts of urban infrastructure improvement projects Environmental regulations of the Government and ADB environmental regulations Coordination between departments for implementation of environmental issues	DWASA engineers / management team, officials responsible for implementing the Project, and other DWASA Officials, environmental inspectors	Workshop	One-day workshop during construction	Project Management, Design and Supervision Consultant's Environmental Specialist/ DWASA
Project training on hazards, health, safety and environmental issues pertaining to the Project	Sensitization and training for engineering and Management professionals, to be involved in on-site execution and operation of the proposed facilities.	DWASA engineers/ management Team, environmental inspectors	Workshops, site visits	Three days before and during construction	Tailor made training programs by the Safety Board of Bangladesh (ISBB), College Engineering Staff etc. organized by Contractors
EMP implementation	Implementation of EMP Identification of environment impacts Monitoring and reporting for EMP Public interactions and consultations Coordination for consents with various departments Monitoring formats filling and review of impacts	DWASA engineers, officials responsible for implementing the Project, and other DWASA / Design Supervision Consultant staff	Lectures and field visit	Two-day session at construction stage	Project Management, Design and Supervision Consultant's Environmental Specialist

F. Environmental Budget

348. As part of good engineering practices in the project, there have been several measures such as erosion prevention, rehabilitation of borrow areas, occupational health and safety, community safety, traffic safety during construction, syngas, provision of temporary drains, etc., the costs for which will be included in the design costs of the project. The IEE costs include monitoring costs during construction and capacity building costs on environmental management of which are absorbed into contractor's work packages. The costs for training proposed include the costs incurred toward site visits, travel to the training program by participants, printing of training materials, and other logistic arrangements. The costs involved towards preparation of training material and training are covered in the consultancy budget for the Design Supervision Consultant. The budget for the environmental management costs for the Project is presented in Table 24 below.

349. The cost estimates mentioned in Table 24 is an indicative price. The bidder can provide their own reasonable quoted rate. The bidder will include the detail cost of EMP in the

Summary Cost Table.

350. Further to note, this budget (USD 20,560.97, indicated in Table-24 of IEE) should be reviewed by the Contractor, and used for implementing the EMP.

351. As such, these costs have been included in the Contract Document along with a copy of IEE (Appendix R). The EMP implementation integrated in PAM, and in bid and contract document has been reviewed by the Contractor.

Table 24: Cost Estimates to Implement the EMP

Sl. No.	Particulars	Stages	Unit	Total number	Rate (BDT)	Cost (BDT)	Costs covered by
● Mitigation Measures							
A 1	Environmental mitigation / enhancement measures integrated into the designs and costs included as part of civil works	Construction	LS			400,000.00	DB Contractor (Design Build Contractor)
A2	Compensatory plantation Measures for P1	Construction	Per Tree	3000	1500	4,500,000	
	Sub-Total (A)					850,000.00	
● Monitoring Measures							
B 1	Air Quality monitoring	Construction	Per location	10	20,000.00	200,000.00	DB Contractor
B 2	Noise level	Construction	Per location	10	7,500.00	75,000.00	DB Contractor
B 3	Noise level	Operation	Per location	2	7,500.00	15,000.00	DWASA
B 4	Water Quality monitoring	Construction	Per location	4	8,000.00	32,000.00	DB Contractor
B 5	Water Quality monitoring	Operation	Per location	3	8,000.00	24,000.00	DWASA
B 6	Adequacy of solid waste management system	Post construction & operation	Per visit	4	10,000.00	40,000.00	DWASA
B 7	Survival Rate of Plantation and landscaping	Operation	Per location	4	25,000.00	100,000.00	DWASA
B 8	Socioeconomic monitoring	Operation	Per location	4	25,000.00	100,000.00	DWASA
	Sub-Total (B)					586,000.00	
C	Capacity Building						
C 1	Introduction and sensitization to environmental issue	Pre-construction	LS	-	-	50,000.00	DB Contractor
C 2	Project training on hazards, health, safety, and environmental issues	Pre-construction	LS	-	-	100,000.00	DB Contractor
C 3	EMP implementation	Construction	LS	-	-	100,000.00	DB Contractor
	Sub-Total (C)					250,000.00	

Sl. No.	Particulars	Stages	Unit	Total number	Rate (BDT)	Cost (BDT)	Costs covered by
	Total (A+B+C)					16,86,000.00	
	Total (in USD) @ 82.0 Taka					20,560.97	

XIII. Conclusion and Recommendations

352. The proposed P1 project will not have any significant adverse impacts on the environment since the project activities will be limited within the intake site at Bishnondi, 22km raw water pipeline corridor of land, and WTP site at Gandharbpur which are already acquired by the Government. The impacts of the project are site-specific, reversible and are confined within the property. The site is not an ecologically sensitive area.

353. Most of the adverse impacts are likely to occur during the construction phase and are considered as temporary in nature. The anticipated adverse environmental impacts are manageable and can be mitigated through proper design and consideration of the proposed mitigation measures.

354. The impacts during the construction of the P1 components are primarily due to the construction of intake on 100 m away from the shore at Meghna, Bishnondi, trenching and clearing of the soils and wastes, and are briefly described in the following paragraphs:

355. There will be water pollution, sanitation, and health hazards due to presence of workers camp. Adequate water supply and toilet facilities will be established at the construction camp as mitigation measure.

356. A construction health and safety plan shall be required from the contractor, including provision of PPE and first-aid facilities to provide measures and procedures in addressing occupational health and safety at the construction site.

357. Based on the analysis conducted in this assessment it is concluded that overall the project will result in significant positive socio-economic benefits, and those potential negative environmental impacts that have been identified are small-scale and local, and can be minimized adequately through good design and the appropriate application of mitigation measures. It is therefore recommended that the project be supported by ADB, subject to the implementation of the commitments contained in the EMP and allocation of appropriate technical, financial and human resources by implementing agencies such as DWASA, Construction Supervision Consultant and Contractors to ensure these commitments are effectively and expediently implemented.

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A. REA Checklist

WATER SUPPLY

Instructions:

- This checklist is to be prepared to support the environmental classification of a project. It is to be attached to the environmental categorization form that is to be prepared and submitted to the Chief Compliance Officer of the Regional and Sustainable Development Department.
- This checklist is to be completed with the assistance of an Environment Specialist in a Regional Department.
- This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB checklists and handbooks on (i) involuntary resettlement, (ii) indigenous peoples planning, (iii) poverty reduction, (iv) participation, and (v) gender and development.
- Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title: Dhaka Environmentally Sustainable Water Supply Project – Package P1, Intake, Raw Water Pipeline & Water Treatment Plant at Gandharbpur

Sector Division: Water Supply of Dhaka City, Bangladesh

SCREENING QUESTIONS	Yes	No	REMARKS
A. Project Siting Is the Project area...			
▪ Densely populated?	☑	☐	Water supply area Dhaka City is densely populated
▪ Heavy with development activities?	☒	☐	
▪ Adjacent to or within any environmentally sensitive areas?			
▪ Cultural heritage site	☐	☒	No cultural heritage site according to information received from: Banglapedia, Census and Upazila
▪ Protected Area	☐	☒	No protected area according to information received from DoE
▪ Wetland	☒	☐	only man-made water bodies as borrow pits, ponds and impeded drainage areas on low lying ground

▪ 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?	☐	☒	Raw water quality is good, installation of upstream water protection area will be suggested (no fish farming)
▪ impairment of historical/cultural monuments/areas and loss/damage to these sites?	☐	☒	No cultural heritage sites
▪ hazard of land subsidence caused by excessive ground water pumping?	☐	☒	No ground water pumping but river water abstraction
▪ social conflicts arising from displacement of communities?	☐	☒	
▪ conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters?	☐	☒	
▪ unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)?	☐	☒	Raw water will be treated on turbidity and will be disinfected for human consumption in water treatment plant
▪ delivery of unsafe water to distribution system?	☐	☒	
▪ inadequate protection of intake works or wells, leading to pollution of water supply?	☐	☒	installation of water protection area will be suggested
▪ over pumping of ground water, leading to salinization and ground subsidence?	☐	☒	No ground water abstraction
▪ excessive algal growth in storage reservoir?	☐	☒	
▪ increase in production of sewage beyond capabilities of community facilities?	☐	☒	No increase of pollution expected, pollution of ponds with sewage in the city already existing
▪ inadequate disposal of sludge from water treatment plants?	☐	☒	Sludge will be stored at WTP in sludge drying beds, sludge management plan under design
▪ inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities?	☐	☒	Noise protection, sources of noise in WTP building
▪ impairments associated with transmission lines and access roads?	☐	☑	Access road to raw water transmission pipeline within the pipeline corridor

▪ health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals?	☐	☒	Proper handling of chlorine gas is implemented. Contractor is experienced in handling with chlorine gas
▪ health and safety hazards to workers from the management of chlorine used for disinfection and other contaminants?	☐	☒	
▪ dislocation or involuntary resettlement of people?	☐	☒	Intake on the river bank, raw water pipeline follows agricultural land, WTP on DWASA property
▪ social conflicts between construction workers from other areas and community ▪ workers?	☐	☒	Local work force will be employed
▪ noise and dust from construction activities?	☐	☒	Only in settled areas, mitigation measures have been suggested in the EMP (e.g. water spray)
▪ increased road traffic due to interference of construction activities?	☒	☐	Increased construction traffic has to be agreed with the local police
▪ continuing soil erosion/silt runoff from construction operations?	☒	☐	Construction will be implemented in the dry season
▪ 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?	☐	☒	Training and capacity building of the contractor is needed
▪ delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals?	☐	☒	No corrosive chemicals will be added
▪ accidental leakage of chlorine gas?	☐	☒	Proper handling of chlorine gas is required. Contractor is experienced in handling with chlorine gas
▪ excessive abstraction of water affecting downstream water users?	☐	☒	Water will be left over for downstream users and environmental flow, only 0.3% of the lean flow of Meghna River is needed for water supply
▪ competing uses of water?	☒	☒	
▪ increased sewage flow due to increased water supply	☒	☐	
▪ increased volume of sullage (wastewater from cooking and washing) and sludge from wastewater treatment plant?	☒	☐	Increased volume of sullage, no sludge from WWTP

B. Minutes of Public Consultation, Bishnondi, 18.05.2019 and Gandharbpur Ansar Camp, 13.02.2018

Project title under Dhaka Environmentally Sustainable Water Supply Project (DESWSP)

Dhaka Water Supply and Sewerage Authority (DWASA)

Subject Public Consultation Meeting Minutes, Environmental Safeguard with DWASA, MDSC, GWT, Sub Contractor (Shangdong), Sub Contractor (Menard), DORP & Local Community (Photos & List of Participants)

Location Bisnondi, Araihazar, Narayanganj.

Date 18/05/2019

Time of meeting 10.00 am.

Project number 346152

Attendees

Name	Initials	Company/unit/division
A.Rahman	AR	Ex-Member, UP, Chaitankanda
Md. Zakir Hossain	ZH	MM MDSC, Civil Engineer
Md. Saidur Rahman	SR	DESWSP DWASA, Safeguard Officer (Env.)
Dr. Rafeza Akter	RA	MM MDSC, National Resettlement Expert
Dr. Syed Latif	SL	MM MDSC, National Environmental Expert
Md. Mahmodul Hasan Rahat	MHR	MM MDSC, Environmental Inspector
Tofazzal Hossain	TH	DESWSP DWASA, Safeguard Officer (S&G)
Abdul Kahdar	AK	SUEZ, WTP project Manager
Mohd. Z.A. Molla	ZHM	SUEZ, WTP QSHE Manager
Md. Sohel Mahamud	SM	SUEZ, WTP SHE Manager
Wang Bin	WB	Sangdong, QA/QC manager
Li Hong Feng	LHF	Sangdong, Site Manager
K. Tushis	KT	Menard
J. Devynck	JD	Menard
Waly	W	Menard
Saidul Islam	SI	GWT, Prosoil, Surveyor
Md. Monirul Islam	MI	DORP, RO
Md. Rroqunuzzaman	R	DORP, LF
Md. Hashem Ali	HA	Member, UP, Chaitankanda

Recorded by: Dr. Syed Latif, Environmental Expert, MM MDSC

Distribution: All+Team Leader+M&E Expert,+Project Coordinator, MM MDSC

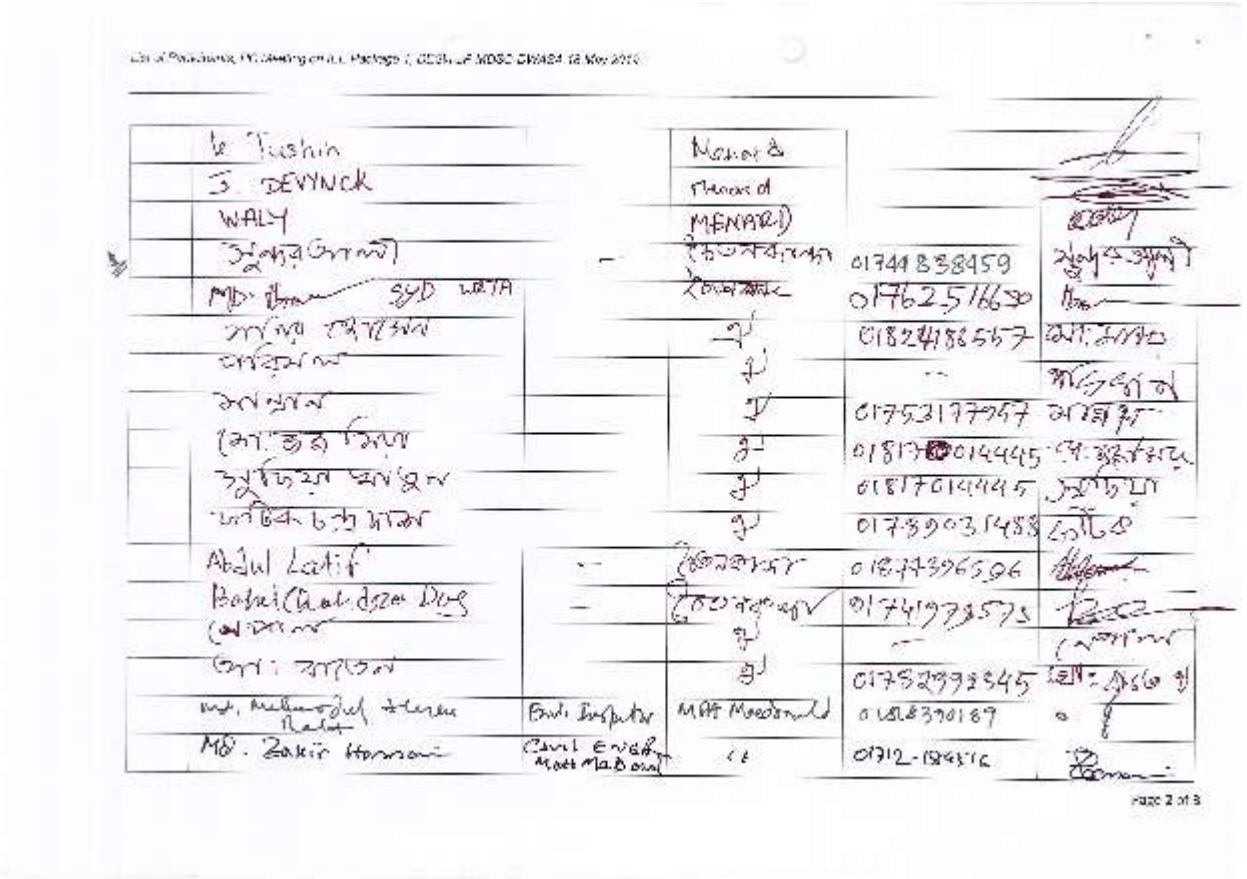
Text		Action on
1.	AR chaired the meeting welcoming everybody, including lots of people from the local community (see photos at the end). Discussion was held on environmental safeguard issue to GWT and sub-contractor Shangdong, Menard to care about environmental impact of	

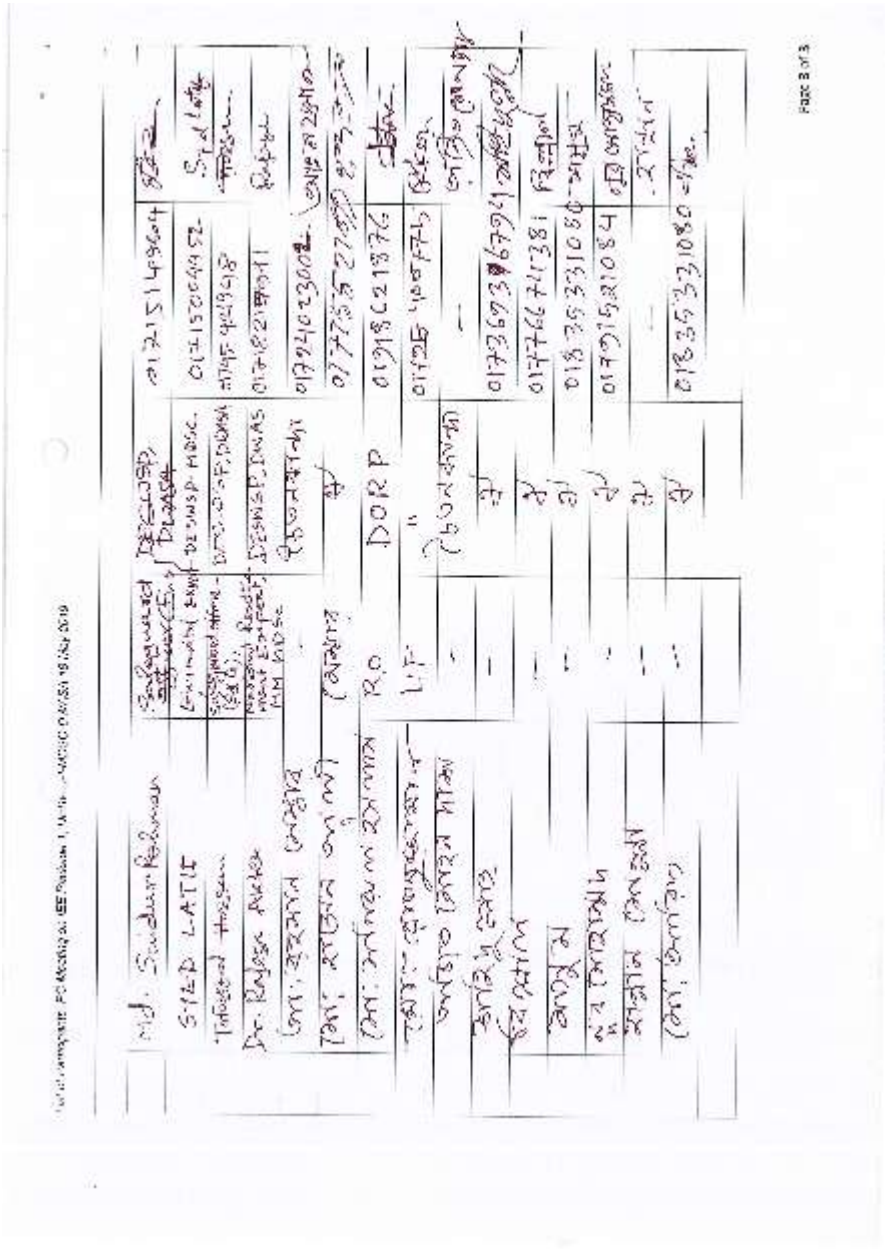
	Text	Action on
	sound, dust, water, and other impact to the project area. Md. Zakir Hossain provided a short briefing about the P1activities.	
2. 3. 4.	ZH Regarding answering another question of a villager, ZH replied that 33Kv line will be established under this project and will be exclusively used for operation of Intake & WTP. So, there will be no problem of local electricity supply. SR introduced the general environmental issues and expected beneficial impacts on the nation by DAWSA project. The adverse effects of DESWSP will be minimized and mitigated through EMP guidance and field inspection during construction period. SL describes the environmental safeguard issue to the audience and explained that the ADB guidelines and GOB environmental policies and regulations must follow at the time of implementing the projects. Further he described the following environmental impacts and mitigation that will be expected temporarily during the construction period. Water will be sprayed on ground surfaces wherever and whenever it is required both on-site and in areas surrounding the site, especially in dry season when air quality levels are at unhealthy levels. Also wetting excavation sites and other sources of dust to control its emission, and public information. The generation and release of emissions of construction vehicles and machines will be managed through a combination of (a) energy use efficiency, (b) selection of fuels, which may result in less polluting emissions, (c) modern equipment with emissions control techniques during pilling. Any hazardous wastes at a construction site create by P1 construction activities will be handled in accordance with all applicable DOE regulations. Earth-moving work will be kept to a minimum with adequate grading and drainage systems installed especially during the monsoon season to avoid creating areas of standing water. Spray water on nearby access roads, cover stockpiles of materials and wastes that might blow away or run-off the site in bad weather. Avoid, as much as possible, construction equipment producing excessive noise. Avoid loud construction activities in the evening and during normal night time sleeping times. Contractors' camp, sites will be kept clean and orderly with all debris and waste materials disposed of in accordance with EMP of EIA. Use of personal protective equipment (PPE) during construction and maintenance will always be adhered to. The Contractor will prepare and implement safety and emergency manuals, procedures, and signs prominently displayed to make it clear what PPE is required. All relevant rules for protection of health and safety of the workers, and community must be rigorously followed To prevent unauthorized entry onto the site, fencing of the construction areas will be installed (Intake, RWP area). Minimize the cutting of trees, shrubs, and low-lying ground cover (such as grass)	

Text		Action on
	Includes best practice health and safety provisions in the construction contract including requirement for a health & safety plan covering, first aid, medical and health services, safety practices, equipment and training. Physical monitoring will be focus on parameters necessary to manage the difficult soil conditions, air, water quality, noise levels flora and fauna in project sites. The Contractor will ensure that appropriate/sufficient warning and information signs are installed on road and that adequate guidance is provided to travellers / villagers throughout the project site. Additionally, he responded the queries from public related to above issues.	
5. 6. 7.	RA wanted to know from the local community if they apprehend any kind of problems with regard to land use, traffic movement, social disturbance to women and children due to mobilization of contractors in the field. They did not assume any kind of disturbance. She focused on minimizing grievances related to project activities and impacts, more efficient management of expectations; improving the efficiency of project implementation by ensuring monitoring of grievance resolving process and providing periodic reporting on progress. Regarding answering a question of a villagers, ZHM replied that they will spray water for dust control and also careful about sound pollution. KT, informed the people that they will implement new technology for soil improvement that will less impact on environment.	

LIST OF PARTICIPANTS

Sl.No	Name	Designation / Occupation	Organization/Mouza	E-mail/ Cell No	Signature
1.	[illegible]	Surveyor	Shapla Project	01716193897	
	Abdul Khaliq	WTP Project Manager	Sweet Water	01313438501	
	Mohd. Z.A. Molla	QHSE Manager	〃	01313438502	
	MD. Shakil Mahamud	HSE Manager	〃	01313438506	
	Wang Bin	QA/QC Manager	SDWP	01968275776	
	LI HONG FENG	Site Manager	SD WP	01307691203	
	[illegible]	[illegible]	[illegible]	01724023002	
	[illegible]	[illegible]	[illegible]	01732003779	
	[illegible]	〃	〃	01818114663	
	[illegible]	〃	〃	01711012805	
	[illegible]	〃	〃		
	[illegible]	〃	〃	01716 [illegible]	
	[illegible]	〃	〃	01726107203	
	[illegible]	〃	〃	01883026242	
	MD. Mehedi Hasan	Manager	[illegible]	01707635594	





Organized by

Development Organization of the Rural Poor (DORP)
Dhaka Environmentally Sustainable Water Supply Project

Area Office, Gandharbpur, Rupganj, Narayanganj

Date: 13.02.2018, Time: 10:30, Place of Meeting: Gandharbpur Ansar Camp
Subject: Impact of the Project, its Mitigation and APs Entitlements

1.Name of the chairperson preside over the meeting (From affected HH)	Md. Abdul Gani Molla

2. Greeting speech was made by Md. Iqbal Hossain, Area Manager, Rupgonaj DORP Mainly he shared overall project impact, its consequences and mitigation procedure in the meeting.	Today, on 13 February 2018 (Tuesday) at about 10.30 am a meeting was held in section-3. In the meeting there were present by the participants from PAPS, Elites and local community people including service holders, Entrepreneur, homemakers DORP staff and Personnel from MDSC. The meeting was coordinated by DORP Area Manager Md. Iqbal Hossain. The meeting was chaired by Md. Serajul Islam Miah the very accepted and be loving person by all of the PAPs. The chairman of the meeting expressed his gratitude to participants for being present in the meeting by leaving their important and urgent business. DORP Area Manager briefed about the project.
3. Md. Imtiazul Haque described about the project, its goal, objective and LIRP of the project.	He expressed detail on project description and its objectives in the way that in mega city of Dhaka, here lives an uncounted number of population, in order to meet up with the present insufficient water supply and increasing demand for it, the Dhaka Water Supply and Sewerage Authority through the Dhaka Environmentally Sustainable Water Supply Project has been taken to provide treated water to Dhaka city dwellers through DWASA distribution system. The project will extract surface water from the River *Meghna* at Shomvupura *Mouza* of Arihazar *Upazila* where a reservoir will be constructed. This surface water will be delivered through 22 km pipeline to the Water Treatment Plant at Gandharbpur in Rupganj *Upazila.* The treated water will then be delivered through 13 km pipeline to the distribution network of Dhaka city near US Embassy in Baridhara. **This project aims to reduce abstraction of ground water by 150 million liter per day (MLD).** He further added that due to implementation of the project the affected persons will be entitled to receive compensation for their losses. In addition, the affected persons will be provided income generating training and will be involved with the income generating activities, so the standard of their lives does not deteriorate from the pre- project level.
4. Dr. Syed Latif discussed on Environmental impact of the project.	He actually committed to the community on the issue of environmental degradation, the community people as well as WASA and DORP will be vigilance to protect in any kind of mishaps and mischievous on environment, especially during construction work, he uttered it will be not permitted in any way depletion or effect on trees and biodiversity.
5. Dr, Thomas Balling discussed on the negative and positive side of the project.	Dr, Thomas Balling gave his thanks to all of the participants in the meeting. He discussed about negative and positive side of the implementation of the project. Dr. Thomas Balling felt the need of pure drinking water for the people of Dhaka city as well as population of surrounding cities as quite indispensable. In 1980, population of Dhaka city was quite a few in numbers, and now the numbers increased incredibly enormous. With the increase of population number in Dhaka city the demand of pure drinking water has been increased accordingly. He added that ensuring pure drinking water for the city dwellers will reduce water borne diseases.
6. Dr. Rafeza Akter (Resettlement Expert, MDSC) discussed on Affected Persons Entitlements, LIRP and Role in Gender.	At the commencing of her speech Dr. Rafeza convey her heartiest thanks and gratitude to all of the participants. Dr. Rafeza discussed elaborately and clearly on 1) objective of the project, 2) Resettlement Activities 3) Implementation of Resettlement Activities. She said that those who are residing in Dhaka, in some way they are the relatives of ours. So, it is

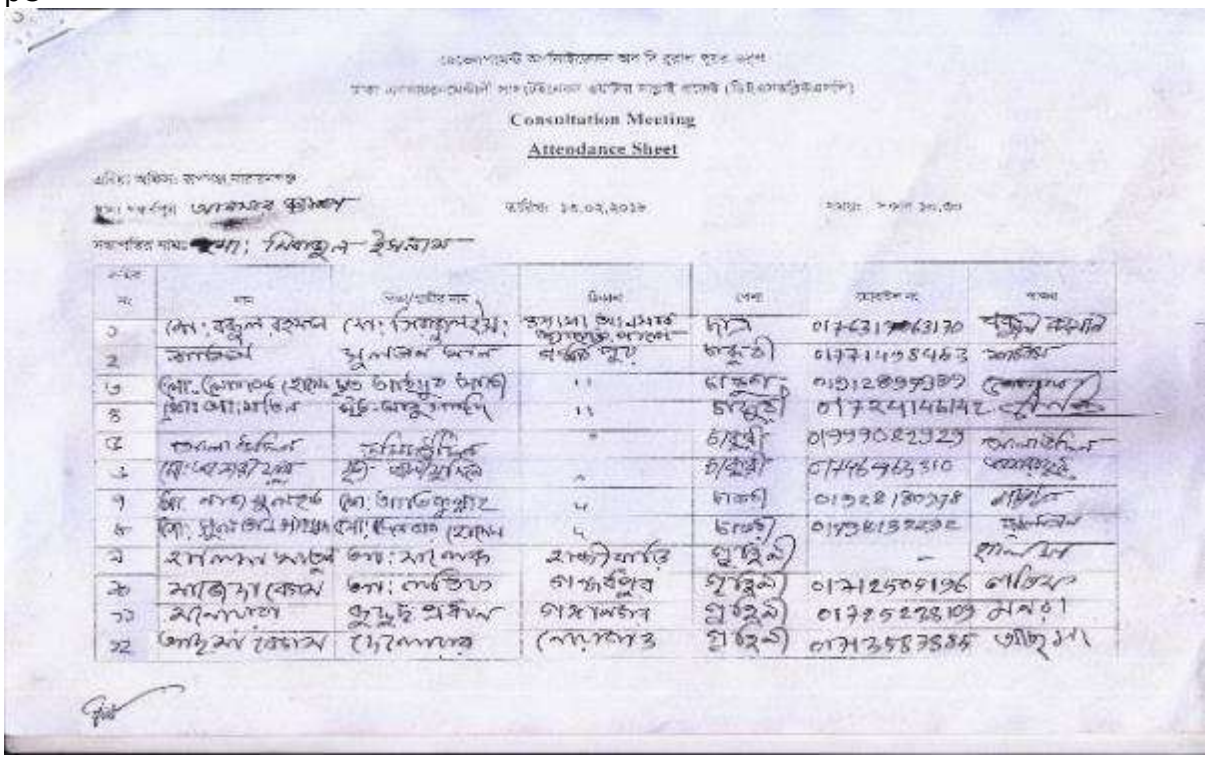
	our moral obligation to support them in ensuring pure drinking water for them. She mentioned that the affected persons will be compensated fairly whatever they lost. According to ADB Safe Guard Policy Statement (SPS) 2009 All types of affected persons (irrespective titled or non-titled) will receive resettlement benefits for loss assets such as: land, trees, residential structures, business structures etc. For easy and tranquil payment for the APs DORP and MDSC will help/assist them in all respect. She assured the PAPs that they will get fair resettlement benefits, the business man, employees of the business will receive benefit of income loss from business and employees/workers will receive grant for wage loss. Tenant, will receive their due resettlement benefits. In addition of the above benefits vulnerable HHs and those HHs fully loss of agriculture based livelihoods will be entitled to receive some other grants like for vulnerable HHs they will receive subsistence allowance and one-time training grant. The vulnerable HHs and HHs fully loss of their agriculture based livelihoods will be resettled through involving them in income generating activities. She added that in this regard DORP and MDSC will assist them, confidently she committed to them that she would fight with DC office and DWASA for ensuring their rights in receiving all sorts of eligible benefits. She urged them to co-operate the JVC team in verifying the affected persons list and their losses and PVAC team in determining of lost assets value. She told that by no means the life standard of the affected persons, especially of the poor (as they maintained before the pre- project time) would not be aggravated, rather it will be tried to enhance their socio-economic condition at a better of condition. After that she asked the participants if they have anything to clarify.
The name of the attendants asked questions: 1. Md. Delower Hossain 2. Md. Abdul Hye and Ahmed Miah 3. Md Samsul Haque Miah 4. Md. Taher Ali	Md. Delower Hossain wanted to know that after acquisition of his land what will be the management of the rest of his land in the alignment area. In reply Dr. Rafeza informed to Delower Hossain that if he wishes he could use the rest of his land or he will receive compensation for the rest of his land Md. Abdul Hye and Ahmed Miah are interested to know when the project activities will be started and notice under section 4 will be provided. Dr. Rafeza replied that within a short span of time they will receive notice under section 4 Md. Samsul Haque Miah intend to know whether MDSC would help them in their need. Dr. Rafeza replied that certainly MDSC and DORP will always assist them in their need The question of Md. Taher Ali was that due to establishment of the pipe line whether the water body will be affected or polluted. In Reply on this question Dr. Rafeza replied that there will be no any harm or detrimental anything in establishing the pipe line, the pipe line will be established keeping the bog at its original shape Mannan Bhuiyan and Serajul Islam Miah wanted to know how their land value will be paid. In this regard Dr. Rafeza replied that the land value will be compensated from DC office in line with ARIPA (Acquisition Requisition of Immovable Property ACT 2017). Lastly in concluding speech Dr. Rafeza thanked to the participants for cooperation in conducting question answer session successfully. Dr. Rafeza once again thanked to the

5. Mannan Bhuiyan and Md. Serajul Islam Miah	participants for sharing their valuable opinions and suggestions. She expressed her gratitude for all and urged them to cooperate in future for smooth implementation of the project. She assured that she will be available in their needs and will share their suggestions to project related authority.
6. The closing note of the chair of the meeting	The chair listened all the discussions of the meeting very carefully and expressed his satisfaction for sharing their opinions and expectations to MDSC and DORP. He requested to MDSC as well as DORP to disseminate their matters to the concern authority. As there were no any other discussions the chair closed the meeting with thanks to everybody attended in the meeting.

Chair of the meeting
Md. Serajul Islam Miah

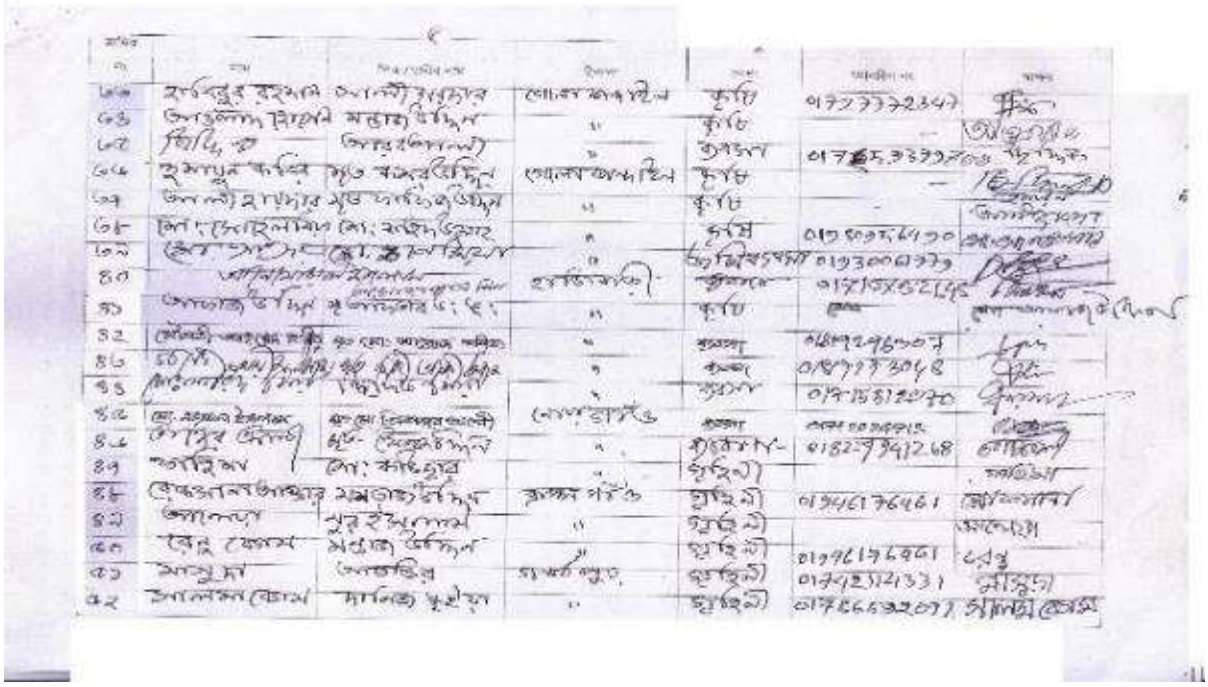
List of Participants and their signature in Bangla Language

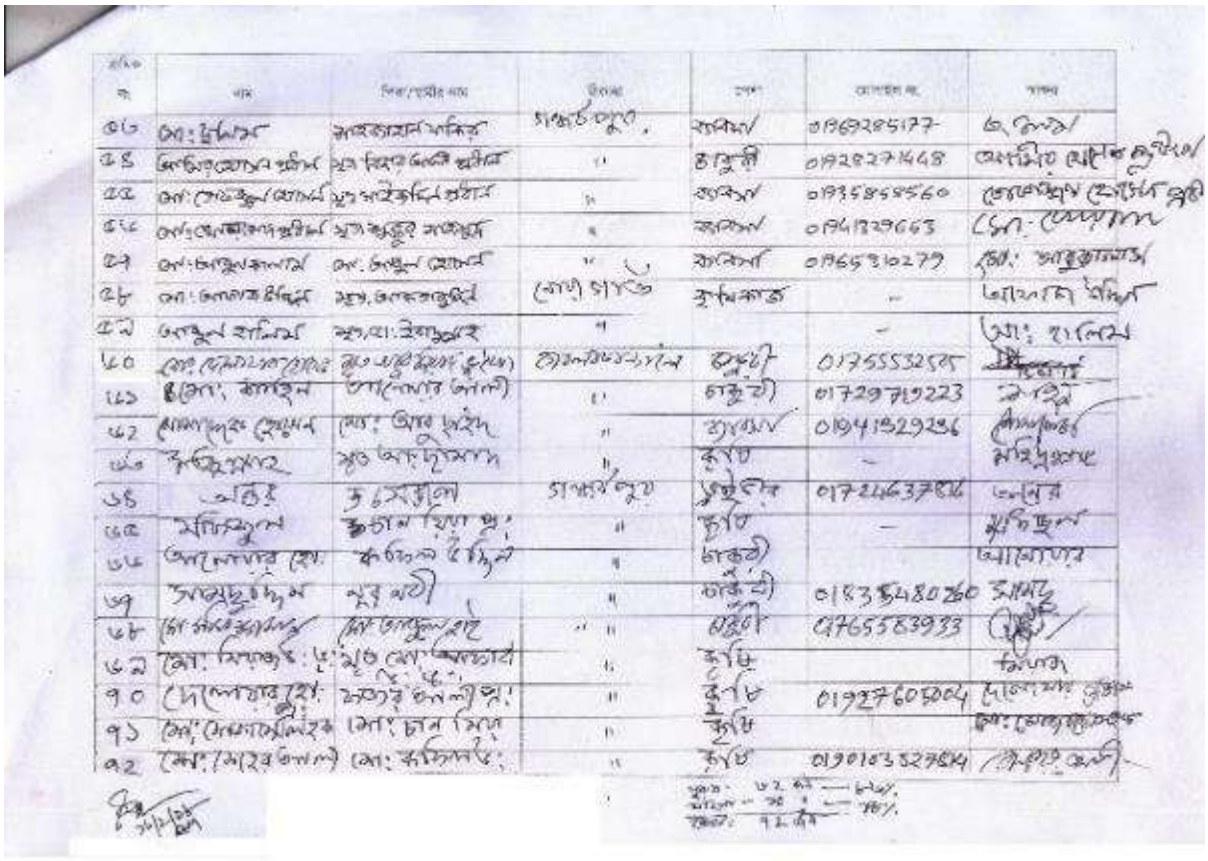
pC



Consultation Meeting

Attendance Sheet





Dhaka Environmentally Sustainable Water Supply Project (DESWSP)
Development Organization of the Rural Poor (DORP)
Meeting Minutes on dreginh Issue at WTP Area

Meeting Date: 15.06.2019
Time: 2:30 PM
Venue: Rupganj Area Office
Recorded by: Area Manager, DORP, DESWSP
Translated by: S M Alamgir Hossain, Team Leader, DORP, DESWSP
Reviewed by: Dr. Rafeza Akter, National Resettlement Expert, MDSC

The meeting was chaired by Mr. Md Mahmudul Islam, Project Director, DESWSP of DWASA. At the commencing of the meeting he welcomed all of the participants for being timely attending in the meeting. He exchanged greetings to all of the participants. At the commencement speech he said that the land of graveyard located sharp in Char Gandharbpur mouza which was acquired long before by Dhaka WASA, and there will be constructed a Water Treatment Plant (WTP) where 150 million liters of water will be purified for distribution to the Dhaka city dwellers. It is one of a Bangladesh government priority project for running the project peacefully and smoothly the community support is quite indispensable in regards to shift or amicable replacement of this graveyard to another suitable place.

Community consultation meeting was held with Gandharbpur Madhyapara Atani Society's graveyard committee and local community people in Water treatment Plant Area under Dhaka Environmentally Sustainable Water Supply Project. Basically the meeting was held with a view to come to an amicable settlement in shifting of the graveyards from the project area to somewhere else. Because the graveyard land is belong to DWASA since 1982.

The Chairman of graveyard Committee said that using the land since the long period of

their ancestor this graveyard comfortably very close and easy communicate able to nearby three societies. He claimed that their ancestors were buried here in this graveyard. Without this one they have no any other alternative land/graveyards to burry anyone from the three societies. This is WAQF property and he said that they have papers. The Chairman of graveyard Committee submit/put up 4 (four) legal papers before the PMU and they claimed that they have more papers in support of their claim on graveyard land.

The Project Director scrutinized the submitted papers in the meeting and found that the land mentioned in the submitted documents does not fall within the boundary of project land. Instantly Project Director informed the graveyard committee that the land mentioned in the submitted documents are quite out of the project area. He requested the committee to submit the remaining documents to the Area Manager (DORP) within short possible time.

Superintendent Engineer Mr. Bahrul Islam, DPD-1, DESWSP, and DWASA said that, on the ground of significance and implementation requirement of this mega project this graveyard to be replaced. Dr. Rafeza Akter, National Resettlement Expert, MDSC opined that, it is important to complete the project activities or make the project a success, for this reason all needs to work together. So, it is important to respect the interest of local people and accordingly local people should extend their helping hand for the success of the project implementation activities. Md. Zakir Hossain, Civil Engineer, MDSC, said that the government can take the required land according to their requirement. So, the graveyard needs to be removed to a different place for the sake of the project.

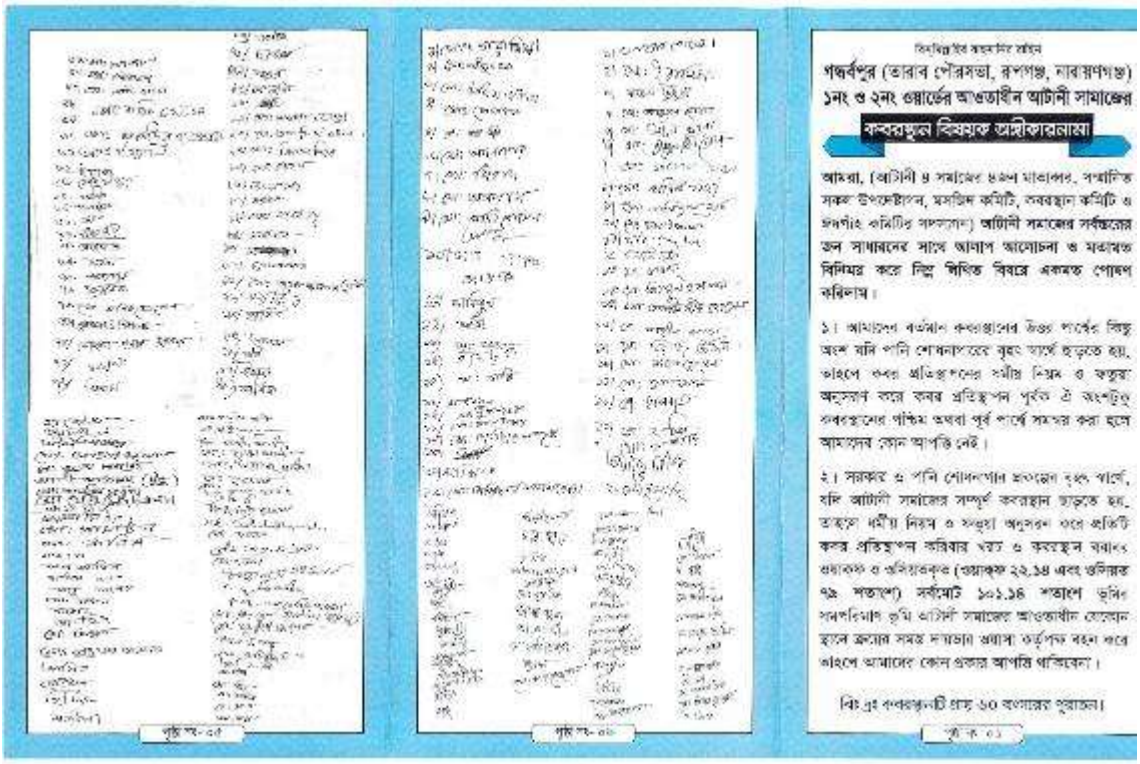
The Chairman of Eidgah Committee and the Councilor of Ward # 01 opined that they are agreed upon with the project authority to make the project success but they have no any other suitable place or option to replace the graveyard to another place. So, they requested to the project authority as well as to the government to give land and arrange graveyard shifting related all activities near to Eidgah or Mosque.

Project Director assured the committee members represented from different 3 (three) institutions that according to their request, he will raise the issue to the higher authority for an amicable and immediate solution. Having no other discussions, the chair closes the meeting with thanks to everybody.

List of Meeting Participants

Sl.	Name	Designation	Address/Organization
1	Engineer Md. Mahmudul Islam	Project Director	DESWSP, DWASA
2	Engineer Bahrul Islam	Deputy Project Director-1	DESWSP, DWASA
3	Dr. Rafeza Akter	National Resettlement Expert	MM, MDSC, DWASA
4	Mr. Imtiazul Haque	Deputy Team Leader	MM, MDSC, DWASA
5	Mr. Zunayed Abu Yasir	Executive Engineer	DESWSP, DWASA
6	Mr. Mostafizur Rahman	Executive Engineer	DESWSP, DWASA
7	Mr. Tofazzel Hossen	Safeguard Officer	DESWSP, DWASA
8	Mr. Jakir Hossain	Civil Engineer	MM, MDSC, DWASA
9	Md. Ashraf Ali	Sub-Assistant Engineer	DESWSP, DWASA
10	Md. Iqbal Hossain	Area Manager	DORP, DESWSP
11	Md. Rafiqul Islam Monir	Ward Councilor	Tarab Pauroshava, Ward-1

12	Shahinul Kabir	President	Graveyard Committee
13	Ashraful Alam Shiraji	Senior Vice President	Mosque Committee
14	Abu Jafar Mohammad Saleh	President	Eid Gah Committee
15	Md. Sirajul Islam	Vice President	Mosque Committee
16	Advocate Mohammad Tarek	General Secretary	Mosque Committee
17	A R Wasim	Co Secretary	Mosque Committee
18	Md. Shamim Iqbal	Senior General Secretary	Eidgah Committee
19	Md. Awlad Hossain	General Secretary	Eidgah Committee
20	Md. Habibur	Cashier	Graveyard committee



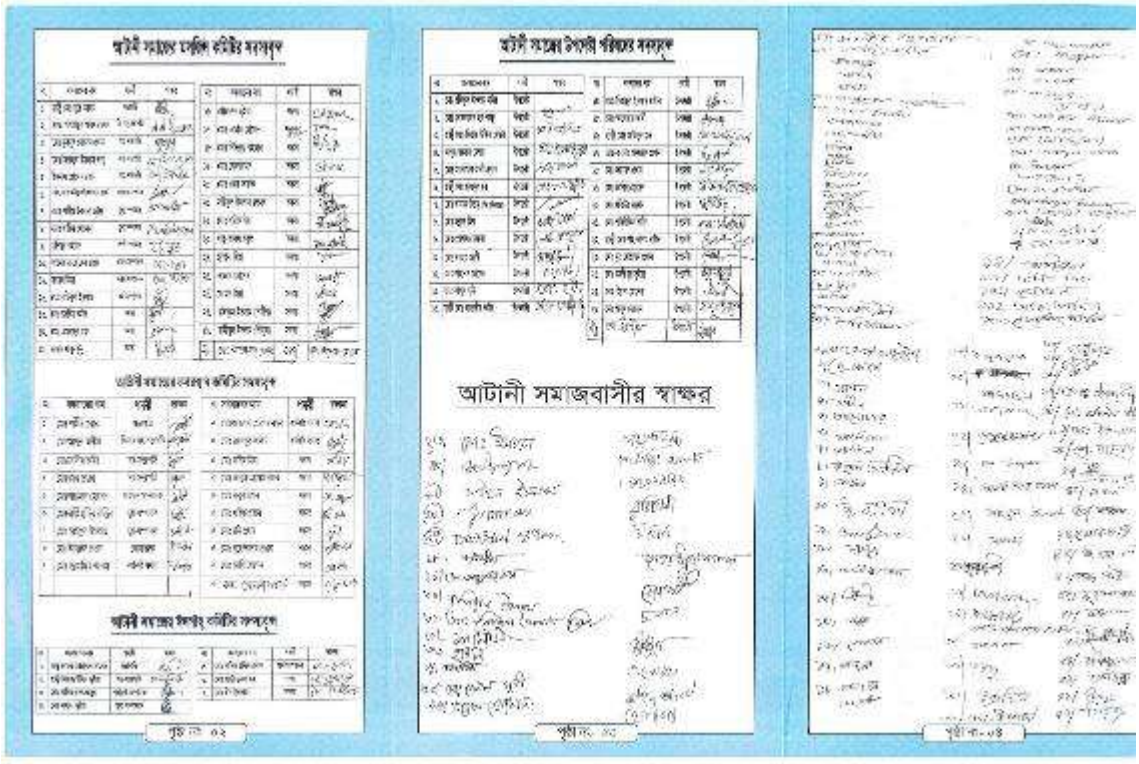
গন্ধর্বপুর (তারাব পৌরসভা, রূপগঞ্জ, নারায়ণগঞ্জ)
১নং ও ২নং ওয়ার্ডের আওতাধীন আটানী সমাজের
কবরস্থান বিষয়ক অঙ্গীকারনামা

আমরা, (আটানী ও সমাজের ৪৯৯ মাতাগণ, সম্মানিত সকল উপজেলাগণ, মসজিদ কমিটি, কবরস্থান কমিটি ও ঈদগাঁহ কমিটির সদস্যগণ) আটানী সমাজের সর্বস্তরের জন সাধারনের সাথে আলাপ আলোচনা ও মতামত বিনিময় করে লিখিত বিবরে একমত পোষণ করিলাম।

১। আমাদের বর্তমান কবরস্থানের উত্তর পার্শ্বের কিছু অংশ যদি পানি শোধনাগারের বৃহৎ স্বার্থে হস্তান্তর হয়, তাহলে কবর স্থানান্তরের যাবতীয় নিয়ম ও রীতি অনুসরণ করে কবর প্রতিস্থাপন পূর্বক ঐ অংশটুকু কবরস্থানের পশ্চিম অথবা পূর্ব পার্শ্বে সমন্বয় করা হলে আমাদের কোন আপত্তি নেই।

২। সরকার ও পানি শোধনাগার কর্তৃপক্ষ যদি আটানী সমাজের সম্পূর্ণ কবরস্থান হস্তান্তর করতে চায়, তাহলে ধর্মীয় নিয়ম ও রীতি অনুসরণ করে প্রতিটি কবর প্রতিস্থাপন করিবার খরচ ও কবরস্থান বাবদ ক্ষতিপূরণ ও অধিগ্রহণকৃত (ওয়াক্ফ ২৯.১৪ এবং ওলিয়ত ৭৯ শতাংশ) সর্বমোট ১০১.১৪ শতাংশ ভূমির সমপরিমাণ ভূমি আটানী সমাজের আওতাধীন যেকোন স্থানে ক্রয়ের সমস্ত দায়ভার প্রয়োজন কর্তৃপক্ষ বহন করে তাহলে আমাদের কোন প্রকার আপত্তি থাকিবেনা।

নিঃ দ্রঃ কবরস্থানটি প্রায় ৬০ বৎসরের পুরাতন।



C. Recommendations for Tender Documents

C1. CONSTRUCTION SUPERVISION AND O&M CONTRACT, MDSC, DESWSP

358. The physical works of Package 1 is being designed by an engineering consultant (MML), who is also preparing the tender documents. Construction will be carried out by a contractor selected by international competitive bidding (ICB) in accordance with the Asian Development Bank's (ADB) rules for procurement of works. The Bank's Standard Bidding Documents for Works have a specific format, agreed between many of the multilateral development banks and based on the well-known standard documents developed over the years by the International Federation of Consulting Engineers (FIDIC).

359. As such, this Annex provides guidance on environmental and social topics which should be considered for incorporation into the project contracts (Bid and Contract Documents.

360. In order to protect the sensitive environment, accelerate the flow of benefits and to establish a high-quality example for project sites and other buffer areas to follow, it is recommended that the following points should be included in this document:

361. The Clauses need to be included in the tender documents are:

(i) The Contractor shall follow the Environmental Management Plan (EMP). The Contractor can access EMP on request.
(ii) In order to ensure the compliance with proposed mitigation and monitoring measurements required under the EMP, the Contractor shall closely liaise and coordinate with the Consultant's Environmental and Social Safeguard Specialists.
(iii) Environmental and Social Officers / EHS Supervisor (at least qualified

Graduate in environmental science/ engineer with relevant experience) as per field requirement shall be appointed by the Contractor, who will act as a nodal person to ensure environmental safeguards.

(iv) The Contractor shall ensure compliance with the labor laws and pertinent occupational health and safety regulation of Bangladesh, and ADB. The Contractor shall ensure that all workers are supplied with and use the relevant protection, safety equipment on the construction site. Abstain from employing child labor.

(v) The Contractor shall obtain "Permit for emissions into the environment" in accordance with the Environmental Code at regional local executive bodies.

(vi) The Contractor is responsible for the fulfillment of the conditions stated in the "Permit for emissions into the environment and EMP".

(vii) If applicable, Contractor should obtain "Permit for trees felling" at regional local executive bodies.

(viii) Monitoring: The O&M contractor is likely to be in the best position to elaborate and implement the necessary physical monitoring programs:

a. Soil and water quality - essential for tracking parameters such as soil salinity (this would cover water quality (e.g. Meghna River Intake Point water, treated water, groundwater depth and quality).

D. General Requirements for Workers Health and Safety

362. Appointment of health and safety officer from the Contractor to supervise the Implementation of OHS Plan is to be done. The Contractors' activities will be coordinated and supervised by MDSC Environmental Unit. The key salient features of the general requirements for the workers' health and safety are presented in Table-A2.1.

Table-A2.1: General Requirements for Workers Health and Safety

Issues	Requirements
Health and Hygiene	• Cleanliness • Proper ventilation and temperature • Protection against dust • Disposal of wastes and effluents • Proper illumination • Provision of adequate latrines and urinals • Sufficient spittoons and dustbins.
Safety	• Safety for building and equipment • Precautions in case of fire • Fencing of machinery • Precautions during work on or near machinery in motion

Issues	Requirements
	• Monitoring against carrying of excessive weights
Compensation for accidents at work	• Contractor's responsibility for compensation • Amount of compensation • Report on fatal accident and treatment • Compensation on contract and contract registration • Scope for appeal
Dust and Fumes	• For any dust or fumes or other impurities likely to be injurious to the workers, effective measures shall be taken to prevent its accumulation and its inhalation by workers.
Latrines and urinals	• Sufficient latrines and urinals shall be provided • Shall be maintained in clean and sanitary condition • Shall be adequately lighted and ventilated.
Precautions in case of fire	• Firefighting apparatus should be provided and maintained.
First aid	• First aid facility should be provided and maintained. • Shall be kept with a responsible trained person who shall be available during the working hours
Disposal of wastes and effluents	• Provide with proper disposal system for solid waste and effluents.
Compensation	• If personal injury is caused to workmen by accident arising in the course of employment, employer (Contractor) shall be liable to pay compensation • Monthly payment as compensation for temporary disablement should be considered in a reasonable way.

E. Archaeological Chance Find Procedure

363. The purpose of this Annex is to address the possibility of archaeological deposits becoming exposed during ground altering activities (Excavation of Vatara Injection Point, trenches for underground primary, secondary pipelines, and P2 works) or archaeological items mixed with construction materials, and brought within the project area and to provide protocols to follow in the case of a chance archaeological find to ensure that archaeological item and sites are documented and protected as required.

364. Archaeological sites are protected by The Law on preservation and use of historical-cultural heritage objects of Bangladesh, Archaeological objects or sites are an important resource that is protected for their historical, cultural, scientific and educational value to the general public, and local communities. Impacts to archaeological objects or sites must be avoided or managed by development proponents of DESWSP interventions. The objectives of this 'Archaeological Chance Find Procedure' are to promote preservation of archaeological data while minimizing disruption of construction scheduling. It is recommended that due to the low to moderate archaeological potential of some areas within the project areas (3 Packages), all on site personnel and contractors be informed of the Archaeological Chance Find Procedure and have access to a copy while on site.

365. Relevant Legislation

366. The Legislation protects all archaeological sites, whether on government or private land, burial sites are protected regardless of age and is guided by the following legislative acts:

(i) ACT NO. XIV OF 1968, *12th December 1968*

367. Archaeological Chance Find Procedure

(ii) If the DESWSP Project activities encountered any archaeological materials, stop work in the area and follow the procedure below:
(iii) All construction activity in the vicinity of the remains is to cease immediately.
(iv) The find location will be recorded, and all remains will be left in place.
(v) The Contractor's Environmentalist and Archaeology Department of Bangladesh will be contacted.
(vi) Potential significance of the remains will be assessed and mitigative options will be identified.
(vii) If the significance of the remains is judged to be sufficient to warrant further action and they cannot be avoided, then the Contractor's Environmentalist in consultation with the Archaeology Department and local administration (Union Parishad) will determine the appropriate course of action.
(viii) In the case of human remains, if the remains are assessed to be archaeological, then the Archaeology Department and local administration will be consulted to determine how to handle them.

F. Set Up and Management of Contractors Camp

F1. Camp Set Up and Management

368. Careful planning and a concern for health, safety and the environment are essential for good project management under MDSC of DESWSP. The Contractors' field camps should provide adequate working, eating and sleeping arrangements for field personnel

and should be appropriately equipped to encourage employees to work safely and efficiently.

369. Consider the following factors when selecting a camp site:

(i) Time of residence: Will the camp be in operation for a field season or year-round?
(ii) Duration: Temporary or a permanent establishment
(iii) Accessibility: Transportation access may impact the site selection
(iv) Required permits:

F2. Risks and Hazards Associated with Contractor Camps

370. The following are the possible risks associated with the camp.

(i) Fires caused by improper fuel storage, fuel use, and fueling practices; faulty equipment or failure to turn off equipment; exploding fuel tank; clothes draped above heaters or on electrical wires; failure to extinguish open fires or cooking fires;
(ii) Illnesses spread by contaminated water, food or sewage contaminated drinking water;
(iii) Diseases spread by local mosquitoes, insects, parasites, and vermin.
(iv) Electrocution, electric shock, or burns caused by inadequate or improper wiring, lack of qualified personnel to install or repair electrical equipment, and lack of adequate employee training;
(v) Cuts, burns caused by spilled hot food or liquids, misuse of kitchen equipment, hot equipment (generators, heating stoves/ovens);
(vi) Injuries or occupational illness caused by exposure to hazardous materials.
(vii)

F3. Alcohol and Drug Policies

371. Contractors should have a clear and concise policy to address alcohol and drugs at project and camp sites. The policy should conform to regulations of the Government of Bangladesh. The Contractors should respect the wishes of local communities, especially when working in or near a “clustered” community. There should be a provision for employees to sign off that they understand the policy and regulations.

F4. Workplace Hazardous Materials Information System (WHMIS)

372. Usually less obvious hazardous products are those used in camp kitchens such as cleaning agents (oven cleaner) and chlorine bleach, chemicals required for water treatment (not always applicable if the pipe supply exist). The degree of risk depends on the quantity, toxicity, concentration, whether the material is flammable, explosive or under pressure.

373. Site location: Consider the arrangement of the camp in relation to the required setback from water bodies, the organization and optimum space requirements for storage, water and sewage systems, fuel storage area, road access, core handling areas, as required.

374. Fire: Assess the potential fire hazards, whether for lightning strike. Consider the prevailing wind direction and the requirements of emergency evacuation plans when organizing the site layout. Include an examination of Material Safety Data Sheets (MSDS) for controlled products that may pose a fire risk.

375. Wind: Pay special attention to wind direction and the possibility of (1) the spread of fire to or from fuel storage areas, (2) blowing dust from road, (3) the potential cooling effect of wind in warm climates. Locate vehicles, fuels, waste disposal areas etc., downwind from camps. Avoid windswept areas such as ridges or gullies to minimize wind damage.

Waste Management

376. Proper waste management is fundamental to camp safety. Project management should determine how waste products are ultimately handled – whether they are recycled or subject to various treatment and disposal options. Depending on the regulations, it may be advisable to seek expert advice to develop a waste management program. It is essential to eliminate potential camp sewage discharge or spills that may contaminate surface and ground water, eliminate potential disease-causing organisms and smells from accumulations of waste deposits that attract wildlife, including vermin.

377. General tips regarding waste management.

- Secure required permits and follow all applicable regulations of the Environment Department of Bangladesh, waste classification, management and disposal, including for any hazardous waste products that may be produced at the site.

378. Waste storage areas:

- All waste storage areas should have restricted access to limit entry by employees, the public and animals.

- Provide fly-tight garbage containers in convenient locations. Maintain containers so they do not become foul smelling, unsightly or breeding place for flies.

379. Camp sewage: Treat and maintain camp sewage as appropriate for the site and size of camp. A proper sewage and/or latrine system is necessary to control potential water contamination, odors and diseases. Construct and maintain latrines (when permitted) where chemical or water flush or other types of toilets are not used.

(i) Construct and maintain all camp sewage toilets correctly;
(ii) Prevent flies, insects, and rats from gaining access to waste materials;
(iii) Prevent surface or ground water from entering the pit or vault;
(iv) Prevent waste material in the privy from contaminating any water supply;
(v) Self-closing seat covers are advisable and should be in operation at all times.

380. If latrines are permitted, latrines must conform to public health standards or to any conditions stipulated in work permits. Locate a latrine at least 100 m from any stream or shoreline. It should be downwind from camp and at least 30 to 40 meters away from the kitchen area. Locate hand washing facilities between the latrine and camp to promote hygiene. A good place is at the beginning of the access path to the latrine.

G. Traffic Management Plan

G1. Introduction

381. This Traffic Management Plan (TMP) provides the traffic management procedures to be followed by the vehicle users of Contractors' while implementing the construction/reconstruction works of ESWSP activities. The vehicle operators should be careful that, road users are not limited to motorists - they include pedestrians, such as school children and people with disabilities, cyclists and emergency vehicles.

G2. Traffic Management Objectives and Strategies

382. The objectives of the TMP are to:

(i) Provide for a safe environment for all road users;
(ii) Provide protection to Contractors' operators and the general public from traffic hazards that may arise as a result of the driving of vehicles;
(iii) Minimize the disruption, congestion and delays to all road users;
(iv) Ensure access to adjacent private/commercial premises is maintained at all times.
(v)

383. To achieve the above objectives, the Traffic Management Plan will:

(i) Ensure whenever possible, that a sufficient number of traffic lanes to accommodate vehicle traffic volumes are provided.
(ii) Ensure that delays and traffic congestion are kept to a minimum and within acceptable levels
(iii) Ensure that appropriate/sufficient warning and information signs are installed and that adequate guidance is provided to delineate the travel paths through the event site.
(iv) Ensure that the roads are free of hazards and that all road users are adequately protected from activities of road users
(v) Ensure that all needs of road users, motorists, pedestrians, cyclists, public transport passengers and people with disabilities are accommodated at and through the site of the event.
(vi)

384. A Traffic Management Plan is a key workplace document that has legal standing. As such it is critical that the structure and content of the Plan is sufficient to explain the potential hazards, the assessed risks and the proposed treatments for the proposed work activities and work site. The TMP should include all of the following. Where any of the following sections are not applicable, the TMP should indicate this accordingly.

(i) Introduction
- Purpose and Scope,
- Objectives and Strategies.

(ii) Project Overview
- Project Location,
- Project Details and Site Constraints/Impacts

(iii) Project Representatives (Principal for the Works; Principal Contractor)
(iv) Safety Plan
- Occupational Safety and Health;
- Competencies;
- Responsibilities- Role, responsibility and authority of key

personnel, management hierarchy including site representatives and contact details of the responsible personnel;
- Communicating TMP requirements;
- Prior approvals (if any) granted by the RHD (Roads and Highways department), City Corporation or Municipality with relevant reference number.

(v) Trip Hazards & Environmental Conditions
- Weather;
- Vegetation;
- Existing signage;
- Structures.

(vi) Worksite Access
- Pedestrians;
- Cyclists;
- Works vehicles;
- Emergency vehicles;
- Public Transport;
- Property Access;
- School crossings;
- Impact on adjoining Road Network;
- Heavy and Oversized Vehicles and Loads;
- Legal and Other Requirements.

(vii) Emergency Arrangements and Contingencies
- Emergency Services;
- Dangerous Goods;
- Damage/Failure to Services (Traffic signals, street lighting, power, gas);
- Contingency Planning (Road crash or vehicle breakdown, serious injury or fatality);
- Emergency Contacts.

H. Record Keeping and Documentations

385. Project site document control system shall be put in place or designed to ensure the following;

(i) Effective communications and correspondence procedures are effectively implemented and relevant records are kept for current and future references.
(ii) All workmanship is inspected, appropriately tested, documented and approved by the concerned Engineer or his designates.
(iii) Comprehensive measurement and test records shall be kept for payment purposes and for later reference if it becomes necessary in the Contractor's evaluation by the Engineer of his claims or poor performance of completed works.
(iv) Records are maintained of the quantities certified for payment so that it will always be possible to establish exactly which work has been paid for on any interim or final payment certificate.

386. It is always important for the Consultant and Contractor to agree at any time with regard to any records that will be maintained by the Contractor at the project site.

H1. Records Maintained Policy at Project Site

387. The Contractor and Consultant shall effectively maintain the following records on the site:

(i) Correspondences between the Contractor, Consultant, Employer, (PMU), and ADB.
(ii) Copies of contract documents issued to the Contractor
(iii) Copies of all relevant construction standards
(iv) Copies of all construction and financial records, progress reports, etc.
(v) Equipment status Records
(vi) Daily Weather Report
(vii) Testing and Material Records
(viii) Weekly and Monthly Reports
(ix) Minutes of Progress and Site Meetings
(x) Construction Records
(xi) Progress records, photographs and video records (if required).
(xii) Survey records
(xiii) Monitoring records (ambient air, noise, water quality)
(xiv) Health and safety instructions
(xv) Site Instructions/Site order book
(xvi) Confirmation of Verbal Instructions
(xvii) Request for Inspection and Measurement Survey
(xviii) Non-Conformance Notices (NCN's)
(xix) Records for labor and materials on site
(xx) Measurement Calculations and records of the quantities certified for payment
(xxi) Drawings (drawings, calculations, etc., including temporary works)
(xxii) Method Statements, Work Procedures
(xxiii) Accident Reports
(xxiv) Any other requirements that may arise during work implementation
(xxv) Daily site work diary

H2. Weekly Progress Report

388. The Weekly Progress Report summary shall be submitted to the Employer DESWSP-DWASA electronic copy. Comments on the safety aspects of the Contractor's performance shall be included in the reports. Engineer should establish weekly progress meeting.

H3. Monthly Progress Report

389. Engineer’s office will conduct Monthly Progress Meeting each month. The Monthly Environmental Progress Report and final Progress Report must be completed and in the hands of the Employer office of DESWSP-DWASA, Dhaka within seven days of the month's end.

H4. Progress Photographs

390. Site Photographs may be used to show irregular or unique construction techniques, illustrate application of environmental safety and engineering principles, controversial situations, and "before and after" views of non-compliance, failures or damage claims.

391. The suggested template for the semi-annual environmental report to be submitted to ADB is below.

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1 Introduction 4
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1.3 Methodology of IEE Report 5
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2.1 Relevant Government Policies, Acts, Rules and Strategies in Bangladesh 7
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Photos

392. The forms for site visits and environmental monitoring is as bellow:

MM MOTT MACDONALD	Dhaka Environmentally Sustainable Water Supply Project (DESWSP) Dhaka Water Supply and Sewerage Authority (DWASA)

Environmental Supervision Minutes of Meeting – No.

Project Number:	MM Proj. No: 346152 / GWT Proj. No: 001464
Project Title:	Dhaka Environmentally Sustainabe Water Supply Project (DESWSP)
Purpose:	
Place / Date:	
Author:	Mr. Md. Mahmodul Hasan Rahat

Participants:	**Company / Title**	**Name / Initial**
	MDSC, Environmental Inspector/ARE	Hasan Rahat (HR)

Distribution list:	Participants +	
	MDSC Intl. Env. Expert	Thomas Balling (TB)
	MDSC Local Env. Expert	Syed Latif (SL)
	MDSC Team Leader	Nigel Osmaston (NO)
	MDSC Sr. Res. Eng.	Pierre Racine (PR)
	MDSC Deputy Team Leader	Imtiazul Haque (IH)
	GWT Consl. Project Manager	Richard Sawa (RS)
	GWT Contractor Representative	Nour-Eddine Wesbeh (NEM)
	DWASA Project Director	Mahmudul Islam (MI)
	DWASA Deputy Project Director	Bahrul Islam (BI)
	DWASA Environmental Officer	Sardur Rahman

Item	Current topics	Responsible/Action
1	**Minutes of Previous Meeting** – (go through previous minutes)	
2	**General Environmental Compliance**	
2.1	**Design and construction commitments in EA and EMP:**	
2.2	**Work does not cause environmental impacts not predicted in EA documentation.**	
2.3	**Compliance with environmental requirements and prohibitions of DOE legislation, and ADB Guidelines w.r.t. EMP:**	
2.4	**Compliance with environmental permits or approval:**	
2.5	**Work is not undertaken that requires environmental permits or approvals have not been obtained:**	
3	**Use of Waste Products or Materials in the Work**	

3.1	Waste and product dust suppressants meet material and construction requirements:	
3.2	Replacement of reclaimed excess:	
3.3	Management and disposal of waste according to waste management plan	
4	Management and Disposal of Excess Material	
4.1	Checking of excess materials:	
4.2	Disposal of excess material are submitted:	
4.3	Record location of excess material being disposed of:	
5	Work in, Adjacent to, and over Water bodies	
5.1	Sediment and deleterious material not gaining entry to water:	
5.2	Work in watercourse, water bodies and their banks in compliance with EMP:	
5.3	Temporary water passages systems, crossings, cofferdams and turbidity curtains in compliance with EMP:	
5.4	Disturbance of water course, body and vegetation:	
6	Work in, Adjacent to Areas of trees not Designated for Removal	
6.1	Sediment and deleterious material not gaining entry to areas of trees:	
6.2	Limits of grading:	
6.3	Entry of equipment, construction materials and excess materials to areas of trees:	
6.4	Check that critical habitats have not been affected, if required	
7	Control of Dust from the Work – pollution prevention	
7.1	Dust from exposed work	
7.2	Minimizing emissions from construction machinery	
7.3	Proper storage, transportation and handling of hazardous material	
7.4	No use of banned hazardous material and pesticides	

7.4	Control of waste generation	
7.5	Implementation of sewage management plan	
8	**Maintenance of Local Traffic Access Patterns**	
8.1	Checking of local traffic access to different areas:	
8.2	Checking of any modification, redirection of local traffic access:	
9.0	**Consultation of affected persons**	
9.1	Checking that consultation and participation of affected people has been implemented and their views and concerns have been addressed, wherever required,	
10	**Check H&S requirements, provision of H&S conditions, emergency preparedness has been established**	
11	**Conservation of physical and cultural resources has been implemented, if required**	
12	**Any other Business/issues**	

signed:

I. Compliance with DoE EIA Guideline and Environmental Clearance Steps

393. The DoE has issued EIA Guidelines for Industries (this document was released in December 1997) and addresses the IEE and EIA for several industrial sectors and development projects. Each Project Proponent shall conduct an EIA and is expected to consult and follow the DoE Guidelines.

394. In this case, it is necessary for DWASA to obtain site clearance followed by environmental clearance for this project (EIA as Red Category) considering submission of following documents.

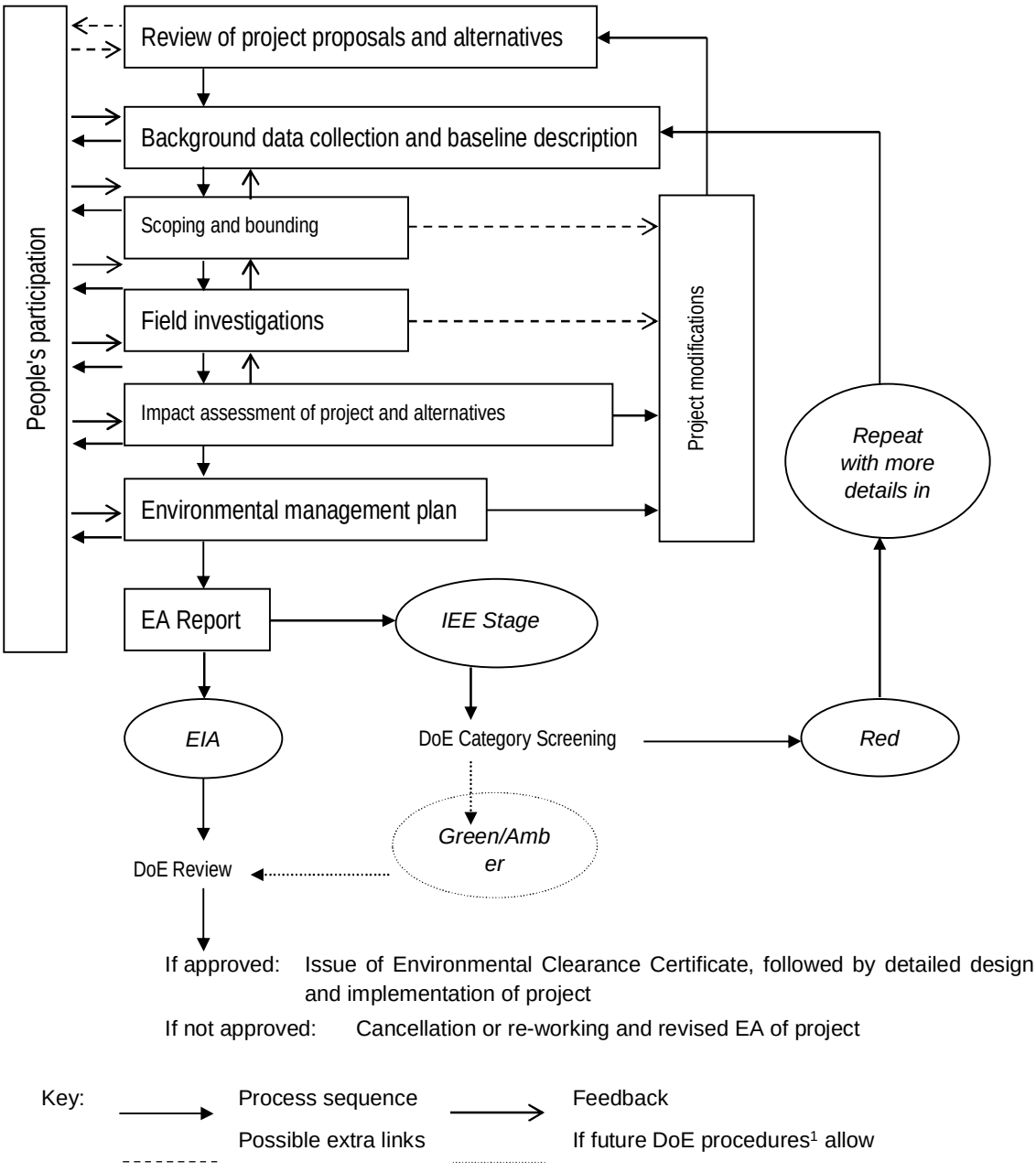
(i) Feasibility Study Report of the project;
(ii) EIA report including environmental management plan (EMP) and emergency response plan for the mitigation of adverse environmental impacts (Submitted Updated EIA prepared by EnviroConsult Ltd);
(iii) A NOC (No Objection Certificate) from the local authorities concerned;
(iv) Outline of relocation plans (where applicable) and;
(v) Other information as deemed necessary

395. As per ECR 1997 DESWSP falls under the red category of project. The following Figure 1 presents key steps in the environmental assessment process and DoE Clearance, Figure 2 displays DoE environmental clearance procedure.

396. No further permission is required. Forest clearance is not required as no public forest will be crossed, only agricultural land.

397. Key Steps in the Environmental Assessment Process & DoE Clearance

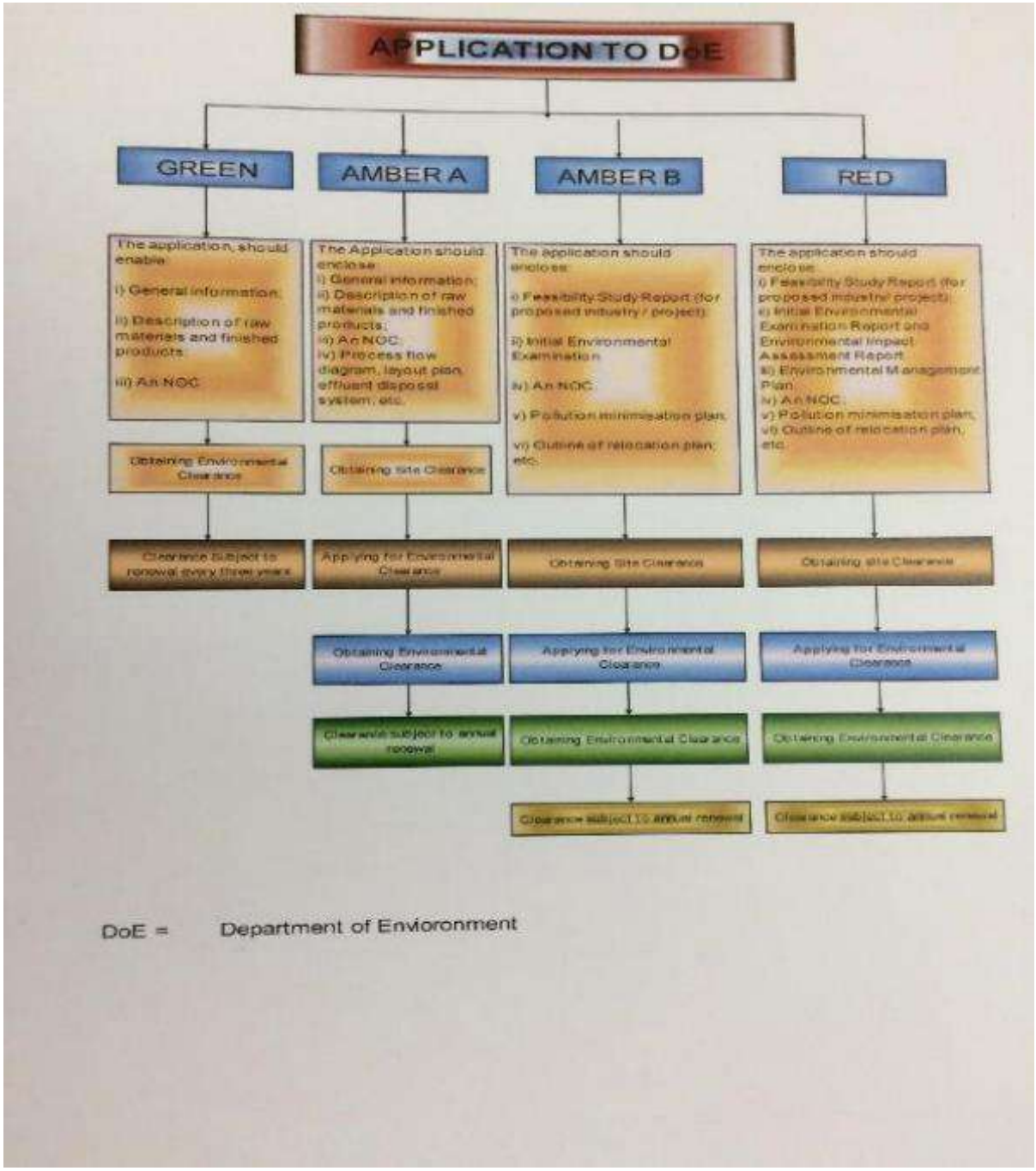
Figure:1 Key Steps in the EA Process



398. Note: 1. DoE procedures (Appendix I here) currently classify all FCD/I projects in the Red Category

399. 2. This diagram is only indicative of the processes involved. The actual activities and sequence may vary slightly, depending on the size, complexity and likely impacts of the proposed components. Similarly, the number of consultations under the people's participation programme, and their place in the planning process, may also vary

Figure 2: DoE Environmental Clearance Procedure



DoE = Department of Environment

J. Approval Letter of EIA Report for DESWSP, DWASA

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

Memo No: DoE/Clearance/5231/2013/264 Date: 21 /05/2015

Subject: Approval of Environmental Impact Assessment (EIA) Report for Water Treatment Plant under Dhaka Environmentally Sustainable Water Supply Project of Dhaka WASA.

Ref: 1) Application dated 05/02/2015.

With reference to the above, the Department of Environment (DOE) is pleased to approve Environmental Impact Assessment Report for Water Treatment Plant at Gandharbpur, Rupganj under Dhaka Environmentally Sustainable Water Supply Project of Dhaka WASA .This approval authorizes and regulates the following activities:

1. Project Proponent may undertake activities for land development and infrastructural development of the said Sub-Component;
2. Project Proponent may open L/C (Letter of Credit) for importing machineries for the Sub-Component which shall also include machineries relating to pollution control devices;
3. Activities must be carried out in a competent manner. This includes:
   (a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
   (b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.
4. Construction works shall be restricted to day time hours so as to avoid/mitigate the disturbance of local lives as well as implementation schedules of the works shall be notified in advance to nearby residents.
5. Storage area for soils and other construction materials shall be carefully selected to avoid disturbance of the natural drainage.
6. Proper construction practices shall be followed that minimize loss of habitats & nursery sites.
7. In order to control noise pollution, vehicles & equipment shall be maintained regularly; working during sensitive hours and locating machinery close to sensitive receptor shall be avoided.
8. Proper and adequate on-site precautionary measures and safety measures shall be ensured so that no habitat of any flora and fauna would be demolished or destructed.
9. All the required mitigation measures suggested in the EIA report are to be strictly implemented and kept operative/functioning on a continuous basis.

10. Any heritage sight, ecological critical area, and other environmentally and/or religious sensitive places shall be avoided during construction phase.
11. Resettlement plan should be properly implemented and people should be adequately compensated, where necessary.
12. Construction material should be properly disposed off after the construction work is over.
13. The Environmental Management and Mitigation Plan included in the EIA report shall strictly be implemented and kept functioning on a continuous basis.
14. Comprehensive Environmental Performance report, upon completion of the project shall have to be submitted to the Narayanganj District Office of DOE at Narayanganj with a copy to the Head Office of DOE in Dhaka describing actual intervention and rehabilitation at the project site.
15. Violation of any of the above conditions shall render this approval void.
16. The project authority shall apply for Environmental Clearance along with NOCs from other relevant agencies for operational activity to the Narayanganj District Office of DOE at Narayanganj with a copy to the Head Office of DOE in Dhaka.
17. This EIA Approval has been issued with the approval of the appropriate authority.

21.05.2015

(Syed Nazmul Ahsan)
Director (Environmental Clearance,e.c)
Phone # 8181778

Project Director
Dhaka Environmentally
Sustainable Water Supply Project
Dhaka WASA
WASA Bhaban(8th Floor), Room # 906
98, Kazi Nazrul Islam Avenue
Kawran Bazar, Dhaka-1215

Copy Forwarded to :

1. The Secretary, Ministry of Environment and Forests, Bangladesh Secretariat, Dhaka.
2. Director, Department of Environment, Dhaka Regional Office, Dhaka.
3. Deputy Director /Office In-charge, Department of Environment, Narayanganj District Office, Narayanganj.
4. Assistant Director, Office of the Director General, Department of Environment, Head Office, Dhaka.

2

400. Road Cutting Permission from Roads & Highways Department, Office of SDE, Narayanganj

401. Government of the People's Republic of Bangladesh

Department of Environment Head Office, Paribesh Bhaban E-16 Agargaon, Dhaka-1207 www.doe.gov.bd

Memo No: 22.02.6700.140.72.138.18. 11 ♦ g Date: 11 /12/2018

Subject: Environmental Clearance for Dhaka Environmentally Sustainable Water Supply Project under Dhaka WASA.

Ref: Your application dated 30/07/2018 and 28/11/2018.

Dear Sir,

Please refer to your letter of 30th July 2018 and 28th November 2018 on the captioned Subject, I have the pleasure to convey the approval of Environmental Clearance in favor of Dhaka Environmentally Sustainable Water Supply Project under Dhaka WASA.

A copy of the said Environmental Clearance Certificate is attached herewith for your kind information and necessary action at your end.

(Syed Nazmul Ahsan) Director (Environmental Clearance) Phone: 8181673

Project Director
Dhaka Environmentally Sustainable Water Supply Project
Dhaka WASA, WASA Bhaban (9th Floor)

98, Kazi Nazrul Islam Avenue, Kawran Bazar
Dhaka-1215.

Copy Forwarded to :

1) Private Secretary to the Hon'ble Secretary, Ministry of Environment, Forest and Climate Change, Bangladesh Secretariat, Dhaka.
2) Director, Department of Environment, Dhaka Metropolitan/Regional office, Dhaka.
3) Assistant Director, Office of the Director General, Department of Environment, Head Office, Dhaka.

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

Environmental Clearance Certificate
Section 12 of the Environment Conservation Act, 1995 (Amended 2002)

Clearance Certificate Number: \ / Lf g
File number: 22.02.6700.140.72.138.18.

Clearance Certificate Issue Date: \1 l, December 2018

Renewal date not later than: le, November 2018
I

A. Clearance Certificate Tvoe
Environmental Clearance Certificate

B. Clearance Certificate Holder
Project Director
Dhaka Environmentally Sustainable Water Supply Project
Dhaka WASA, WASA Bhaban (9th Floor)
98, Kazi Nazrul Islam Avenue, Kawran Bazar
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C. Premises to which this Clearance Certificate Aoolies
Project Director
Dhaka Environmentally Sustainable Water Supply Project
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1. **Limit Condition for Discharges to Air and Water**: The Environmental Clearance Certificate must comply with schedule 2 and 10, rule 12 of the Environment Conservation Rules, 1997.

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In case of non-coverage of ECR 1997 the World Bank Environment, Health and Safety
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3.12 All the required mitigation measures suggested in the EIA report are to be strictly implemented and kept operative/functioning on a continuous basis.

3.13 Any heritage sight, ecological critical area, and other environmentally and/or religious sensitive places shall be avoided during project construction phase.
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(b) the method by which the complaint was made;
(c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
(d) the nature of the complaint;

(e) the action taken by the certificate holder in relation to the complaint, including any follow-up contact with the complainant; and
(f) if no action was taken by the certificate holder, the reasons why no action was taken.

The record of a complaint must be kept for at least 4 years after the complaint was made. The record must be produced to any authorized officer of the DOE who asks to see them.

G. Validity of the Clearance Certificate

This Environmental Clearance is valid for one year from the date of issuance and the project authority shall apply for renewal to the Head Office of DOE with a copy to Dhaka Metropolitan/Regional office at least 30 days ahead of expiry.

Violation of any of the above conditions shall render this clearance void.

(Syed Nazmul Ahsan) Director (Environmental Clearance) Phone:

K. Grievance Redress Committee Members in PMU

402. Following ADB Safeguard Policy Statement (SPS), 2009 established time bound grievance committees together with procedures at three levels to address or resolve unusual incidences occurs during implementation of the project activities. The solution of incidences would be based on the complaints raised from APs and community people. In case of any unsettle dispute, GRC through submission of formal reference from DWASA will resolve the problem.

K1. Formation of GRC

403. Grievance Redress Committee (GRC) constituted comprising of a panel of five members; 1st is DWASA representative, 2rd MDSC representative 3rd DWASA Representative as well as the other two are also from DWASA Safe Guard Officer (Social & Gender) as member Secretary.

404. The GRC under ICB Package 1 is as below:

K2. GRC Composition

S.I	Name	Designation at GRC	Institution	Designation
1	Executive Engineer, DESWSP	Convener	DWASA	EE, DESWSP
2	Resettlement Specialist	Member	Consultant (MDSC)	Resettlement and Awareness Expert
3	Assistant Engineer	Member	DESWSP DWASA	AE DESWSP
4	Assistant Engineer (Female)	Member	DESWSP DWASA	AE DESWSP
5	Safeguard officer (Social and Gender)	Member Secretary	DESWSP DWASA	Safeguard Officer (S&G) DESWSP

405. The finalized GRC is below:

উন্নয়নের গণতন্ত্র
শেখ হাসিনার মূলমন্ত্র

Office of the Project Director
Dhaka Environmentally Sustainable Water Supply Project (DESWSP)
Dhaka Water Supply and Sewerage Authority
WASA Bhaban, 98, Kazi Nazrul Islam Avenue (9th Floor)
Kawran Bazar, Dhaka-1215
Web site- www.deswsp-dwasa.com , Email: pddeswspgwtp@gmail.com, Fax & Tel:88-02-8189095

Memo no: 46.113.618.00.00. GN- 97/DESWSP/ 1234 Date- 22.08.2019

Office Order

Sub: Formation of Environmental Safeguard Grievance Redress Committee (GRC) for Gandharbpur Water Treatment Plant related works under DESWS Project, Dhaka WASA .

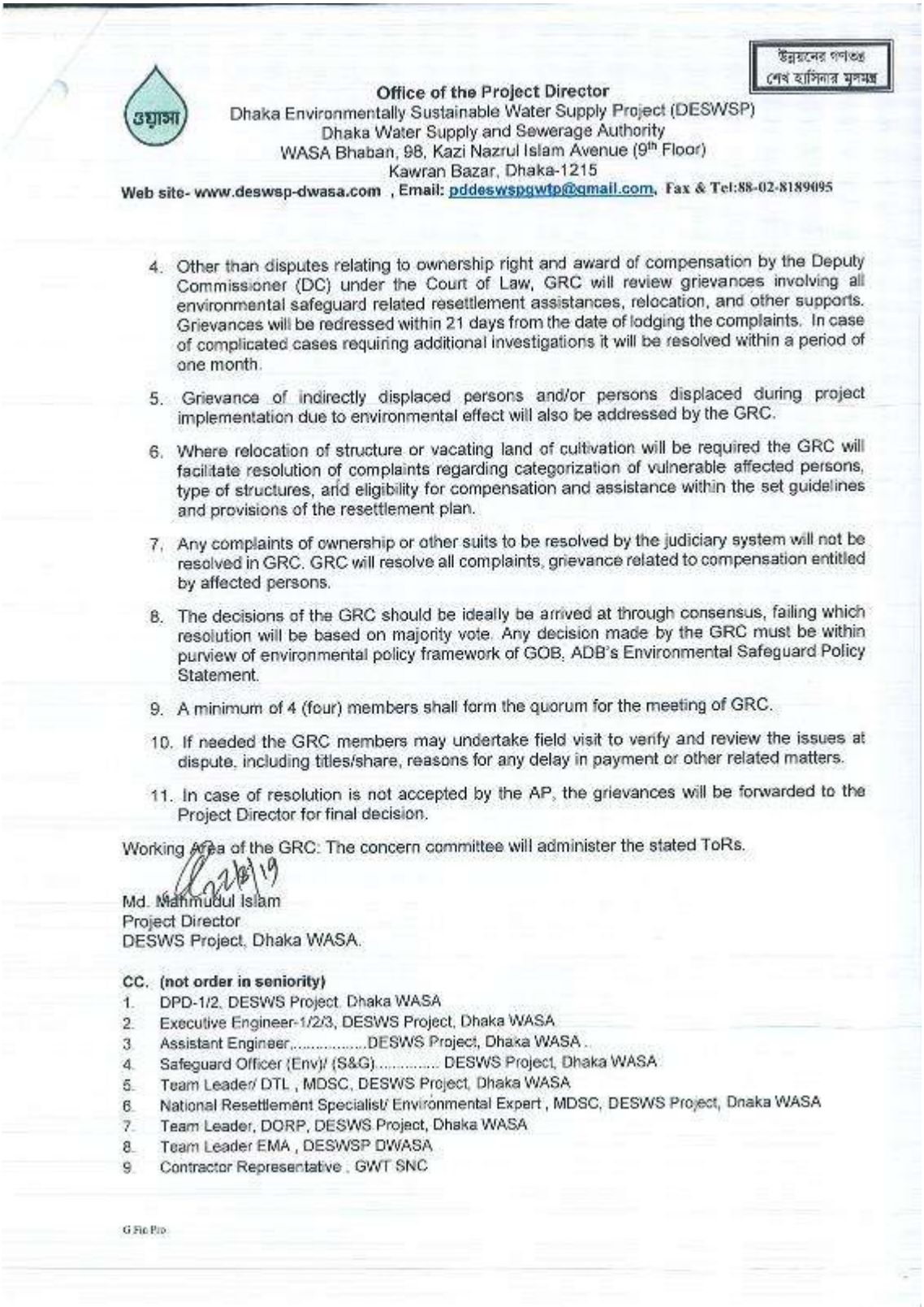
With due regards based on subject mentioned this is to notify you that Environmental Safeguard **Grievance Redress Committee (GRC)** for Gandhorbpur Water Treatment Plant related works (WTP, Intake Raw water transmission main , Finish Water transmission and distribution Feeder line) of DESWSP the PMU has formed Environmental Safeguard Grievance Redress Committee (GRC) and approved the same by the competent authority.

Environmental Safeguard Grievance Redress Committee (GRC) for Gandhorbpur Water Treatment Plant related works

Sl.	Name and Designation	Position in GRC
1.	Md. Shafiqur Rahman, DPD, DESWSP, DWASA.	Convener
2.	Mostafizur Rahman, Executive Engineer, DESWSP, DWASA.	Member
3.	Md. Al-Amin, Executive Engineer, DESWSP, DWASA.	Member
4.	National Environment Expert (Representative from MDSC), DESWSP, DWASA.	Member
5.	Md. Saidur Rahman, Safeguard Officer (Environment), DESWSP, DWASA.	Member Secretary
6.	Representative from contractor of WTP related works	Member

TOR of Environmental Safeguard Grievance Redress Committee (GRC) for Gandhorbpur Water Treatment Plant related works:

1. Environmental Safeguard Grievance Redress Committee (GRC) will be established to ensure stakeholders' participation in the implementation process and fair compensation to vulnerable affected persons (APs) for environmental safeguard issues related effects.
2. The APs can also call upon the representative of contractor/ MDSC/ PMU to assist them in presenting their grievance or queries to the GRC.
3. The GRC will receive grievance cases from the affected persons through the representative of contractor/ MDSC/ PMU.



উন্নয়নের গণতন্ত্র
শেখ হাসিনার মূলমন্ত্র

Office of the Project Director
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Kawran Bazar, Dhaka-1215
Web site- www.deswsp-dwasa.com , Email: pddeswspgwtp@gmail.com, Fax & Tel:88-02-8189095

4. Other than disputes relating to ownership right and award of compensation by the Deputy Commissioner (DC) under the Court of Law, GRC will review grievances involving all environmental safeguard related resettlement assistances, relocation, and other supports. Grievances will be redressed within 21 days from the date of lodging the complaints. In case of complicated cases requiring additional investigations it will be resolved within a period of one month.
5. Grievance of indirectly displaced persons and/or persons displaced during project implementation due to environmental effect will also be addressed by the GRC.
6. Where relocation of structure or vacating land of cultivation will be required the GRC will facilitate resolution of complaints regarding categorization of vulnerable affected persons, type of structures, arid eligibility for compensation and assistance within the set guidelines and provisions of the resettlement plan.
7. Any complaints of ownership or other suits to be resolved by the judiciary system will not be resolved in GRC. GRC will resolve all complaints, grievance related to compensation entitled by affected persons.
8. The decisions of the GRC should be ideally be arrived at through consensus, failing which resolution will be based on majority vote. Any decision made by the GRC must be within purview of environmental policy framework of GOB, ADB's Environmental Safeguard Policy Statement.
9. A minimum of 4 (four) members shall form the quorum for the meeting of GRC.
10. If needed the GRC members may undertake field visit to verify and review the issues at dispute, including titles/share, reasons for any delay in payment or other related matters.
11. In case of resolution is not accepted by the AP, the grievances will be forwarded to the Project Director for final decision.

Working Area of the GRC: The concern committee will administer the stated ToRs.

Md. Mahmudul Islam
Project Director
DESWS Project, Dhaka WASA.

CC. (not order in seniority)
1. DPD-1/2, DESWS Project, Dhaka WASA
2. Executive Engineer-1/2/3, DESWS Project, Dhaka WASA
3. Assistant Engineer.....DESWS Project, Dhaka WASA .
4. Safeguard Officer (Env)/ (S&G)..... DESWS Project, Dhaka WASA
5. Team Leader/ DTL , MDSC, DESWS Project, Dhaka WASA
6. National Resettlement Specialist/ Environmental Expert , MDSC, DESWS Project, Dnaka WASA
7. Team Leader, DORP, DESWS Project, Dhaka WASA
8. Team Leader EMA , DESWSP DWASA
9. Contractor Representative , GWT SNC

G File P/o

K3. Procedures of resolving grievances

Step 1

406. In case of any grievances, the complainant approaches to the Safeguard Implementation Unit (SIU) officials for clarification, or submits any formal complaints. The SIU will provide clarification to the displaced persons (DPs) and try to resolve the problem at the local level

with the involvement of SIU social safeguards officer, If not resolved.

Step 2

407. The SIU will recommend that APs submit their complaints to the GRC. The SIU will assist the DPs filing the complaints and organizes hearing within 14 days of receiving the complaints.

Step 3

408. GRC to scrutinize applications determine whether the submitted cases are within their mandate. Cases related to compensation under the Acquisition & Requisition of Immovable Property Ordinance (ARIPO) will be referred to DC through DWASA, SIU for further review and action .GRC invites representatives of APs to attend the meetings.

Step 4

409. If within the GRC mandate and not related to compensation under ARIPO, GRC will hold session with aggrieved APs, minutes recorded. If resolved, the project director approves. If not resolved;

Step 5

410. The DP may accept GRC decision; if not, he/she may file a case in the court of law for further appeal.

Step 6

411. The GRC minutes, approved by the project director will be received at the conveners' office.

412. The approved verdict is communicated to the complainant AP in writing. APs will be able to submit their grievance/complaint about any aspects of resettlement plan implementation and compensation. Grievances can be shared with DWASA verbally or in written form, but in case of verbal form, the SIU representatives in the GRC will write it down at the first instance during the meeting at no cost to APs. The AP will sign and formally submit the written report to the GRCs at the office of the SIU, PMU, and DWASA in implementing the RP. Any AP can also take their case to the court following the country legal system at any stage without going through the project GRM, if they wish to do so.

413. The GRCs has been activated with power to resolve resettlement and compensation issues not to be addressed under legal suit in the courts. The GRCs is ready to receive grievance cases from the affected persons through the resettlement awareness. The NGO will assist the APs in lodging their resettlement complaints in a proper format acceptable to the GRCs after they get ID cards from DWASA or are informed about their entitlements and losses.

414. The appeal procedure and conflict resolution:

(i) All complaints from the APs will be received at the field office of the resettlement awareness SIU the member secretary of the GRCs, with a copy for the concerned City Corporation Ward Commissioner's representatives.

(ii) The representative of the SIU in the GRCs, upon receipt of complaints, will inform the convener (DWASA representative) of the GRC and convener will organize a hearing session from the complainants in the concerned City Corporation/Word Commissioner office, where the complaint was received.

(iii) The GRC will review the proceedings and pass verdicts to convey to the concerned AP through the SIU. If there are matters relating to arbitration or compensation under the existing law, the matter will be referred to the DC and the courts. The DC has to make decision within maximum of 14 days.
(iv) The GRC will settle the disputes within a maximum of 21 days of receiving the complaints from the APs.
(v) Resolution of the GRCs will be sent to the PD for approval, and after approval these will be adopted in the process of resettlement for issuance of ID cards, determination of loss and entitlements, and payment thereof.
(vi) affected people can go to the GRC for any environmental concern
(vii) all workers can go the GRC for any issues and concerns during project implementation

415. In the event that the established 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 Project Information Disclosure (PID) to be distributed to the affected communities, as part of the project GRM.

L. Waste Disposal and Transfer Sites

L1. Meeting between DNCC & MDSC, 26 May 2019)

416. On 26 May 2019, at 15:00 the MDSC Team (Mr Imtiaz, Mr Zakir, Mr Rahat & Mr Latif), had a meeting with Dr. Tarek, PD of a project, DNCC office at Gulshan. Followings are the results:

(i) Presently DNCC has no such identified dumping site for hazardous waste. Amin Bazar dumping site is for kitchen waste only and it is almost full. Matuail dumping site condition is same.
(ii) DNCC have a proposal for new dumping site which is in Ministry to get approval and will take time to materialize, not within coming 2 -3 years.
(iii) DNCC thinks in Madani Avenue waste are not hazardous. Those are mostly rubbish, building materials, plastic bags and kitchen waste which can be dumped in DNCC Transfer station or dumping site with DNCC permission and may cost for the contractor for transportation to DNCC.
(iv) Outside Dhaka city there are hardly any hazardous waste along the pipe route. Contractor may sell the excavated soil to the developer or individual land owners to raise their land because presently they are filling their land with costly river sand and demand is very high.
(v) Inside Dhaka, contractor may sell or give free the excavated soil to the interested inhabitants but need to find those interested land owners.

L2. Overall Scenario of DNCC Landfill sites

417. DNCC helped to take excavated soil of Metro Rail Project to DNCC dumping site at Amin Bazar to develop their future extension land. PMU together with contractor may approach for this kind of assistance if there is a possibility.

418. Waste disposal sites (Landfills) of Dhaka are usually situated outside the city boundary, this also increases the transport cost of disposing wastes. In Dhaka, Matuail is the sanitary landfill of South Dhaka and Gabtoli (Amin Bazaar) is the landfill of North Dhaka. Currently, the construction of a sanitary landfill is going on in Amin Bazaar landfill. The sanitary landfill is a result of the initiative by JICA. In the Sanitary landfill, the wastes carried by the truck are measured first and then they are dumped at the dumping platform. Subsequently, the trucks are unloaded using excavator and manually. Finally the bulldozers compact the waste at the dumping platform.

419. In Dhaka City, out of the two main landfills, Matuail Landfill is a semi-aerobic landfill, where methane-dioxide, oxygen and odorous gases release through pipes, so the smell of the landfill is less toxic. Matuail Landfill is under Dhaka South City Corporation (DNCC), which consists of an area of about 40 hectares. JICA had stated in the master plan that out of 40 hectares, only 20 hectares area were still unused in 2005. The DSCC official confirmed that at present all the lands are covered in waste and by 2017 the capacity of dumping will be exhausted. Currently they are dumping the waste adopting pyramid method (having a slope of 1/3). The records of the trips by trucks are documented in a computer system at *Nagar Bhaban* (Central office of DSCC) to understand the truck movements. They have garbage bracket to prevent the trucks from slipping into the water in the rainy season.

420. Gabtoli (Amin Bazaar) is an open dumping landfill at the moment. Even though the work of sanitary dumping site is going on, Amin Bazaar is expected to be fully exhausted and sealed by 2017- 2018. The total area of Amin Bazaar is 20 hectares.

421. Ultimate disposal of urban solid waste is done crudely in open dumps, lowlands or water bodies in an unsanitary manner. As a result, the surrounding environment of the dumpsites is barely hygienic. The increasing demand for landfill is also a big problem for the authority to find suitable lands for dumping wastes.

422. However, DoE, DWASA, MDSC and contractors have to discuss and to find out alternative options for proper waste disposal because none of the three sites (landfills, transfer station) is suitable for disposal of construction waste including spoiled soil from P2 construction sites because these disposal sites do not have capacity anymore.

423. Following are the photographs of disposal site

(i) Matuail Site: This site has an area of 40 hectare, with an average height of 5meter, but now its height is 18 meter. JICA and DCC funded this site.

Photograph of Matuail Disposal Site

Photograph of Matuail Disposal Site

(ii) Gabtoli (Amin Bazar) Site:

Photograph of Gabtoli (Amin Bazar) Disposal Site

Photograph of Gabtoli (Amin Bazar) Disposal Site

(iii) Uttara Secondary Waste Transfer Station: This area is not a dumping site, rather this is a transfer station.

Photograph of Secondary Transfer station, Uttara.

M. Environmental Clearance for DESWSP

Valid upto 10/12/19

Government of the People's Republic of Bangladesh
Department of Environment
Head Office, Paribesh Bhaban
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www.doe.gov.bd

Memo No: 22.02.6700.140.72.138.18. 1148 Date: 11 /12/2018

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Environmental Clearance Certificate

Section 12 of the Environment Conservation Act, 1995 (Amended 2002)

Clearance Certificate Number: ১৭৪

File number: 22.02.6700.140.72.138.18.

Clearance Certificate Issue Date: 11, December 2018

Renewal date not later than: ১০, November 2018

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Environmental Clearance Certificate

B. Clearance Certificate Holder

Project Director
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98, Kazi Nazrul Islam Avenue, Kawran Bazar
Dhaka-1215.

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(d) the nature of the complaint;

Translated copy of WARPO clearance regarding water use of Meghna river,
ENGLISH TRANSLATION OF THE MEMORANDUM OF WARPO PERMISSION

WARPO — Water Resources Planning Organization

Water Resources Planning Organization — Ministry of Water Resources

Government of the People's Republic of Bangladesh

WARPO Bhaban

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Memo No.: 42.02.0000.004.36.001.18-34 Date: 15/01/2019

Managing Director
Dhaka Water Supply and Sewerage Authority
WASA Bhaban, Kazi Nazrul Islam Avenue
Kawran Bazar, Dhaka.

Subject: Regarding issuance of Clearance for proposed "Dhaka Environmentally Sustainable Water Supply"

Reference: Memo No.: 46.113.618.00.00.W-229(Vol-01)/DESWSP/354; dated: 26/11/2018 AD

In regard of the above subject and reference, this clearance is issued after evaluation of the submitted information and DPP for the proposed "Dhaka Environmentally Sustainable Water Supply" subject to the WARPO's comment and compliance with the comments.

Sd/-
(Md. Mahmudul Hasan)
Copy to

1. Secretary, Ministry of Water Resources, Government of the People's Republic of Bangladesh, Bangladesh Secretariat, Dhaka.

2. Project Director, DESWSP, Dhaka WASA, Dhaka (along with annexure).

WARPO
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"WARPO's clearance matrix on proposed development plan of "Dhaka Environmentally Sustainable Water Supply Project".

Description of Project Clearance Controller	Yes	No	Comments
1 Is the project compliant to the National Water Policy?	Yes		See comment 3.1
2 Is the project compliant with the National Water Management Policy (NWMP)?	Yes		See comment 3.2
3 Is the project compliant with the Water Resources Management 7th 5-Year Plan and Sustainable Development Goal (SDG) together with other Poverty-Assisted Activities, Programme/ Goal of Principles/ Objectives?	Yes		See comment 3.3
4 Is the project compliant with Bangladesh Water Law 2013 and Bangladesh Water Regulation 2018?	Yes		See comment 3.4
5 Is the project compliant with the Integrated Water Resources Management (IWRM) concept?	Yes		See comment 3.5
6 Is the project duplicate or repetition to a project under implementation or completed by other Organization, Person/Group or if so, whether synchronized with those Organization, Person/Group?	Yes		See comment 3.6
7 Is the Environmental Impact Assessment of the Water Sectoral Projects completed?	Yes		See comment 3.7
8 Is the project prepared giving importance to the important social aspects and women, children, poor and under-developed population?			See comment 3.8
9 Whether during project preparation (Feasibility Study) the project scheduling guide (GPA) was followed?			See comment 3.9
10 Is in preparation of the project suitable and tested process, evaluation, technic and tools used?	Yes		See comment 3.10

Comment on Clearance:
Clearance to the proposed project is given subject to the necessary amendment as commented.

Sd/- Principal Scientific Officer/ Superintending Engineer (Water Resources Branch	Sd/- Director (Planning/ Technical)

WARPO
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Comments on the submitted DPP (Part of it) and information for the proposed “Dhaka Environmentally Sustainable Water Supply” for issuance of Water Resources Planning Organization (WARPO) clearance.

Background:
Dhaka Water Supply and Sewerage Authority (Dhaka WASA) is an important organization engaged in supplying potable water to the people of Dhaka City. The Organization, currently, supplying potable water to 15 Million people spreading 400 sq. km. area of the Dhaka City. It is expected that the demand of potable water will increase every day with the increase of the area of the Dhaka City to 600 sq. km. by the year 2020. Presently, water is supplied to the city mainly through extracting ground water using deep tube well. On one hand, more and more water is in extraction from the underground; on the other hand, necessary amount of water recharge is not possible due to continuous urbanization and other human created shortage of open spaces. On top of that due to climatic changes, the rainfall is reducing every day. Due to these the level of the underground water is alarmingly diminishing every year. It necessitates declaring of 40-60 deep tube well abandoned in and around Dhaka City. This is causing failure to supply water through extracting underground water. On the other hand extracting underground water is not sustainable and environment friendly and distribution system is not based on sustainable technology. That is why, it is necessary to arrange supplying potable water according to the demand through treating surface water reducing dependency on extraction of underground water. At present, for a long time, supply of water to North-Western part of Dhaka City, that means, to Uttora, Gulshan, Banani, Nikunjo, Khilkhet, Badda, whole of Mirpur and adjacent areas is insufficient to the demand. A project for construction of Water Treatment Plant at Gandhabpur in Rupgonj of Narayangonj and its associated works are undertaken aiming to fulfil the increasing demand of 24 hour safe and uninterrupted pressurized water supply by this vast area.
As a fist stage, under the project, water will be lifted constructing Intake at Bishnandi in Araihazar Upozila on the bank of the River Meghna, 30 km East of Narayangonj and will be brought to the proposed Treatment Plant at Gandhabpur, Rupgonj from Golkandail of Dhaka Sylhet road using 2 pipes. Later, this treated water will be brought to the injection point at Baridhara, Dhaka through Madani Avenue crossing the Sitalakhya and the Balu rivers and thereafter that will be supplied to Uttora, Rampura, Mirpur of Dhaka town; and to North-Eastern part of Dhaka. The Feasibility Study of the project is completed.
Project Objective:
The main objective of the project is to ensure water supply to the water crisis areas of Dhaka City collecting surface water and reducing dependency on the underground water.
Physical Works under the Project:

- Construction of Intake on the bank of the river Meghna at Bishnandi of Araihazar Upozila in Narayangong.
- Construction of 22 km Raw Water Transmission Line from Intake point to Treatment Plant.
- Construction of Treatment Plant at Gandharbpur of Rupgonj Upozila in Narayangonj.
- Construction of 14 km Finished Water Transmission Line from Gandharbpur Treatment Plant to Baridhara, Dhaka.

The estimated cost of the project is 5 248.06 Crore according to the DPP.
Project’s Financial and Economic Analysis:

	Net Project Value (NPV) (lac taka)	Benefit – Cost Ratio (BCR)	Internal Rate of Return (IRR)
Financial	30129	1.08:1	12.54%
Economic	92274	1.29:1	14.99%

Comments:

3.1 In the National Water Policy-1999 household and municipal use of water is given the highest priority. Concurrent use of underground and surface water, taking steps in limiting use of underground water are mentioned in the Water Policy. Para 4.6 (Ka) of the Water Policy mentioned about government support in collecting rain water and ensuring supply of safe and easily accessible water through various way. Dhaka WASA is an organization engaged in ensuring supply of pure water and sanitation system of Dhaka City. The implementation of the project under discussion will play an important role in ensuring supply of safe water to people. On top of that it will reduce uncontrolled use of underground water. Considering all these the project is aligned with the National Water Policy.

3.2 The National Water Management Plan (NWMP) mentioned programs aiming supply of potable and dependable water for ensuring protection of public health. The project is aligned with the aim-objective and programs as mentioned in MC 002: Dhaka Bulk Water Supply and Distribution System of the National Water Management Plan.

3.3 The 7th 5-Year Plan was formulated targeting Vision 2020 goal. The 7th 5-Year Plan mentioned to ensure safe water in its Nutrition and Services Strategy. It is mentioned in the Plan that the government organizations would continue to work towards providing services to citizens. Dhaka WASA would plan to supply safe water to the city dwellers. Apart from that this project will assist in achieving SDG-6 goal.

3.4 It is mentioned in the National Water Law to ensure safe extraction of underground water. The project will play a role in reducing extraction of underground water to supply water to Dhaka City. Clause 3 (2) of Water Law considered rights of water use for potable water and cleanliness and sanitation as the highest priority. Apart from that, the priority list of use of water resources of the Clause 18 of the Water Law has given the highest priority to drinking water. The objective of the project is using surface water instead of underground water to contribute in supplying water to Dhaka town that would be environmentally sustainable.

3.5 The National Water Policy (Para 4.5 Ka) suggests to develop water resources projects as much as possible diversified and complete these projects in an integrated and diversified fashion from project planning, implementation to project monitoring. The proposed project will play an important role in supplying safe water to Dhaka City and will help in reducing dependency on underground storage thereby will support to reduce environmental risks.

3.6 To stride for supplying water and development of sanitation system for Dhaka City is the main function of the Dhaka WASA. Water will be supplied from the river Meghna. It is necessary to consider whether within the vicinity of the collection point at Meghna river there is any irrigation or river embankment protection project has been completed or is under implementation by any other organization. It is necessary to show in the index map of the DPP any completed or implementing irrigation or river embankment protection project by any other organization in or near the project area.

3.7 It is compulsory to determine environmental impact for all Water Resources projects according to the para 4.12 of the National Water Law. The Feasibility Study of the proposed project was conducted in 2011. Later, Initial Environmental Examination (IEE) was completed for construction of the Water Treatment Plant under the Dhaka Environmentally Sustainable Water Supply Project and clearance certificate from the Department of Environment was obtained. The Environmental Impact Assessment was conducted further under the Dhaka Environmentally Sustainable Water Supply Project. The report mentioned that there would be no negative impact on the environment implementing the project. It

would be necessary to follow the suggested Environmental Management Plan (EMP) that is included in the report. It is necessary to follow the instructions of the report about designing of the Intake Screen considering the fish and other aquatic animals near the Intake point.

3.8 To supply uninterrupted water to increased population of Dhaka City would be possible on completion of the project. The local people and stakeholders were consulted during the Environmental Impact Assessment. Socio-economic impact due to implementation of the project and rehabilitation plan were developed under the project.

3.9 It is necessary, during investing in water sector, to follow all the instructions related to assessment of project or GPA (GPA), people's participation and various other circular issued by the government at time to time during preparation of Feasibility Study Report for all Projects. The Financial and Economic Analysis of the project is completed.

3.10 Feasibility Study of the "Dhaka Environmentally Sustainable Water Supply Project" was completed in 2011. The report considered few locations of Meghna and Sitalakhya rivers for analysis of water quantity and quality and river hydrology and morphology. It is reported that there would be no environmental impact on the river as there would be extraction of 1% of water from the river Meghna during dry season under the project. The report didn't mention whether impact of the environmental change was considered. The Feasibility Study considered that the Water Treatment Plant would be constructed at Khilkhet. Later, it was decided to change to Gandharbpur and further study was conducted. The Feasibility Study reported that the river bank at Bishnandi is stable. But, whether there will be any impact due to construction of the Intake or there will be any new possibility of river bank erosion need to be analyzed and necessary measures need to be adopted accordingly. Apart from that the report didn't consider climatic change and whether availability of water at intake point would be influenced by the construction of any obstruction, presently or in future. So, climatic change and availability of water due to construction of any obstruction in the upstream may be considered seriously.

Sd/- 14/1/19 Sd/- 14/01/209
Md. Jamal Haider Md. Jahid Hossain
Scientific Officer Senior Scientific Officer
Water Resources Planning Organization Water Resources Planning Organization
Ministry of Water Resources Ministry of Water Resources

WARPO
পানি সম্পদ পরিকল্পনা সংস্থা

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PD/DESWSP

স্মারক নং: ৪২.০২.০০০০.০০৪.৩৬.০০১.১৮-৬৪

তারিখঃ ২৫/০২/২০১৯

অবগতি	অতীব জরুরী	অনুরোধ
উর্ধ্বতন পদ (প্রশাসন)	উপস্থাপন করুন	
উর্ধ্বতন পদ (অর্থ)	প্রয়োজনীয় ব্যবস্থা নিন	
অতিরিক্ত (টেকনিক্যাল)	বিবেচনা করুন	
অতিরিক্ত (প্রশাসন)	পরিচালক অবগত	
[illegible]		

তারিখ: ১৯/০২/১৯

ব্যবস্থাপনা পরিচালক
ঢাকা পানি সরবরাহ ও পয়ঃনিষ্কাশন কর্তৃপক্ষ
ওয়াসা ভবন, কাজী নজরুল ইসলাম এভিনিউ,
কাওরান বাজার, ঢাকা।

বিষয়: প্রস্তাবিত "ঢাকা এনভায়রমেন্টালি সাসটেনেবল ওয়াটার সাপ্লাই" শীর্ষক প্রকল্পের ছাড়পত্র প্রদান প্রসঙ্গে।

সূত্রঃ স্মারক নং: ৪৬.১১৩.৬১৮.০০.০০.W-229(Vol-01)/DESWSP/354; তারিখ:২৬/১১/২০১৮ খ্রিঃ

উপর্যুক্ত বিষয় ও সূত্রে বর্ণিত পত্রের প্রেক্ষিতে প্রস্তাবিত "ঢাকা এনভায়রমেন্টালি সাসটেনেবল ওয়াটার সাপ্লাই" শীর্ষক প্রকল্পের উপস্থাপিত তথ্য এবং ডিপিপি (অংশবিশেষ) পর্যালোচনান্তে ওয়ারপোর মতামত ও উক্ত মতামত প্রতিপালন সাপেক্ষে ছাড়পত্র প্রদান করা হলো।

সংযুক্তি: বর্ণনামতে (০৫ পাতা)।

(মোঃ মাহমুদুল হাসান)
মহাপরিচালক, ওয়ারপো

অনুলিপি:

১। সচিব, পানি সম্পদ মন্ত্রণালয়, গণপ্রজাতন্ত্রী বাংলাদেশ সরকার, বাংলাদেশ সচিবালয়, ঢাকা।
(দৃষ্টি আকর্ষণ: যুগ্ম প্রধান, পানি সম্পদ মন্ত্রণালয়, গণপ্রজাতন্ত্রী বাংলাদেশ সরকার, বাংলাদেশ সচিবালয়, ঢাকা)

২। প্রকল্প পরিচালক, DESWSP প্রকল্প, ঢাকা ওয়াসা, ঢাকা (সংযুক্তিসহ)।

TL, MDSC
PL. Reply
23/1/19
Engr. Md. Mahmudul Islam
Superintending Engineer &
Project Director
PMU, DESWSP, Dhaka WASA

RONALD
23/01/19

WARPO
পানি সম্পদ পরিকল্পনা সংস্থা

"ঢাকা এনভায়রনমেন্টালী সাসটেইনেবল ওয়াটার সাপ্লাই প্রজেক্ট" শীর্ষক উন্নয়ন প্রকল্প প্রস্তাবের উপর ওয়ারপোর ছাড়পত্র নির্ণায়ক ছক/ ম্যাট্রিক্স।

	প্রকল্প ছাড়পত্র নিয়ামকের বর্ণনা	হ্যাঁ	না	মন্তব্য
১	প্রকল্পটি জাতীয় পানি নীতি এর সাথে সামঞ্জস্যপূর্ণ কিনা	হ্যা		মন্তব্য ৩.১ দ্রষ্টব্য
২	প্রকল্পটি জাতীয় পানি ব্যবস্থাপনা পরিকল্পনা (এনডব্লিউএমপি) এর সহিত সামঞ্জস্যপূর্ন কিনা	হ্যা		মন্তব্য ৩.২ দ্রষ্টব্য
৩	প্রকল্পটি পানি সম্পদ ব্যবস্থাপনায় ৭ম পঞ্চ বার্ষিকী পরিকল্পনা ও টেকসই উন্নয়ন লক্ষ্যমাত্রা (এসডিজি) সহ অন্যান্য দারিদ্র-সহায়ক কর্মকাণ্ড, কর্মসূচী/নীতিমালার লক্ষ্য/উদ্দেশ্যের সাথে সামঞ্জস্যপূর্ণ কিনা	হ্যা		মন্তব্য ৩.৩ দ্রষ্টব্য
৪	প্রকল্পটি বাংলাদেশ পানি আইন ২০১৩ এবং বাংলাদেশ পানি বিধিমালা-২০১৮ এর সাথে সামঞ্জস্যপূর্ণ কিনা	হ্যা		মন্তব্য ৩.৪ দ্রষ্টব্য
৫	প্রকল্পটি সমন্বিত পানি সম্পদ ব্যবস্থাপনা (আইডব্লিউআরএম) ধারণার সাথে সংগতিপূর্ণ কিনা			মন্তব্য ৩.৫ দ্রষ্টব্য
৬	অন্যান্য সংস্থা, ব্যক্তি/গোষ্ঠি কর্তৃকপরিচালিত বা সমাপ্ত প্রকল্পসমূহের সহিত প্রস্তাবিত প্রকল্পটির কোন দ্বৈততা বা পুনরাবৃত্তি আছে কিনা বা থাকলেও সংস্থা, ব্যক্তি বা গোষ্ঠির সহিত সমন্বয় করা হয়েছে কিনা	হ্যা		মন্তব্য ৩.৬ দ্রষ্টব্য
৭	পানি খাতের প্রকল্পসমূহের পরিবেশগত প্রভাব (ইআইএ) নিরুপন করা হয়েছে কিনা	হ্যা		মন্তব্য ৩.৭ দ্রষ্টব্য
৮	প্রকল্পটি গুরুত্বপূর্ণ সামাজিক বিষয়াদি এবং নারী, শিশু, দরিদ্র ও অনগ্রসর জনগোষ্ঠীর প্রতি বিশেষ গুরুত্ব দিয়ে প্রকল্পটি প্রস্তুত করা হয়েছে কিনা			মন্তব্য ৩.৮ দ্রষ্টব্য
৯	প্রকল্প প্রণয়নের ক্ষেত্রে (সম্ভাব্যতা যাচাই) প্রকল্প নির্ধারণি নির্দেশিকা (জিপিএ) অনুসরণপূর্বক তৈরী করা হয়েছে কিনা			মন্তব্য ৩.৯ দ্রষ্টব্য
১০	প্রকল্পটি তৈরীতে উপযুক্ত ও পরীক্ষিত বিশ্লেষণি প্রক্রিয়া, মূল্যায়ন পদ্ধতি, কৌশল ও টুলস্ ব্যবহার করা হয়েছে কিনা	হ্যাঁ		মন্তব্য ৩.১০ দ্রষ্টব্য

ছাড়পত্র মন্তব্যঃ

মতামতের আলোকে প্রয়োজনীয় সংশোধন সাপেক্ষে প্রস্তাবিত প্রকল্পটির ছাড়পত্র প্রদান করা হলো।

১৪/১১/১৯ মুখ্য বৈজ্ঞানিক কর্মকর্তা/ তত্ত্বাবধায়ক প্রকৌশলী (পানি সম্পদ শাখা)	১৪/১১/১৯ পরিচালক (পরিকল্পনা/কারিগরী)

WARPO
পানি সম্পদ পরিকল্পনা সংস্থা

ছাড়পত্র প্রদানের নিমিত্তে সরবরাহকৃত ডিপিপি (অংশ বিশেষ) ও তথ্যের ভিত্তিতে "ঢাকা এনভায়রনমেন্টালী সাসটেইনেবল ওয়াটার সাপ্লাই প্রজেক্ট" শীর্ষক উন্নয়ন প্রকল্প প্রস্তাবের উপর পানি সম্পদ পরিকল্পনা সংস্থা (ওয়ারপো)'র মতামত

পটভূমিঃ

ঢাকা পানি সরবরাহ ও পয়ঃ নিষ্কাশন কর্তৃপক্ষ (ঢাকা ওয়াসা) ঢাকা মহানগরীতে জনসাধারণের কাছে সুপেয় পানি সরবরাহের কাজে নিয়োজিত একটি গুরুত্বপূর্ণ প্রতিষ্ঠান। প্রতিষ্ঠানটি বর্তমানে ৪০০ বর্গ কিঃমি বিস্তৃত ঢাকা মহানগরী এলাকায় প্রায় ১৫ মিলিয়ন জনসাধারণকে সুপেয় পানি সরবরাহ করে যাচ্ছে। আশা করা যায় যে, ২০২০ সালের মধ্যে ঢাকা মহানগরীর পরিধি বৃদ্ধি পেয়ে ৬০০ বর্গ কিঃমিঃ এ দাঁড়াবে এবং সেই সাথে সুপেয় পানির চাহিদাও দিন দিন বৃদ্ধি পাবে। বর্তমানে নগরীতে পানি সরবরাহ করা হয় মূলত গভীর নলকূপের মাধ্যমে ভূ-গর্ভস্থ পানি উত্তোলন করে। একদিকে সুপেয় পানির চাহিদা মেটানোর জন্য অধিক মাত্রায় ভূ-গর্ভস্থ পানি উত্তোলন করা হচ্ছে, অন্যদিকে উত্তোরত্তর নগরায়ন ও অন্যান্য মানব সৃষ্ট কারণে প্রয়োজনীয় উন্মুক্ত জায়গার অভাবে প্রয়োজনীয় পরিমান পানি ভূপৃষ্ঠে পুনঃভরণ হচ্ছে না। তদুপরি জলবায়ু পরিবর্তনের কারণে বৃষ্টিপাতের পরিমান ও দিন দিন হ্রাস পাচ্ছে। ফলে প্রতিবছরই ভূ-গর্ভস্থ পানির স্তর আশংঙ্কাজনক হারে নিচে নেমে যাচ্ছে। ফলে ঢাকা নগরী ও আশেপাশের ৪০-৬০ টি গভীর নলকূপ বাধ্য হয়ে পরিত্যক্ত ঘোষণা করার প্রয়োজন হচ্ছে। এতে নলকূপের মাধ্যমে ভূ-গর্ভস্থ পানি উত্তোলন ও সরবরাহ ব্যবস্থা অকার্যকর হয়ে পড়ছে। তাছাড়া গভীর নলকূপের মাধ্যমে ভূগর্ভস্থ পানি উত্তোলন টেকসই ও পরিবেশবান্ধব নয় এবং বিতরন ব্যবস্থাও লাগসই প্রযুক্তি নির্ভর নয়। এ কারনেই চাহিদা মোতাবেক সুপেয় পনি সরবরাহের লক্ষ্যে ভূ-গর্ভস্থ পানি উত্তোলনের উপর নির্ভরশীলতা কমিয়ে ভূ-পরিস্থ পানি শোধন করে তা সরবরাহের ব্যবস্থা করা প্রয়োজন। বর্তমানে ঢাকা মহানগরীর উত্তর পশ্চিমাংশ অর্থাৎ উত্তরা, গুলশান, বনানী, নিকুঞ্জ, খিলক্ষেত, বাড্ডা, সমগ্র মিরপুর ও তৎসংলগ্ন এলাকা সমুহে দীর্ঘ দিন ধরে প্রয়োজনের তুলনায় পানি সরবরাহ অপ্রতুল। এই ব্যপক আরবান এলাকায় ক্রমবর্ধমান পানির চাহিদার পরিপ্রেক্ষিতে ২৪ ঘন্টা নিরাপদ ও নিরবিচ্ছিন্ন প্রেসারাইজড পানি সরবরাহ নিশ্চিত করার লক্ষ্যে টেকসই পরিকল্পনার অংশ হিসেবে নারায়ণগঞ্জের রূপগঞ্জ উপজেলার গন্ধর্বপুরে পানি শোধনাগার নির্মাণ ও আনুষঙ্গিক কাজের জন্য প্রকল্পটি নেয়া হয়েছে।

উক্ত প্রকল্পের আওতায় মেঘনা নদীর পাড়ে ঢাকা হতে ৩০ কিঃমিঃ পূর্বে নারায়ণগঞ্জ জেলার আড়াইহাজার উপজেলার বিশনন্দী এলাকায় ইনটেক স্থাপনের মাধ্যমে পানি উত্তোলন করে প্রথম ধাপে ২ টি পাইপের মাধ্যমে ঢাকা সিলেট রোডের গোলকান্ডাইল হতে রূপগঞ্জের গন্ধবপুরে প্রস্তাবিত পানিশোধনাগার এ আনা হবে। পরবর্তীতে এ পরিশোহিত পানি শীতলক্ষ্যা ও বালু নদী অতিক্রম করে মাদানী এভিনিউ হয়ে ঢাকার বারিধারায় ইনজেকশন পয়েন্টে আনা হবে এবং পরবর্তীতে তা ঢাকা শহরের উত্তরা, রামপুরা মিরপুর, এবং ঢাকার উত্তর পূর্বাংশে সরবরাহ করা হবে। প্রকল্পটি গ্রহণে ফিজিবিলিটি স্ট্যাডি সম্পন্ন করা হয়েছে।

প্রকল্পের উদ্দেশ্যঃ

প্রকল্পের মূল উদ্দেশ্য ভূ-পরিস্থ পানি আহরণের মাধ্যমে ঢাকা মহানগরীতে পানি সংকটপন্ন এলাকায় নিরবিচ্ছিন্ন পানি সরবরাহ নিশ্চিত করা এবং ভূ-গর্ভস্থ পানি উপর নির্ভরশীলতা হ্রাস করা।

WARPO
পানি সম্পদ পরিকল্পনা সংস্থা

প্রকল্পের আওতায় ভৌত কাজঃ

- মেঘনা নদীর পাড়ে নারায়ণগঞ্জ জেলার আড়াইহাজার উপজেলার বিশনন্দী এলাকায় ইনটেক নির্মাণ।
- ইনটেক পয়েন্ট হতে পানি শোধনাগার পর্যন্ত ২২ কিঃমিঃ Raw Water Transmission Line নির্মাণ।
- নারায়ণগঞ্জের রূপগঞ্জ উপজেলার গন্ধর্বপুরে পানি শোধনাগার নির্মাণ
- গন্ধর্বপুরের পানি শোধনাগার হতে ঢাকার বারিধারা পর্যন্ত ১৪ কিঃমিঃ Finished Water Transmission Line নির্মাণ।

ডিপিপি অনুযায়ী প্রকল্পটির প্রাক্কলিত ব্যয় ৫২৪৮.০৬ কোটি টাকা।

প্রকল্পের আর্থিক ও অর্থনৈতিক বিশ্লেষণঃ

	নেট প্রেজেন্ট ভ্যালু (NPV) (লক্ষ টাকায়)	বেনিফিট কস্ট রেশিও (BCR)	ইন্টারনাল রেট অব রিটার্ন (IRR)
আর্থিক	৩০১২৯	১.০৮: ১	১২.৫৪ %
অর্থনৈতিক	৯২২৭৪	১.২৯ : ১	১৪.৯৯ %

মতামতঃ

৩.১ জাতীয় পানি নীতি-১৯৯৯ তে পানির গার্হস্থ্য এবং পৌর ব্যবহারকে সর্বাধিক গুরুত্ব প্রদান করা হয়েছে। পানি নীতিতে ভূ-গর্ভস্থ এবং ভূ-পরিস্থ পানির সংযোজক ব্যবহার, ভূ-গর্ভস্থ পানির ব্যবহার সীমিত পর্যায়ে রাখার পদক্ষেপের কথা উল্লেখ করা হয়েছে। পানি নীতির ৪.৬ (ক) অনুচ্ছেদে বৃষ্টির পানি সংরক্ষণসহ বিভিন্ন উপায়ে নিরাপদ সহজ লভ্য খাবার পানির সুষ্ঠু যোগান নিশ্চিতকরণে সরকারের সহায়তার কথা বলা হয়েছে। ঢাকা ওয়াসা ঢাকা মহানগরীতে বিশুদ্ধ পানি সরবরাহ ও পয়ঃনিষ্কাশন ব্যবস্থা নিশ্চিতকরণের কাজে নিয়োজিত প্রতিষ্ঠান। আলোচ্য প্রকল্প বাস্তবায়নে শহরের জনসাধারণের নিকট নিরাপদ পানি সরবরাহ নিশ্চিতকরণে গুরুত্বপূর্ণ ভূমিকা পালন করবে। তদুপরি ভূ-গর্ভস্থ পানির অনিয়ন্ত্রিত ব্যবহার হ্রাস করবে। এসব দিক বিবেচনায় প্রকল্পটি জাতীয় পানি নীতির সাথে সামঞ্জস্যপূর্ণ।

৩.২ জাতীয় পানি ব্যবস্থাপনা পরিকল্পনা (এনডব্লিউএমপি)তে প্রধান প্রধান শহরে জনস্বাস্থ্যের সুরক্ষা নিশ্চিত করণের লক্ষ্যে সকলের জন্য নিরাপদ ও নির্ভরযোগ্য সুপেয় পানি সরবরাহের উদ্দেশ্য কর্মসূচীর উল্লেখ রয়েছে। প্রকল্পটি জাতীয় পানি ব্যবস্থাপনা পরিকল্পনা (এনডব্লিউএমপি)'র MC 002: Dhaka Bulk Water Supply and Distribution System প্রোগ্রামে বর্ণিত লক্ষ্য-উদ্দেশ্য এবং উল্লেখিত কর্মসূচীর সাথে সঙ্গতিপূর্ণ।

৩.৩ ভিশন-২০২১ এর লক্ষ্যমাত্রা কে সামনে রেখে সপ্তম পঞ্চবার্ষিকী পরিকল্পনা প্রণয়ন করা হয়। সপ্তম পঞ্চবার্ষিকী পরিকল্পনার পুষ্টি ও সেবাখাতে উন্নয়ন কৌশলে নিরাপদ পানি নিশ্চিতকরণের কথা বলা হয়েছে। পরিকল্পনায় উল্লেখ করা হয়েছে নাগরিক সেবা পৌঁছে দেওয়ার লক্ষ্যে সরকারি সংস্থা সমূহ কাজ করে যাবে।

ঢাকা ওয়াসা সকল নগরবাসীর নিকট নিরাপদ পানি সরবরাহের নিমিত্তে কার্যক্রম গ্রহণ করবে। তাছাড়া এসডিজি-৬ এর লক্ষ্যে অর্জনে এই প্রকল্প সহায়ক ভূমিকা পালন করবে।

৩.৪ বাংলাদেশ পানি আইন-২০১৩ এর পঞ্চম অধ্যায়ের ধারা-১৯ এ ভূ-গর্ভস্থ পানির নিরাপদ আহরণ সীমা নিশ্চিত করণের কথা উল্লেখ করা হয়েছে। প্রকল্পটি ঢাকা মহানগরীতে পানি সরবরাহের জন্য ভূ-গর্ভস্থ পানির আহরণ সীমিত করতে ভূমিকা পালন করবে। পানি আইনের ৩ (২) নং ধারায় সুপেয় পানি এবং পরিচ্ছন্নতা ও পয়ঃনিষ্কাশনের জন্য ব্যবহার্য পানির অধিকারকে সর্বাধিক হিসেবে বিবেচনা করা হয়েছে। তাছাড়া পানি আইনের ১৮ নং ধারায় পানি সম্পদের অগ্রাধিকার ভিত্তিক ব্যবহার এর যে ক্রম উল্লেখ করা হয়েছে সেখানে খাবার পানিকে সর্বোচ্চ অগ্রাধিকার দেওয়া হয়েছে। প্রকল্পটির উদ্দেশ্য হলো ভূ-গর্ভস্থ পানির পরিবর্তে ভূ-পরিস্থ পানি ব্যবহার করে ঢাকা শহরের পানি সরবরাহ ব্যবস্থায় অবদান রাখা যা পরিবেশগতভাবে টেকসই হবে।

৩.৫ জাতীয় পানি নীতি (অনুচ্ছেদ ৪.৫.ক) অনুযায়ী পানি সম্পদ প্রকল্প, যতোটা সম্ভব বহুমুখী প্রকল্প হিসেবে গড়ে তোলা এবং এসব প্রকল্পের পরিকল্পনা ও বাস্তবায়ন থেকে পরিবীক্ষণ পর্যন্ত সব কিছুই একটি সমন্বিত বহু বিষয়ক দৃষ্টি ভঙ্গির ভিত্তিতে সম্পন্ন করা। প্রস্তাবিত প্রকল্পটি ঢাকা মহানগরীতে নিরাপদ পানি সরবরাহ নিশ্চিতকরণে গুরুত্বপূর্ণ ভূমিকা পালন করবে এবং ভূ-গর্ভস্থ পানি থরকস্তরের উপর নির্ভরশীলতা হ্রাস করে পরিবেশগত ঝুঁকি কমাতে সাহায্য করবে।

৩.৬ ঢাকা মহানগরীতে পানি সরবরাহ এবং পয়ঃনিস্কাশন ব্যবস্থা গ্রহণে পদক্ষেপ নেওয়া ঢাকা ওয়াসার মূল কার্যাবলীর অংশ। প্রকল্পের অধীনে মেঘনা নদী হতে পানি সরবরাহ করা হবে। মেঘনা নদীর পানি সংগ্রহ এলাকায় কাছাকাছি অন্য কোন সংস্থার কোন সেচ বা নদীর তীর সংরক্ষণ প্রকল্প বা অন্য কোন প্রকল্প বাস্তবায়ন হয়েছে কিনা বা চলমান রয়েছে কিনা তা বিবেচনা করা প্রয়োজন। প্রকল্পের ডিপিপিতে ইনডেক্স ম্যাপে প্রকল্প এলাকায় অথবা কাছাকাছি অন্য সংস্থা কর্তৃক বাস্তবায়িত বা বাস্তবায়নাধীন অন্য প্রকল্প সমূহের অবস্থান উল্লেখ করা আবশ্যক।

৩.৭ জাতীয় পানি নীতি অনুচ্ছেদ ৪.১২ খ অনুযায়ী পানি সম্পদ খাতের সকল প্রকল্পে পরিবেশগত প্রভাব নিরুপন করা অপরিহার্য। প্রস্তাবিত প্রকল্পে প্রাথমিক ভাবে ২০১১ সালে ফিজিবিলিটি স্টাডি করা হয়। পরবর্তীতে "ঢাকা এনভায়রনমেন্টালী সাসটেইনেবল ওয়াটার সাপ্লাই প্রজেক্ট" এর আওতায় পানি শোধনাগার স্থাপনের জন্য Initial Environmental Examination (IEE) সম্পন্ন করা হয় এবং পরিবেশ অধিদপ্তরের ছাড়পত্র গ্রহণ করা হয়। "ঢাকা এনভায়রনমেন্টালী সাসটেইনেবল ওয়াটার সাপ্লাই প্রজেক্ট" প্রকল্পটির অধীনে পরবর্তীতে পরিবেশগত প্রতিক্রিয়া সমীক্ষা পরিচালনা করা হয়। সমীক্ষায় প্রকল্পের ভৌত কাজ বাস্তবায়নের ফলে উল্লেখযোগ্য কোন পরিবেশগত নেতিবাচক প্রভাব পড়বে না বলে উল্লেখ করা হয়েছে। প্রতিবেদনে Environmental Management Plan (EMP) অন্তর্ভুক্ত করা হয়েছে যা যথাযথভাবে অনুসরণ করা আবশ্যক। পরিবেশগত সমীক্ষায় মেঘনা নদীর ইনটেক পয়েন্ট মাছসহ অন্যান্য জলজ প্রাণীর প্রতি বিবেচনা করে Intake Screen নকশা প্রণয়নের কথা বলা হয়েছে যা গুরুত্বসহকারে বিবেচনা করা প্রয়োজন।

৩.৮ প্রকল্পটি বাস্তবায়িত হলে ঢাকা মহানগরীতে বর্ধিত জনসাধারণের নিকট নিরবিচ্ছিন্ন পানি সরবরাহ করা সম্ভব হবে। পরিবেশগত প্রতিক্রিয়া সমীক্ষা পরিচালনার সময় স্থানীয় জনগণ ও স্টেকহোল্ডারদের সঙ্গে

WARPO
পানি সম্পদ পরিকল্পনা সংস্থা

আলোচনা করা হয়েছে। প্রকল্পের আওতায় প্রকল্প বাস্তবায়নের ফলে আর্থ-সামাজিক প্রভাব এবং পুনর্বাসন পরিকল্পনা প্রণয়ন করা হয়েছে।

৩.৯ পানি খাতে বিনিয়োগের ক্ষেত্রে, সকল প্রকল্পের পরিকল্পনা সম্ভাব্যতা সমীক্ষা প্রণয়ন ক্ষেত্রে প্রকল্প মূল্যায়ন সংক্রান্ত নির্দেশনা বা জিপিএ (GPA), জনগনের অংশগ্রহণের নির্দেশনা এবং সরকার কর্তৃক বিভিন্ন সময়ে জারীকৃত অন্য সকল নির্দেশনা অনুসরণ করা প্রয়োজন। প্রকল্পের আর্থিক ও অর্থনৈতিক বিশ্লেষণ সম্পন্ন করা হয়েছে।

৩.১০ ২০১১ সালে "ঢাকা এনভায়রনমেন্টালী সাসটেইনেবল ওয়াটার সাপ্লাই প্রজেক্ট" এর ফিজিবিলিটি স্ট্যাডি সম্পন্ন করা হয়েছে। উক্ত সমীক্ষায় পানি আহরণের জন্য মেঘনা এবং শীতলক্ষ্যা নদীর কতিপয় স্থান বিবেচনায় নিয়ে পানির পরিমান, গুণগতমান ও অন্যান্য বিষয় বিবেচনায় নিয়ে বিশ্লেষণ করা হয় এবং নদীর হাইড্রোলজিক্যাল ও মরফোলজিক্যাল বিষয় বিবেচনা করা হয়েছে। মেঘনা নদী হতে প্রকল্পের আওতায় উত্তোলিত পানির পরিমান শুষ্ক মৌসুমে পানি প্রবাহের ১ শতাংশের কম হওয়ায় পানি আহরণের ফলে নদীতে কোন পরিবেশগত প্রভাব পড়বেনা বলে উল্লেখ করা হয়েছে। সমীক্ষায় পরিবেশ পরিবর্তনগত প্রভাব বিবেচনা করা হয়েছে কিনা তা উল্লেখ করা হয়নি। সমীক্ষা প্রতিবেদনে পানি শোধনাগার খিলখেতে স্থাপনের বিবেচনা করা হয়েছিল। পরবর্তীতে তা গন্ধবপুরে স্থানান্তরের বিষয়ে সিদ্ধান্ত হয় এবং পুনরায় স্ট্যাডি করা হয়। ফিজিবিলিটি স্ট্যাডিতে উল্লেখ করা হয়েছে বিশনন্দী নামক স্থানে নদীর তীর Stable রয়েছে। তিন্নু ইনটেক স্থাপনের ফলে কোন প্রভাব পড়বে কিনা বা নতুন করে তীর ভাঙনের সম্ভাবনা তৈরি হবে কিনা তা বিশ্লেষণ করা প্রয়োজন এবং তদানুযায়ী ব্যবস্থা গ্রহণ করা আবশ্যক। তাছাড়া সমীক্ষা কার্যক্রমে জলবায়ু পরিবর্তনের বিষয়টি বিবেচনা করা হয়নি এবং ইনটেক পয়েন্টের উজানে বর্তমানে বা ভবিষ্যতে কোন প্রতিবন্ধক নির্মাণ করা হলে ইনটেক পয়েন্টে পানির প্রাপ্যতা প্রভাবিত হবে কিনা তাও বিবেচনা করা হয়নি। তাই জলবায়ু পরিবর্তন ও উজানে প্রতিবন্ধক নির্মাণের ফলে পানির প্রাপ্যতার বিষয়টি গুরুত্বসহকারে বিবেচনা করা যেতে পারে।

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LETTER TO DWASA FROM EDE, NARAYANGONJ RH... PIR ROAD CUTTING, PERMISSION

পণ্যমন্ত্রী সাহায্যেপ সহকার
উপ-বিভাগীয় প্রকৌশলীর, সড়ক'ও কার্যালয়
নারায়ণগঞ্জ সড়ক উপ-বিভাগ-১
শিমরাইল, নারায়ণগঞ্জ ।

স্মারক নং: ৭১৩

তারিখ: 26.01.2017

বিষয়: ঢাকা মহানগরী এলাকায় সুপেয় পানি সরবরাহের লক্ষ্যে "ঢাকা এলাকায়নগরীন্দ্র ওয়াটার সাপ্লাই প্রজেক্ট" আওতায় এর পূর্বপুর এলাকায় প্রস্তাবিত পানি শোধনাগার নির্মাণ প্রকল্পে যেসব নবীন বিপদনী পাইপ হতে পানি পাওয়ার জন্য ঢাকা-সিলেট হাইওয়ে পোলকাবাদীন, মুগদা, নারায়ণগঞ্জ রোডে ক্রশিং করার অনুমতি প্রদান প্রসঙ্গে।

সূত্র: ঐর সমারের স্মারক নং-২৫৫০, তারিখ: ২৭-১০-২০১৬ইং।

উপরোক্ত বিষয় ও সূত্রস্থ স্মারক মূলে সম্পর্ক সহকারে জানানো যাচ্ছে যে, ঢাকা-সিলেট মহাসড়কের কিঃ ২৪+৭০০, মাছাদেবপুর-পেলাবাব-খুলনা-শাহাপুর বেলনপুর সড়ক কিঃ ৩৭+১০০, গাজিপুরী-পলবাজার সড়ক কিঃ ২৪+৭০০ "ঢাকা এলাকায়নগরীন্দ্র ওয়াটার সাপ্লাই প্রজেক্ট" আওতায় এর পূর্বপুর এলাকায় প্রস্তাবিত পানি পোশকাগার নির্মাণ প্রকল্পে যেসব নবীন বিপদনী পাইপ হতে পানি পাওয়ার জন্য সরল সড়কের বাঁয়া পাশে পিট খনন ও বাঁয়া পাশে H.D.D পদ্ধতিতে ১৬০মিঃমিঃ ডায়া এর পাইপ লাইন স্থাপন করিবার বিষয়ে অনুমতি প্রদান করিবার জন্য আবেদন করেছেন। সেই প্রেক্ষিতে সংশ্লিষ্ট উপ-সহকারী প্রকৌশলী ও নিম্ন স্বাক্ষরকারী অফিসগিয়ে জরুরি ভাবে এলাকী বিভাগীয় প্রকিবেশন প্রস্তুত করে প্রস্তাবিত বাঁয়া পাশে পিট খনন ও এইচ.ডি.ডি পদ্ধতিতে হোরিং এর অনুমতি প্রদানের জন্য সরল সড়কের বাঁয়া পাশে পিট খনন ও পাকা পাশে এইচ.ডি.ডি পদ্ধতিতে হোরিং করিবার অনুমতি প্রদান করা হোক যার উক্ত শর্ত সমূহ নিম্নরূপ ঃ

শর্তসমূহ: CONDITIONS ARE SAME AS PREVIOUS.

১. বাঁয়া পাশে পিট খননের সময় প্রয়োজনীয় সর্তকতামূলক সাইন বিলবোর্ড স্থাপন করতে হবে, যাতে কোন প্রকার দুর্ঘটনা না ঘটতে পারে।

২. পাইপ লাইন স্থাপনের সময় যানবাহন চলাচলে যাহাতে কোন ব্যাঘাত সৃষ্টি না হয় সেদিকে খেয়াল রাখতে হবে।

৩. পরিবহনে সড়ক ডিঙ্গিয়ে ডাইনিং মোতাবেক বর্ণিত নবীন স্থাপনাধে ঢাকা পানি সরবরাহ ও পয়ঃ নিষ্কাশন কর্তৃপক্ষ এর নিজস্ব উদ্যোগে পাইপ লাইন স্থাপনের করতে হবে।

৪. পাইপ লাইন স্থাপনের সময় সড়কের যাহাতে ক্ষেত্রফল ক্ষতি সাধিত না হয় সেদিকে সর্তক রাখতে হবে। কোন প্রকার ক্ষতি হলে ঢাকা পানি সরবরাহ ও পয়ঃ নিষ্কাশন কর্তৃপক্ষ এর নিজস্ব উদ্যোগে মেরামত করতে বাধ্য থাকবে।

৫. সড়কের পাইপ বসানোর পর খননকৃত সিটের মাটির সিকদার করতে পর্যন্ত ৬ ইঞ্চি ধরে বালু মাটি করব এবং চলাচল সব এর উপর ইট বিছাতে হবে। কোন অবস্থাতেই মাটি এবং এর ০.৬০ এর নীচে হবে না।

৬. উক্ত কাজটি ঢাকার সময় অত্র অফিসের প্রতিনিধিকে উপস্থিতিতে কার্যক্রম সম্পাদন করতে হবে।

৭. কোন অবস্থাতেই সড়কের পেভমেন্টের কোন অংশ খনন করা যাবে না। [illegible]

৮. কোন অবস্থাতেই ফুটপাথের কোন ক্ষতি করা যাবেনা। পাইপ লাইন স্থাপনের পর তার উপর মাটির Compaction এর ব্যাপারে যথা নিশ্চিত করতে হবে।

১০. পানির পাইপ লাইন স্থাপনের সময় মাটির উপর এবং নীচের সকল Utilities এর বিষয়ে অত্র দপ্তরের সাথে যোগাযোগ করে উহা অপসারণের প্রয়োজন হলে তাহা করানো প্রয়োজনীয় ব্যবস্থা নিতে।

১১. সড়ক পার্শ্ববর্তী ভূমি হতে ১.৫ মিটার নীচ দিয়ে পাইপ লাইন স্থাপন করতে হবে।

১২. যথা সম্ভব কাজটি এইচ.ডি.ডি পদ্ধতিতে সম্পাদন করতে হবে। উপযুক্ত পদ্ধতিতে রাস্তা খননের প্রয়োজন হলে যথাসম্ভব Shoring/Boxing সহ Bypass রাস্তা নির্মাণ করতে হবে। কাজ শুরু আগে পুর্ণে সংশ্লিষ্ট সড়ক শাখার সহিত যোগাযোগ করতে হবে।

এক্ষেত্রে প্রাক্কলনে অতিরিক্ত টাকা যথাযথ কর্তৃপক্ষের কর্তৃক অনুমোদনের পর বিভাগীয় অধিদপ্তর জন্য দেওয়া আদেশে বিভাগীয় অনুসরণ পর্যবেক্ষণ প্রাপ্তির বীতিমালা অনুযায়ী আবেদনকারীকে সড়কের বাঁয়া আদেশ পিট খনন ও পাকা আদেশ এইচ.ডি.ডি পদ্ধতিতে হোরিং এর অনুমতি দেওয়া যেতে পারে।

ইহা ছাড়া সময় সময় আরোপিত শর্তাবলী প্রয়োজনীয় ব্যবস্থা গ্রহণের জন্য সুপারিশ সহ পেশ করা হলো।

সংযুক্তি:
১। মূল আবেদন।
২। সড়ক বাঁধ খননের নক্সা।
৩। প্রাক্কলন ০৩(তিন) কপি।
৪। প্রাক্কলন রিভাইজিং কমিটির সভার কার্য বিবরণী।

(মোহাম্মদ জহিরুল আলম)
পরিচিতি নং-৬০২১৬৫
উপ-বিভাগীয় প্রকৌশলী, সড়ক (অ:দা:)
নারায়ণগঞ্জ সড়ক উপ-বিভাগ-১

অবগতি:
✓ নির্বাহী প্রকৌশলী, সড়ক
নারায়ণগঞ্জ সড়ক বিভাগ,
শিমরাইল, নারায়ণগঞ্জ।

অনুলিপি: কার্যার্থে প্রেরণ করা হল
০১। উপ-সহকারী প্রকৌশলী, সড়ক, সড়ক শাখা- ৩, নারায়ণগঞ্জ সড়ক উপ বিভাগ-২, শিমরাইল, নারায়ণগঞ্জ।
০২। উপ-সহকারী প্রকৌশলী, সড়ক, সড়ক শাখা-৬, মিটারবাধি সড়ক উপ-বিভাগ, শিমরাইল, নারায়ণগঞ্জ।

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
স্থানীয় সরকার প্রকৌশল অধিদপ্তর
নির্বাহী প্রকৌশলীর কার্যালয়
টাঙ্গাইল, নারায়ণগঞ্জ
www.lged.gov.bd

স্মারক নং-এলজিইডি/নিজস্ব/নারায়ণ/আই-০১/২০১৭/ ২৫১

তারিখ : ২৫/০১/২০১৭ খ্রি:
25/01/2017

বরাবর

তত্ত্বাবধায়ক প্রকৌশলী ও প্রকল্প পরিচালক
DESWSP, ডালা ভবনঃ।

বিষয় : ঢাকা ওয়াসার Dhaka Environmentally Sustainable Water Supply Project (DESWSP) শীর্ষক প্রকল্পের আওতায় নারায়ণগঞ্জ পৌরসভার ৫০০ MLD ক্ষমতা সম্পন্ন পানি শোধনাগার নির্মাণের লক্ষ্যে মেঘনা নদী বিধৌত এলাকা হতে অপরিশোধিত পানি পৌরসভার শোধনাগার সাইটে আনার জন্য পাইপ লাইন এলাইনমেন্ট হিসেবে LGED'র বিভিন্ন রাস্তা ক্রসিং এর অনুমতি প্রদান প্রসঙ্গে।

সূত্র : Memo No-46.113.618.00.00 G-28(DESWSP)2475 Date: 17-01-2017.

উপরোক্ত বিষয় ও সূত্রের প্রেক্ষিতে জানানো যাচ্ছে যে, ঢাকা মহানগরীসহ আশুপাশ পানি সরবরাহ ব্যবস্থা বিধিত করণের লক্ষ্যে ঢাকা ওয়াসার Dhaka Environmentally Sustainable Water Supply Project (DESWSP) শীর্ষক প্রকল্পটি সরকার কর্তৃক অনুমোদিত হয়েছে মর্মে সুত্রস্থ পত্রের সূত্রে জানা যায়। আরও জানা যায় যে, মেঘনা নদী হতে পানি উত্তোলন করে ট্রান্সমিশন লাইনের মাধ্যমে নারায়ণগঞ্জ পৌরসভার পৌরবিপুরে নবনির্মিত শোধনাগারে পানি পরিশোধন করে ঢাকা মহানগরীতে সরবরাহ করা হবে। বর্ণিত প্রকল্পের আওতায় বিলমণী হতে পৌরবিপুর পর্যন্ত ২০ কিঃমিঃ Water Transmission Line নির্মাণ করা হবে। সেজন্য আরইসিএসএর উপজেলায় এলজিইডি'র আওতাভুক্ত বিভিন্ন রাস্তা পাগুলা এলাকায় (মেঘনা নদীর পাড়ে), উসিপুরা বাজার, আমরাগনী, আমানী, ইসপাডি, কাশবাগী, তিলাউটি, হাজী পাগলী, আজাদনী, কুমারকান্দা, পাড়াগীল মন্দির, ইবরাহীনী, কান্দিপাড়া স্কুল দিয়ে এবং নারায়ণগঞ্জ উপজেলার মডিবাগিদি চক, সেলারকান্দাইল, ভোলাচর, ফুলতা, কাশীপুর, সোহাগীচর, পৌরবিপুর, নারায়ণগঞ্জ, পাওয়ার গ্রিডে ক্রসিং এর নিমিত্তে স্বাচ্ছন্দ্য বাস্তবায়ন জন্য অনুরোধ করা হয়েছে। উক্ত অনুরোধের প্রেক্ষিতে দ্বিপক্ষীয় সভা গতকে ঢাকা ওয়াসার প্রস্তাবিত ট্রান্সমিশন লাইন ক্রসিং করার অনুমতি বিবেচনা করা হলো :

১। এলজিইডি এবং ওয়াসার মধ্যে যুগ্মাক্ষরিদপনে কার্য সম্পাদন করতে হবে। কাজের বিস্তারিত নক্সা এলজিইডিকে সরবরাহ করতে হবে।
1. DRAWING, JOINT SUPERVI
২। পাইপ লাইন স্থাপন কালে রাস্তার যানবাহন চলাচলে বিঘ্ন সৃষ্টি করা যাবে না। রাস্তার উপরে বা পাশে কোন নির্মাণ সামগ্রী স্তূপাকারে (ইট, বালি, পাইপ, সিমেন্ট, রড সিডিআইবি ইত্যাদি) কোন অবস্থাতেই রাখা যাবে না। প্রয়োজনে বাইপাস রাস্তা নির্মাণ করতে হবে।
2. NO TRAFFIC DISTURBANCE BYPASS ROAD IF NEEDED
৩। পাইপ স্থাপনকালে বিদ্যমান রাস্তা বা ফাসলাটি যাতে কোনভাবেই ক্ষতিগ্রস্থ না হয় সে বিষয়ে ঠিকাদার সতর্ক থেকে কাজ সম্পাদন করতে হবে এবং পানির পাইপ স্থাপনকালে কোন বৈধ স্থাপনা, রাস্তা বা রাস্তার গাছের ক্ষতি হলে তা ওয়াসা কর্তৃপক্ষ নিজ দায়িত্বে মেরামত করে দিবে।
3. NO DAMAGE TO ROAD DAMAGE SHOULD RESTORE.
৪। পানির পাইপ স্থাপনের কারণে রাস্তার কোন অঙ্গ-ক্ষতির আশংকা দেখা দিলে বিকল্প অন্য কোন কারণে পানির পাইপ স্থাপন করতে হলে ওয়াসা কর্তৃপক্ষ নিজ ব্যবস্থাপনায় ও খরচে তা সম্পন্ন করবে।
4. EXISTING UTILITY TO BE SHIFTED BY DWASA.
৫। পাইপ লাইন এর সার্বিক Alignment এর কারণে বিদ্যমান রাস্তা যাতে কোনভাবেই ক্ষতিগ্রস্থ না হয় সে বিষয়ে ঠিকাদার সংশ্লিষ্ট এলজিইডি'র সাথে উন্মুক্ত লিখিত মাধ্যমে কাজ সম্পাদন করতে হবে।
5. ROAD CUTTING SHOULD BE WITH MODERN TECH
৬। বর্ষার সময় রাস্তার কাটের ক্ষতি হয় এমন কাজ করা যাবে না।
6. ROAD CUTTING IN WET YEAR TO AVOID.
৭। পানির পাইপ লাইন স্থাপনের সময় মাটির উপর এবং নীচের সকল Utilities এর বিষয়ে সংশ্লিষ্ট সকলের সহিত যোগাযোগ করে উহা অপসারণ/পুনর্স্থাপনের প্রয়োজন হলে ঢাকা ওয়াসা প্রয়োজনীয় ব্যবস্থা নিবে।
7. CONTACT TO DWASA UTILITIES WITH AUTHORI
৮। এলজিইডি সকল সময়ের নির্দেশনা মোতাবেক ক্ষতিপূরনের দাবি বিবেচিত হবে।
8. FOLLOW LGED INSTRUCTION TIME

উপরোক্ত শর্ত সাপেক্ষে ঢাকা ওয়াসাকে রাস্তাসহ এলাকা সমূহ দিয়ে ট্রান্সমিশন পাইপ লাইন স্থাপনের জন্য এলজিইডি কর্তৃপক্ষ নির্মিত রাস্তা ক্রসিং করার প্রাথমিক অনুমতি দেয়া হলো।

PERMISSION FOR ROAD CUTTING FROM LGED, WITH CONDITIONS

২৫/০১/১৭

(মোহাম্মদ আকরামুল কবীর)
নির্বাহী প্রকৌশলী
ফোন : ৭৬৬৫১০ (অফিস)
ই মেইল : xen.narayangan@lged.gov.bd

অনুলিপি :
১। প্রধান প্রকৌশলী, এলজিইডি, আগারগাঁও, শেরেবাংলা নগর, ঢাকা-১২০৭।
২। অতিরিক্ত প্রধান প্রকৌশলী (সকল অঞ্চল), এলজিইডি, আগারগাঁও, শেরেবাংলা নগর, ঢাকা-১২০৭।
৩। তত্ত্বাবধায়ক প্রকৌশলী, ঢাকা অঞ্চল, এলজিইডি, ৬২ পশ্চিম আগারগাঁও, শেরেবাংলা নগর, ঢাকা-১২০৭।
৪। উপজেলা প্রকৌশলী, এলজিইডি, উপজেলা : আড়াইহাজার/জেলা : নারায়ণগঞ্জ।

Letter-1, P-24

N. Checklist for Environmental Mitigation

424. General Environmental Compliance

(i) Check compliance with design and construction commitments in environmental assessment and Environmental Management Plan (EMP);
(ii) Check that work does not cause environmental impacts that were not predicted in environmental assessment documentation;
(iii) Check compliance with environmental requirements and prohibitions of DOE legislation, and ADB Guidelines particularly with respect to Environmental Management Plan (EMP);
(iv) Check compliance with environmental permits or approval;
(v) Check that work is not undertaken that requires environmental permits or approvals have not been obtained.

425. Use of Waste Products or Materials in the Work

(i) Check that waste and product dust suppressants meet material and construction requirements of the contract;
(ii) Check that any use replacement of reclaimed excess concrete, asphalt pavement, etc, as aggregate, embankment material, slope flattening material or fill in compliance with the material and construction requirements of the Environmental Management Plan (EMP);

426. Management and Disposal of Excess Material

(i) Check that excess materials from the work are stored, re-used and disposed of as specified in the Environmental Management Plan (EMP);
(ii) Check that standard forms regarding disposal of excess material are submitted prior to disposal of excess materials off site;
(iii) Record location of disposal or management areas and source of excess material being disposed of.

427. Work in, Adjacent to, and over Water bodies

(i) Check that sediment and other deleterious material is not gaining entry to water courses, other water bodies;
(ii) Check that work specified in watercourse, water bodies and their banks is in compliance with that specified in the Environmental Management Plan (EMP) and environmental documentation, and as may be authorized through environmental permits or approvals;
(iii) Check that temporary water passages systems, temporary water body crossings,
(iv) Check that disturbance, damage to water course or water body beds, banks and bank vegetation is limited to that specified in the contract and environmental documentation, and as may be authorized through environmental permits or approvals.

428. Work in, Adjacent to Areas of trees not Designated for Removal

(i) Check that sediment and other deleterious material is not gaining entry to areas of trees not designated for removal;
(ii) Check that work specified limits of grading are not exceeded in and adjacent to areas of trees not designated for removal, and that damage or removal

of trees is limited to that specified in the Environmental Management Plan (EMP); and environmental documentation;

(iii) Check that entry of equipment, construction materials and excess materials to areas of trees not designated for removal is limited to that specified in the Environmental Management Plan (EMP); and environmental documentation.

429. Control of Dust from the Work

(i) Check that dust from exposed work, and from construction operations such as grading, concrete cutting, grinding, abrasive blast cleaning of concrete and steel, and road sweeping does not cause a nuisance to pedestrian and vehicular traffic with in the Right of Way (ROW), and adjacent residential, commercial, institutional properties.

430. Maintenance of Local Traffic Access Patterns

(i) Check that local traffic access to residential, commercial, institutional areas is not modified, redirected unless otherwise specified in the contract;

(ii) Check that any modification, redirection of local traffic access to residential, commercial institutional areas comply with time constraints specified in contracts.

431. Construction/occupational health and safety

(i) Check if occupational H&S instructions have been followed by the contractor.

432. The required level of checking or inspection once or twice per day until Contractor demonstrates satisfactory performance of operations.

433. The checklist will be used during each site visit by environmental inspectors.

O. SITE SPECIFIC GUIDANCE FOR ENVIRONMENTAL MONITORING PROGRAM, INTAKE

1. INTRODUCTION

434. The Dhaka Environmentally Sustainable water Supply Project (DESWSP) is aimed at improving the public health and environment for about 17 million people living in Dhaka City[4] through safe and reliable water supply facilities. Based on the submission made by the Government of Bangladesh (GoB) and as appraised by the Asian Development Bank (ADB), there are 3 Packages covering from Bishnandi-Intake site in Meghna River to Dhaka City

[4] The population of Dhaka is increasing every day as people move into it from different areas across the country to avail facilities. Government estimates say at least 1,418 people are adding to the population of Dhaka every day, with the current population at over 17 million marking the city as the densest city on the globe, with a density of 47,400 people $km^{2.}$ Ref. Dhaka Tribune, 20 March 2019.

where there is an urgent need for water supply improvements. The Project will help the Government provide the required institutional and management support to the DWASA under the Ministry of Local Government, Rural Development and Co-operatives (MLGRDC).

2. PROJECT DESCRIPTION

435. The overall proposed project has six project components. Among those, components 1 to 3 falls under package-1, component 5 under Package 2 and component 6 under Package 3 Table 1 which all are covered by this EIA study[5] (**Figure**1). The components are as follows:

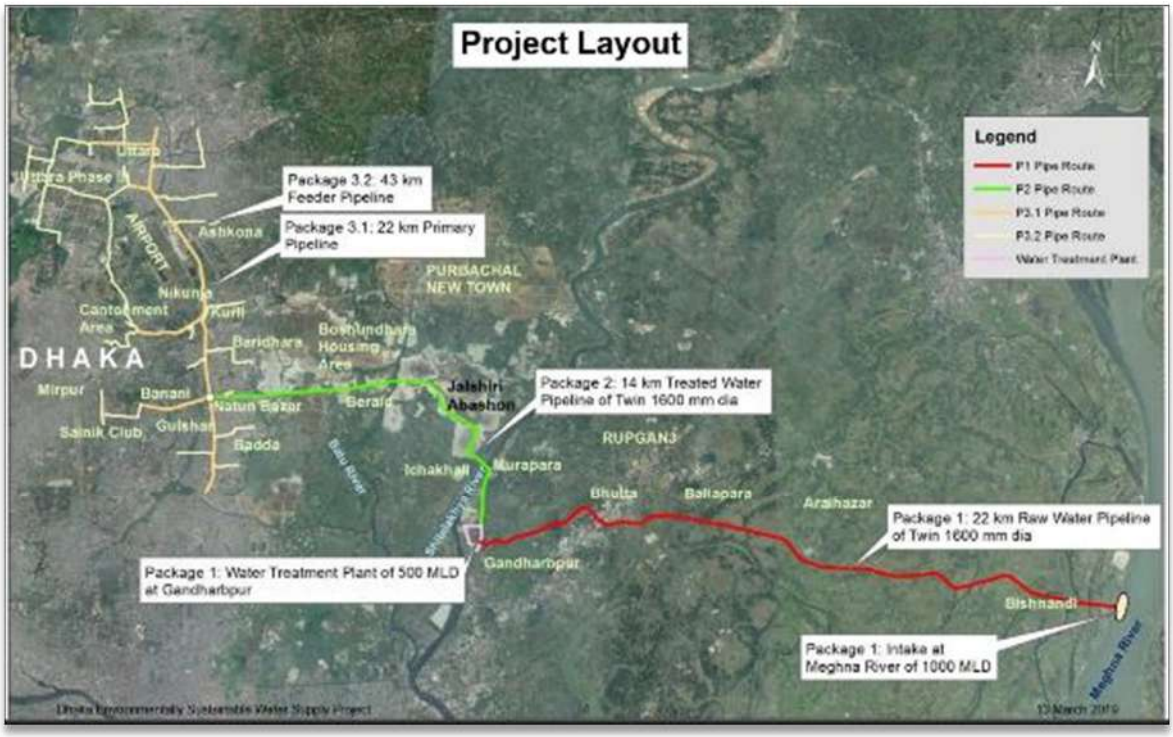

Figure 1: Project Layout Plan

Table 1: Project components / construction sites

Co. Sl.	Package	Component name	Infrastructure	Contract Package
1		Intake structures	Total Capacity: 1,050 MLD Equipment Capacity: 500 MLD	Design-build contract
2		Raw water Transmission main from Intake to Gandharbpur WTP	17.2 km: Intake to Shezan Juice Factory 4.5 km: Shezan Juice Factory to Gandharbpur WTP	Design-build contract
3		Water treatment plant at Gandharbpur	Capacity: 500 MLD at Gandharbpur	Design-build contract
4	2	Treated Water Pipeline	13 km: Gandharbpur WTP to	Construction

[5] *Updated EIA, DESWSP, Enviroconsult, April 2018*

Co. Sl.	Package		Component name	Infrastructure	Contract Package
			Transmission Main Starting from Gandharbpur Treatment Plant to Near US Embassy	US Embassy injection point	contract
5	3	3.1	Distribution reinforcement	23 km: within the existing network	Construction contract
		3.2	Distribution reinforcement	56 km: Small distribution pipe to DMA (Additional area)	Construction contract

Source: *Updated EIA, DESWSP, Enviroconsult, April 2018*

3. ENVIRONMENTAL MONITORING

436. Dhaka Water Supply and Sewerage Authority (DWASA) is the implementing agency (IA), which is responsible for administration, implementation, through its PMU, carries overall responsibility for engineering and environmental compliance of works aim to performed under the DESWSP Project – Additional environmental financing and to meet this responsibility provides day-to-day environmental supervision of the project implementation. According to the requirements of the national legislation, and ADB Procurement Policy, DWASA/PIU hired a consultant to provide technical supervision of works, including environmental supervision (Mott MacDonald LTD as MDSC). DWASA's environmental specialist oversees performance of the Contractor (Now SUEZ for Package 1) for the purpose of quality assurance, which implies review of Contractor's monthly reports and validation of the provided information through periodic site-specific field visits of MDSC and DWASA environmental specialists.

437. The new DESWSP (the Project) is included in the country operational business plan and it strongly supports the Government's objective of human development by providing better access to safe, reliable, and sustainable water supply which will improve the lives of households in Dhaka City (under Packages 1, 2 and 3) in Bangladesh.

438. The outcome of the Project is improved access to safe, reliable, and sustainable water supply service managed on commercial principles and environmentally sound practices. The Project will first focus on optimizing the operation of existing infrastructure and maximizing the operating efficiency of water supply service system, followed by constructing new infrastructure. The Project will improve public health and environment for people (households and other consumers) living in Dhaka City.

439. Monitoring during construction shall include noise and vibration measurement based on the risk assessment that determines the final SSEMP or on the basis of any complaint. Implementation of the SSEMP will be monitored by inspection on and ongoing basis by the MDSC and audited by the PIU of DWASA Environmental Specialist.

440. Field visit checklist will be used for monitoring. Environmental impact mitigation measures implementation would be strongly supervised for all abovementioned contracts during construction implementation period. No omissions or violations of environmental standards and norms would be allowed.

441. Monitoring during the operating phase will be conducted as per advice of the EMP of April 2018.

442. Environmental Monitoring and Mitigation Measures are provided in Table 6.

4. ENVIRONMENTAL MANAGEMENT

443. Construction works will tentatively commence on April 2019. Site inspections and random visits will be organized during construction period for the Package 1 first, followed by Package 2 and package 3. Average number of visits to each construction site per month will be determined by EMP of 2018. The compliance of environmental impact mitigation measures during construction works will be supervised by the Environmental specialists of MDSC in association with PMU Environment and safety Officer.

444. In general, during site visits, negative environmental impacts will be registered. Some omissions and negligence on safety will be identified during randomly visits. Particularly for mobilization period main problems needs to be identified as: construction site organization in proper way /illumination, fencing, signboards, construction site pollution by construction and domestic wastes, safety signs installation. Respectively verbal notifications will be provided to contractors and technical supervisors. During regular staff meetings with contractor's issues on mandatory implementation of environmental impact and safety mitigation measures will be discussed.

445. Corrective action plans will be developed, once monitoring reports are prepared during construction period. Quarterly Progress Reports (QPR) will be sent to PD-DWASA and ADB on time. Separate part of safeguard compliance will be detailed indicating all issues concerning EMP updating and environmental impact mitigation measures implementation, public participation component, resettlement and gender points.

446. Further to note, the Environment Management Plan (EMP's) goal is to ensure that implementation of the DESWSP complies with both Bangladesh legislation and ADB environmental guidelines and standards. Specific auditable objectives of the EMP are listed in Table-1.

447. The EMP will be formulated using the following approach:

- **Impact avoidance:** Project design adjustment**,** construction and operation methods so as to avoid predicted negative impacts;
- **Impact minimization:** Where impacts cannot be avoided, implementing mitigation measures to reduce the impacts to insignificant levels;
- **Compensation:** Where residual impacts remain significant after mitigation, arranging compensation for example, temporary business loss for farmers, farmers affected by permanent and temporary loss of land for construction of Packages 1, 2 and 3 under DESWSP, assets or livelihoods, or biodiversity offsets;
- **Sustainability measures:** Where certain actions are required to ensure the project's success or avoid significant risks, identifying these;
- **Enhancement:** Where additional actions could be taken giving high benefit at relatively low cost, identifying these.

448. During monitoring stage, the status of various parameters (Table-3) will be subject to measurement/quantification to compare with the values of Maximum Allowable Concentration (MAC) of pollutants present in soil and in water.

449. Table 2 provides the objectives of SSEMP

Table-2 Objectives of SSEMP

Phase and Topic	Objective
Pre-construction Phase	
Design	Inclusion of all mitigation measures in final project design and budget
Tendering	Inclusion of recommended measures in tender documents for construction and construction supervision /operation.
Construction and Commissioning	
Physical	Minimized project impact during construction.
	Restoration of all land used temporarily to equal condition at end of construction.
Ecological	Avoid all spillage or disposal of toxic substances to water.
	Avoid any interruption of fish and other aquatic species migration by construction activities (Intake at Bisnandi in Meghna River and other wetlands/
	Maintain all wetlands in condition suitable for use by migratory birds throughout construction.
Social	Maximized local unskilled employment from this DESWSP Project area.
	Zero fatalities and serious accidents during construction, including from construction traffic.
	Zero increase in STD - HIV/AIDS transmission rates during construction.
	Zero unresolved complaints from local communities during construction. The community complains are important for the DESWSP construction where temporary adverse impacts are anticipated. However, after receiving any complain from the community people, the complaint type will be assessed and will be served as a way to meet requirements, prevent and address community concerns, reduce risk, and assist larger processes that create positive social change. The construction contractor supported by MDSC will employ social safeguard specialist exclusively to address grievances. As such, coordinated efforts will enable design and build more effective strategies for addressing community complains and grievances.
Operational Phase	
Physical	No major changes of surrounding topography a level at which crop yields are affected.
Ecological	No obstruction to fish and fisheries migration, improved habitat of native species at the rivers, canals.

	No significant reduction of water quality due to spillage runoff from the construction area.
Social	A major reduction in the incidence of common vector-borne and communicable diseases and an improvement in all other health indicators.
	No exclusion of women, and other vulnerable groups from project benefits. The proposed DESWSP construction will improve water supply, and enhance induced economic and social development objectives
	No use of child labor
Institutional	Effective, environmentally & socially sensitive operation of O&M contractor.

450. Air Quality:

i) Construction Phase: Construction works include site clearance, site formation, building works, infrastructure provision and any other infrastructure activities. The major temporary air pollution is dust generated as a result of these construction works. Sampling Parameters and Stations will be determined as per EIA of 2018 (parameters are: SPM, PM_{10}, $PM_{2.5}$, SO_2, NO_x, CO, O_3).

ii) Operational Phase: The major permanent sources of air pollutants are sludge, effluents, vehicle emission from traffic on major roads and the air pollutants emitted from the vicinity of the industrial stationary sources of the Project area (parameters are: SPM, PM_{10}, $PM_{2.5}$, SO_2, NO_x, CO, O_3).

451. Following Updated EIA of April 2018, 6 major location of the projected area will be under SSEMP activities. Six monitoring locations are Chaitankanda (Bishnandi), Shejan Point, Gandharbpur, Murapara near LGED Bridge, Gulshan-2 near US Embassy, Uttara (House Building) Figure 1, and Table 1.

Figure 2 Environmental monitoring location of the projected area

Source: UEIA, April 2018

Table 3: Monitoring location of the projected area

ID	Monitoring Location	Map Content Name	Latitude DMS	Longitude DMS	Latitude DD	Longitude DD
1	Chaitankanda (Bishnandi)	GW1, NL1 SW1 & AAQ1	23° 45' 25.340" N	90°42' 58.075" E	23.757039	90.716132
2	Shejan Point	AAQ2, SW2, GW2, NL2	23° 45' 56.027" N	90° 33' 9.582" E	23.765563	90.552662
3	Gandharbpur	AAQ3, NL3, SW3, GW3	23° 44' 32.211" N	90° 31' 0.680" E	23.742281	90.516856
4	Murapara Near LGED Bridge	AAQ4, SW4, GW4, NL4	23° 46' 54.454" N	90° 31' 5.109" E	23.781793	90.518086
5	Gulshan-2 Near US Embassy	AAQ5, NL5, SW5, GW5	23° 47' 51.508" N	90° 25' 19.683" E	23.797641	90.422134
6	Uttara (House	AAQ6, NL6, SW6, GW6	23° 52' 38.886" N	90° 24' 5.976" E	23.877468	90.40166

	Building)					

Source: UEIA, April 2018

Ambient Noise Levels

452. During Baseline study, noise levels were recorded at locations in the study area detailed in UEIA, will be monitored during DESWSP (P1, 2 and 3) implementation period as part of SSEMP requirement. Noise levels will be recorded in the form of sound pressure levels with the help of a digital sound level meter. The details of noise monitoring locations are shown in Table 4 below. The purpose of ambient noise level measurement is to determine sound intensity at the monitoring locations. These locations were chosen in such a way that a representative data could be record all over the project area. The sound level will be recorded in form of A-weighted equivalent continuous sound pressure level (Leq) values with the use of A-weighting filters in the noise-measuring instrument. Table 5 presents noise quality standards.

Table 4: Ambient noise level monitoring locations

Pac. No.	Project Packages	Lo. No.	Monitoring Location	Land Use
1	P1 Raw Water Intake, Pipeline & Water Treatment Plant	1	Chaitankanda (Bishnandi)	Residential/agricultural
		2	Shejan Point	Industrial
		3	Gandharbpur	Residential
2	P2 Treated Water Pipeline Transmission Main Starting from Gandharbpur Treatment Plant to Near US Embassy	4	Murapara Near LGED Bridge	Commercial
		5	Gulshan-2 Near US Embassy	Industrial
3	P3 (Component 3.1) (23 km Major Distribution Pipe) P3 (Component 3.2) (56 km Small Distribution pipe to DMA)	6	Uttara (House Building)	Commercial

453. During SSEMP implementation, the following DoE Standards in Table 3 will be uses as a reference to identify any deviation of results, if the results exceeds than mitigation options will be applied as far as possible.

Table 5: Noise quality standards, by zone and time of day

Zone Class	Limits in dB(A)	
	Daytime (6 am – 9 pm)	Nighttime (9 pm – 6 am)
Silent zone	45	35
Residential zone	50	40
Mixed (residential/commercial/industrial) zone	60	50
Commercial zone	70	60

Industrial zone	75	70

Source: Department of Environment (DoE), Bangladesh

Water Quality

454. The physical parameters will include temperature, pH, EC, TDS, TSS, DO, and BOD_5 COD, and Iron (Fe). Samples will be tested in the field immediately after collection using field test kit. For laboratory test, samples will be preserved properly in cooler box during storage and transportation to the laboratories maintaining chain of custody (detail procedures are provided below). The sampling Stations are: Chaitankanda (Meghna River), Shejan Point (Canal), Gandhabpur (Shitalakshya River), Murapara (Shitalakshya River), Gulshan (Pond), Uttara (Turag River)

Water Quality and Sample Collection Procedure for all Packages (P1, P2, P3)

455. The surface water source of the proposed site for the DESWSP is Meghna River at Bishnondi.

456. The following procedures should be maintained during collection of samples for all Packages.

- Collect location map, sample bottles and waterproofed levels from the market (scientific Shops at Bangabandhu Avenue, Dhaka) or Laboratory, use dedicated GPS (Calibrate properly) machine to record the actual location of the sampling stations

- Water sample should be collected in one litre glass or high-density polyethylene bottle and store at low temperature (4˚-10˚ c). Collect the water sample using sterile bottle, use special preservatives for some parameters, use cool box

- If groundwater, pump out water from the well for 5-7 minutes and measure the pH with the portable meter and record it in the form, subject to requirement, also test Dissolved Oxygen (DO), Temperature, Turbidity, Electrical Conductivity (EC), Alkalinity etc. (as per EMP), immediately after sampling, as the value of these parameters will change during transport and storage
- At the time of collection samples from groundwater, use hand gloves or wash your hand with well water, uncap the bottle carefully, fill the bottle and fix the cap. If preservative is needed fill the bottle till 2-3 cm below the top of the bottle add the relevant preservative and complete filling up to the top
- For bacteriological analysis, pump out water from the well for 5-7 minutes, remove any dirt with a clean cloth from the outlet of the pump, sterilize the pump outlet for 1-2 minutes with the flame by an ignited spirit or alcohol-wet cotton, fill the bottle and fix the cap. Transport

the sample to the laboratory by 4-6 hours; otherwise use portable Microbiological Testing equipment for such test (suggested labs are: BSTI (Bangladesh Standards and Testing Institute), DPHE (Department of Public Health Engineering), BRTC (Bureau of Research, Testing and Consultation), BAEC (Bangladesh Atomic Energy Commission).

- All the sample bottles should be labelled properly and corresponding sampling forms should be filled in with the information detailed below:

- Serial number of the sample

- Date of collection and time

- Weather condition (sunny, rainy, cloudy, etc.)

- Filtered or raw water

- Use of any preservative

- Source of sample water- Surface or Groundwater (if groundwater, record depth of well, type of well, etc.)

- Preserve the entire sample in a cool box and send immediately to the laboratory or any other recognized laboratory.

- If necessary, collect some additional samples for cross-checking.

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5 CONCLUSIONS

Table 6: Site Specific Environmental Management Plan (SSEMP)

Water Intake at Bishnondi

Activity	Environmental Impact	Duration/ Extent	Magni -tude	Mitigation Measures	Responsibility
Pre-construction (Design Phase)					
Seismic considerations in design of structures	Structure at seismic risk	Permanent	Moderate	The designs of the project components, including intake structures and transmission mains, will conform to Bangladesh National Building Code, 2006.	Design Build Contractor, and SC
Contractor's Camps	Temporary loss of land and implications of insufficient physical and social management of camps and labor resources	Permanent	Moderate	Temporary construction camps and any auxiliary objects will be located in places adjacent to project sites. The particular place for construction camps and auxiliary objects (vehicle parking lots, storage areas and etc.) will be determined jointly with local administration authorities	Design Build Contractor, and SC
Construction Materials	Procurement from non-environmentally & socially responsible suppliers	Permanent	Moderate	Give preference to goods and services sourced from organizations implementing an EMS (provision in tender documents).	Design Build Contractor, and SC
Spoil Disposal	Improper location and treatment of spoil dumps	Permanent	Moderate	Require Method Statement for spoil disposal, with details of authorization, location, placement, closure etc. (tender documents).	Design Build Contractor, and SC
Mesh size fine screens intake / water abstraction	Impact on fish fauna	Permanent	Moderate	Design of sufficient mesh size in accordance with DoF	Design Build Contractor, and SC
Cutting of trees	Damage to trees and clearance of vegetation at the project locations	Moderate	moderate	Only trees that will require removal within the proposed construction areas of the sites will be cut. After the finalization of the designs and layout of the project components, the trees within proposed construction areas will be marked. For trees not proposed to be cut, taking all precautions to protect them from any damage from construction activities, including placement of tree guards will be taken up.	Design Build Contractor, and SC

Assets/facilities lost, including common property resources and religious structures	Assets/facilities lost, including common property resources and religious structures	Permanent	Moderate	Designs to be worked out to minimize impacts on these assets. Compensation and assistance will be provided in accordance with the provisions of the RP.	Design Build Contractor, and SC
	Impairment of cross-drainage	permanent	moderate	Designs to ensure cross-drainage through the provision of balancing culverts and sufficient cross-movement, including movement of fishes, shall be done to minimize severance impacts on khals and fish ponds cut across by the alignment.	Design Build Contractor, and SC
Drinking water availability	Drinking water availability and water arrangement	Temporary	Moderate	Prior to the initiation of construction activities, the contractor will be responsible for the arrangement of water in every workplace at suitable and easily accessible places for the whole construction period. Sufficient supply of cold potable water should provide and maintain at the construction camps and other ancillary work areas.	Design Build Contractor / SC
Impacts on water abstraction and ecological flows of Meghna River, especially in lean flow	Impacts on water abstraction and ecological flows of Meghna River, especially in lean flow	Permanent	Moderate	The proposed abstraction accounts for 0.31% of the lean flows for the ultimate intake capacities of 1,050 MLD (2035). Therefore, no impacts on downstream uses or impairment of ecological flows in Meghna River envisaged.	PMU
fisheries	Impacts on fisheries in Meghna River	Permanent	Moderate	Design of the water intake should carry out to avoid impacts on hilsa fish, the key species found in Meghna River requiring protection. The design of the intake screen will be based on the following key considerations as per the recommendations of the fisheries expert of the SC: 1. The screen face will be oriented in the same direction as the flow. 2. The water velocity flowing through the structure against which the fish will have to swim must be lower than the critical fishes' swimming capability and it recommended that the approach	Contractor, with technical guidance from the fisheries

				intake velocity should not be more than 8 cm/sec. 3. Screens will be located at the bottom of the watercourse to prevent entrainment of sediment and aquatic organisms associated with the bottom area. 4. Screen sizes will be determined based on assessment of fish sizes at the location and the swimming characteristics of hilsa and it recommended that the opening shall not exceed 5 mm) for woven wire or perforated plate screens, or 0.0689 inches (1.75 mm) for profile wire screens, with a minimum 27% open area. It recommended providing a screen in the direction of flow to escape small fish and spawn from the screen as shown in the picture also. 5. Impact on inland water bodies, including khals and fishponds, will address in the detailed designs through appropriate measures to provide for cross-drainage to minimize severance impacts. Traffic management plans and spoil management plans shall be prepared as part of the detailed designs.	
Construction Phase					
Relocation of utilities	Damage of utility lines	Permanent	Moderate	All utilities and services impacted due to the proposed components will be shifted/relocated, with prior approval of the concerned agencies.	Design Build Contractor, and SC
Build Intake structure at Bishnandi; Including Pump station, sub-station, embankment	Pilling and associated construction activities will disturb benthic flora and fauna.	Temporary	moderate	Use of low noise and low vibration machinery for piling work Chemical and other waste disposal measure required proper maintenance Carry out site inspections	Design Build Contractor, and SC
Health and Safety	Hazards to workers	Temporary	Moderate	Project proponent and financier signal that best practice H&S standards should apply. At every workplace, a readily available first aid unit, including an adequate supply of sterilized dressing material and appliances,	Design Build Contractor, and SC

				will be provided as per the factory rules. Suitable transport will be provided to facilitate the transfer of injured or ill persons to the nearest hospital. At every workplace and construction camp, equipment and nursing staff will be provided. The contractor will, at his own expense, conform to all anti-malaria instructions given to him by the SC. All relevant provisions of the Bangladesh Labor Act, 2006 and Bangladesh National Building Code, 2006 will be adhered to, concerning the provision of adequate safety measures during construction. The contractor will comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, trenches, and safe means of entry and egress.	
Ecology	Possible habitat impacts	Temporary	Moderate	Need the construction contractor to design and implement fish-friendly construction processes (Standard Operating Procedures) for the diversion weir and other structures in watercourses (tender documents)	Design Build Contractor, and SC
Conflict among the work personnel and labor	Conflict among the work personnel and labor	Temporary	Moderate	Proper work distribution plan with maintenance authority.	Build Contractor
Child labor	Child labor Risk of contractors or subcontractors hiring child labor in the construction activities.	Temporary	Minor	• National laws on child labor will strictly followed. No child labor will be allowed by the contractors or subcontractors in any of the project activities.	
Health and safety	Accident prevention and work safety procedures	Temporary	Moderate	Awareness of workers about hazardous materials and proper handling methods. Warning signs, labels and signals. Provide helmets, safety shoes and other PPE for workers in accordance with accident prevention and work safety procedures	build contractor
Dust and air quality	Dust Pollution • Impact Sources Emissions from construction	Temporary	Moderate	The contractor will (i) take every precaution to reduce the levels of dust at construction sites, and not exceeding the pre-project ambient air quality standards; (ii) fit all heavy equipment and machinery with air	Design Build Contractor and SC

	related traffic and machinery. • Dust from works, carrying machinery equipment to the site, and traffic from trucks and vehicles. • Create nuisance Road damage			pollution control devices that are operating correctly; (iii) reduce dust by spraying stockpiled soil, excavated materials, and spoils; (iv) cover with tarpaulin vehicles transporting soil and sand; and (v) cover stockpiled construction materials with tarpaulin or plastic sheets. • Implement measures in Environmental Code of Practice of Air Quality Management. Dust generation will be restricted as much as possible and water sprinkling carried out as appropriate, especially where earth moving and excavation are carries out. • Emissions during bore logs digging, equipment and traffic will comply with ADB EHS guidelines and will be monitored. Spray of water is suggested in the road and construction sites Capacity of truck load should stay below capacity of road	
	River Water Pollution	Temporary	Moderate	Protect river water during construction of intake screen and river training work. Confined the river water area of intake screen to prevent the turbidity, DO level of water and fish.	Design Build Contractor and SC
Air quality	Air pollution (SPM, $PM_{2.5}$, PM_{10}, SO_x, NO_2 and CO) • Impairment of air quality may have an impact on geotechnical investigation workers, local residents and surrounding environment • Air pollution generates from exhaust of engines. • During GI bore logs work	Temporary	moderate	• Drilling and transport vehicles shall move only in-designated areas and roads. • Water dry drilling areas and access roads to reduce dust emissions • Minimize traffic in villages and other residential areas • Reduce vehicle speed in drilling areas and access roads to 10 km/h • Machines and vehicles must be regularly examined and maintained to comply with requirements of technical specifications	Design Build Contractor and SC

	Emission from drilling vehicle and machine			Repair and maintain access roads, as necessary	
	Noise and Vibration from construction equipment	Temporary	Moderate	The contractor will ensure (i) regular maintenance of vehicles, equipment, and machinery to keep noise from these at a minimum; and (ii) all vehicles and equipment used for construction will be fitted with exhaust silencers. During routine servicing operations, the effectiveness of exhaust silencers will be checked, and if found to be defective, will be replaced.	Design Build Contractor and SC
	Temporary measures for construction activities around habitations/ institutional uses	Temporary	Moderate	The contractor will provide the following measures during the laying of transmission mains for sections in the vicinity of habitations and commercial and institutional areas, to minimize access and livelihood disruption: (i) place walkways and metal sheets where required to maintain access across trenches for people and vehicles; (ii) increase workforce in front of critical areas such as institutions, places of worship, business establishments, hospitals, and schools; (iii) consult businesses and institutions regarding operating hours and factoring this into work schedules; and (iv) provide signboards for pedestrians to inform them of nature and duration of construction works and contact numbers for concerns/complaints.	Design Build Contractor and SC
	Environmental pollution / human health Stockpiling of construction materials, excavated earth/spoil from trenches	Temporary	Moderate	Due consideration will be given to material storage and construction sites such that it doesn't cause any hindrance to daily traffic movement. The contractor will (i) consult with implementing agency on the designated areas for stockpiling of clay, soils, gravel, and other construction materials; (ii) avoid stockpiling of earth fill, especially during the rainy season, unless covered by tarpaulins or plastic sheets; (iii) prioritize reuse of excess spoils and materials in the construction works; and (iv) protect surface water bodies from any source of contamination, such as oily wastes, debris, and spoils that will degrade its quality. • Excavated material shall not enter surface waters, surface water banks or impede flows - in	Design Build Contractor / SC

				particular, the following shall be done: do not dump material in surface waters, at river banks or in flooding areas, in case rivers have been blocked remove the material	
	Improper movement of construction vehicles, Oil spillage, grease and lubricant	Temporary	Moderate	The movement of construction materials and equipment, to the extent possible, will be plan along major roads, with the exception of access roads to the site. In the event of movement of construction vehicles and equipment on the narrow roads, strengthening of these roads will be carried out, and timing of movement of heavy vehicles worked out to avoid peak hours and nighttime, and to ensure minimal disturbances to the communities and the resident population along these roads. • Maintenance will be conducted at safe distance from watercourses so that no oil spills can enter the water. Contaminated soil should be excavated and disposed properly in a confined place outside inundation areas	Design Build Contractor and SC
	Contamination of soil and groundwater quality	Temporary	moderate	• The soil contaminated with drilling mud should be avoided For effluents to be discharged from work place, camps, and offices, treatment arrangements such as retention ponds and septic tanks will be incorporated in the facility designs.	Design Build Contractor and SC
	Archaeological property chance findings	Permanent	Moderate	In the event of an archaeological chance find at the construction site, the contractor will prevent workmen or any other persons from removing and damaging any chance find artefacts and will, immediately upon discovery thereof, inform the SC of such discovery and carry out the SC's instructions for dealing with the same, awaiting which all work will be stopped for 100 m in all directions from the site of discovery.	Design Build Contractor and SC
	Loss of access to residents, businesses, and	Temporary	Moderate	The contractor will provide safe and convenient passage for vehicles and pedestrians through diversions to and from side roads, and	Design-Build Contract

	institutions during construction.			property access connecting the project roads. The contractor will ensure that (i) the construction works do not interfere with the convenience of the public or access to, use, and occupation of public or private roads, or any other access to properties, whether public or private. Temporary access to properties adjacent to the construction site will be provided through the construction of ramps with concrete slabs for use of pedestrians and light vehicles; (ii) in critical areas such as institutions, operating hours are factored into work schedules and workforce is increased for speedy completion; (iii) advance information on works to be undertaken including appropriate signage, is provided; and (iv) the diversion is done in coordination with the traffic police division for necessary rerouting of traffic and traffic management.	or and SC
	Damages to utilities and services during construction	Permanent	Moderate	The contractor will be required to: (i) plan for immediate attendance by the service providers to any damages to utilities during construction; (ii) replace (or compensate for) public and private physical structures damaged due to construction or vibration; and (iii) provide prior public information about the likely disruption of services. In consultation and with support from DWASA, the contractor will provide alternative arrangements for water supply in the event of disruption beyond a reasonable time, for instance, through tankers.	Design-Build Contractor and SC
	Compensation • Loss or impairment of private property			• written compensation arrangement and consent between property owner and contractor	
	Clearing of construction camps and restoration	Temporary	Moderate	The contractor will prepare site restoration plans for approval by the SC. The plan will be implemented by the contractor prior to demobilization. On completion of the works, all temporary structures will be cleared away, all rubbish burned, excreta or other disposal pits or trenches filled in and effectively sealed off, and the site left clean and tidy, at the contractor's expense. The site will	Design Build Contractor and SC

				be restored to pre-project conditions through the removal of all extraneous material on site. During the site clearance and earthwork, it the necessary to be careful about the following:	
	Quarry/borrow pit operations	Permanent	Moderate	Responsibility of the contractor to- (i) obtain approval of implementing agency if new quarries and borrow sites are necessary (ii) store stripped materials as not to disrupt natural drainage and protect them to prevent erosion and migration of soil particles into surface waters; (iii) provide temporary ditches and/or settling basins to collect run-off water and to prevent erosion and contamination of surface water; (iv) plant exposed areas with suitable vegetation at the earliest opportunity and prevent ponding of water through temporary drains discharging to natural drainage channels; (v) restore sites after construction activities by stabilizing contours and slopes, spreading stripped materials to promote percolation and re- growth of vegetation, and draining any standing water. Land utilized for quarry sites access roads will also restored, and (vi) ensure adequate safety precautions during transportation of quarry material from quarries to the construction site (vii) Ensure all employee and labor covered by proper PPE and safety net program. Vehicles transporting the material will cover to prevent spillage.	Design-Build Contractor and SC
	Disposal of bituminous wastes / construction waste / debris / cut material	Temporary	Moderate	For project components involving demolition of structures, the contractor will prepare and implement a waste management plan. Safe disposal of the extraneous material will be ensured in the pre-identified disposal locations. To enable minimization of waste disposal and do this in an environmentally safe manner, the waste management plan will (i) recover used oil and lubricants and reuse or remove from the site; (ii) manage solid waste according to the following preference hierarchy: reuse, recycle, and dispose of in designated areas;	Design Build Contractor and SC

	Stripping, stocking, and preservation of topsoil	Permanent	Moderate	The topsoil from productive agricultural lands at the intake site, borrow areas, and areas to be permanently covered will be stripped to a specified depth of 150 mm and stored in stockpiles. The stockpile will be designed such that the slope does not exceed 1:2 (vertical to horizontal), and the height of the pile will be restricted to 2 m. Stockpiles will not be surcharged or otherwise loaded, and multiple handling will be kept to a minimum to ensure that no compaction will occur. The stockpiles will be covered with gunny bags or tarpaulin. It will be ensured by the contractor that the topsoil will not be unnecessarily trafficked, either before stripping or when in stockpiles. Such stockpiled topsoil will be returned to cover the disturbed area and cut slopes.	Design-Build Contractor and SC
	Use of explosive materials	Permanent	Moderate	Except as may be provided in the contract or ordered or authorized by the SC, the contractor will not use explosives. The contractor will, at all times, take every possible precaution, and will comply with appropriate laws and regulations relating to the importation, handling, transportation, storage, and use of explosives and will, at all times when engaged in blasting operations, post sufficient warning flagmen. The contractor will carry out the use of explosive materials only after obtaining written approval of the SC of the procedures to be followed.	Design-Build Contractor and SC
	Material handling at site	Temporary	Moderate	All workers employed for mixing asphaltic material, cement, concrete, etc. will be provided with protective footwear and goggles. Workers engaged in welding works will be provided with welder's protective eye shields. The use of any toxic chemical will be strictly in accordance with the manufacturer's instructions.	Design Build Contractor and SC
Soil and water pollution	Soil and water pollution due to fuel, lubricants, and construction waste	Temporary	Moderate	The fuel storage and vehicle cleaning area will be stationed such that runoff from the site does not drain into the water bodies/ponds abutting the construction sites.	Design Build Contractor and SC

				Oil interceptors will be provided at construction vehicle parking areas, vehicle repair areas, and workshops, ensuring that all wastewater flows into the interceptor prior to its discharge. All work sites will be cleaned and restored to pre-project conditions. Discharge standards promulgated under Schedule 10, standards for waste from industrial units or projects waste will be strictly adhered to.	
Operation phase					
Water abstraction and management	Water availability and flow, turbidity, species disturbance	Permanent	Moderate	Ensure O&M contractor meets cleaning of water hyacinth, weeds around the water abstraction screens performance standards	Design Build Contractor, and SC
	Effectiveness of intake screens	Permanent	Moderate	DWASA will periodically monitor the effectiveness of the intake screens, in terms of fish sizes and quantities of fish passing through the screen. Any modifications to the screen as required will be taken up in consultation with the fisheries department. Prevent upstream at least 5 km of aquaculture system which will pollute the river water	DWASA
	Source protection - water quality	Permanent	Moderate	Continuous water quality monitoring at the upstream locations as defined in the monitoring plan will be carried out, in addition to semi-annual field visits by DWASA jointly with the DoE representative to assess any potential polluting activities/ threats. The findings shall be documented, taken up, and presented to the steering committee for decision.	DWASA/ DoE
	Survival of trees, maintenance, of landscaping, and the green buffer zone	Permanent	Moderate	Proper care will be taken to increase the survival rate of saplings, like regular watering, pruning, provision of tree guards, provision of manure for better nourishment, etc., including timely replacement of perished saplings.	DWASA
	Environmental conditions	Permanent	Moderate	DWASA will undertake seasonal monitoring of air, water, noise, and soil quality through an approved monitoring agency. The parameters to be monitored, frequency and duration of monitoring, as well as	DWASA

				the locations to be monitored will be as per the monitoring plan prepared.	

P. SITE SPECIFIC GUIDANCE FOR ENVIRONMENTAL MONITORING PROGRAM, RWP MAIN

1. **INTRODUCTION (see Annex O)**

2. **PROJECT DESCRIPTION (see Annex O)**

3. **ENVIRONMENTAL MONITORING (see Annex O)**

4. **ENVIRONMENTAL MANAGEMENT (see Annex O)**

5. **Table of Contents of Semiannual Environmental Monitoring Report (see Annex O)**

Table 6: Site Specific Environmental Management Plan (SEMP)

Raw Water Transmission Main

Activity	Environmental Impact	Duration /Extent	Magnitude	Mitigation Measures	Responsibility
Pre-construction (Design Phase)					
Raw water transmission pipeline	Damage to trees and clearance of vegetation at the project locations	Permanent	Moderate	Trees within the corridor of impact (area required for construction) will be felled after prior approval.	DBO Contractor
Assets	Assets/facilities lost, including common property resources and religious structures	Permanent	Moderate	Designs to ensure cross-drainage through the provision of balancing culverts and sufficient cross-movement, including movement of fishes, shall be done to minimize severance impacts on khals and fish ponds cut across by the alignment.	DBO Contractor
Erosion	Soil erosion	Permanent	Moderate	The measures to address soil erosion at the proposed facilities will consist of measures as per design, or as directed by the SC to control soil erosion, sedimentation, and water pollution. All temporary sedimentation, pollution control works, and maintenance thereof will be deemed incidental to the earthwork or other items of work.	DBO Contractor
Seismic considerations in design of structures	Structure at seismic risk	Permanent	Moderate	The designs of the project components, including intake structures and transmission mains, will conform to Bangladesh National Building Code, 2006.	Design Build Contractor, and SC
Contractor's Camps	Temporary loss of land and implications of insufficient physical and social management of camps and labor resources	Permanent	Moderate	Temporary construction camps and any auxiliary objects will be located in places adjacent to project sites. The particular place for construction camps and auxiliary objects (vehicle parking lots, storage areas and etc.) will be determined jointly with local administration authorities	Design Build Contractor, and SC
Construction Materials	Procurement from non-environmentally & socially responsiblesuppliers	Permanent	Moderate	Give preference to goods and services sourced from organizations implementing an EMS (provision in tender documents).	Design Build Contractor, and SC
Spoil Disposal	Improper location and treatment of spoil dumps	Permanent	Moderate	Require Method Statement for spoil disposal, with details of authorization, location, placement, closure etc. (tender documents).	Design Build Contract

					or, and SC
Cutting of trees	Damage to trees and clearance of vegetation at the project locations	Moderate	moderate	Only trees that will require removal within the proposed construction areas of the sites will be cut. After the finalization of the designs and layout of the project components, the trees within proposed construction areas will be marked. For trees not proposed to be cut, taking all precautions to protect them from any damage from construction activities, including placement of tree guards will be taken up.	Design Build Contractor, and SC
Assets/facilities lost, including common property resources and religious structures	Assets/facilities lost, including common property resources and religious structures	Permanent	Moderate	Designs to be worked out to minimize impacts on these assets. Compensation and assistance will be provided in accordance with the provisions of the RP.	Design Build Contractor, and SC
Drinking water availability	Lacking of drinking water availability and water arrangement	Temporary	Moderate	Prior to the initiation of construction activities, the contractor will be responsible for the arrangement of water in every workplace at suitable and easily accessible places for the whole construction period. Sufficient supply of cold potable water should provide and maintain at the construction camps and other ancillary work areas.	Design Build Contractor / SC
Access to properties and services	Interference with access to properties and services	temporary	moderate	Section 6, part 03D-General spec-Contract requirements, chapter 1.6.2: Before interfering with access to any property, the contractor shall provide alternative arrangements for such access. The contractor shall notify the engineer and the relevant occupiers in writing not less than 28 days in advance of such interference, and shall confirm to the engineer that alternative arrangements have been agreed. The contractor shall not obstruct access to any public utility or private owned manhole or other surface cover without prior approval in writing from the relevant authority.	Design built contractor
Construction Phase					
Relocation of utilities	Damage of utility lines	Permanent	Moderate	All utilities and services impacted due to the proposed components will be shifted/relocated, with prior approval of the concerned agencies.	Design Build Contractor, and SC

Health and Safety	Hazards to workers	Temporary	Moderate	Project proponent and financier signal that best practice H&S standards should apply. At every workplace, a readily available first aid unit, including an adequate supply of sterilized dressing material and appliances, will be provided as per the factory rules. Suitable transport will be provided to facilitate the transfer of injured or ill persons to the nearest hospital. At every workplace and construction camp, equipment and nursing staff will be provided. The contractor will, at his own expense, conform to all anti-malaria instructions given to him by the SC. All relevant provisions of the Bangladesh Labor Act, 2006 and Bangladesh National Building Code, 2006 will be adhered to, concerning the provision of adequate safety measures during construction. The contractor will comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, trenches, and safe means of entry and egress.	Design Build Contractor, and SC
Conflict among the work personnel and labor	Conflict among the work personnel and labor	Temporary	Moderate	Proper work distribution plan with maintenance authority.	Build Contractor
Child labor	Child labor Risk of contractors or subcontractors hiring child labor in the construction activities.	Temporary	Minor	• National laws on child labor will strictly followed. No child labor will be allowed by the contractors or subcontractors in any of the project activities.	
Health and safety	Accident prevention and work safety procedures	Temporary	Moderate	Awareness of workers about hazardous materials and proper handling methods. Warning signs, labels and signals. Provide helmets, safety shoes and other PPE for workers in accordance with accident prevention and work safety procedures	build contractor
Dust and air quality	Dust Pollution • Impact Sources Emissions from	Temporary	Moderate	The contractor will (i) take every precaution to reduce the levels of dust at construction sites, and not exceeding the pre-project ambient	Design Build Contract

	construction related traffic and machinery. • Dust from works, carrying machinery equipment to the site, and traffic from trucks and vehicles. • Create nuisance Road damage			air quality standards; (ii) fit all heavy equipment and machinery with air pollution control devices that are operating correctly; (iii) reduce dust by spraying stockpiled soil, excavated materials, and spoils; (iv) cover with tarpaulin vehicles transporting soil and sand; and (v) cover stockpiled construction materials with tarpaulin or plastic sheets. • Implement measures in Environmental Code of Practice of Air Quality Management. Dust generation will be restricted as much as possible and water sprinkling carried out as appropriate, especially where earth moving and excavation are carries out. • Emissions during bore logs digging, equipment and traffic will comply with ADB EHS guidelines and will be monitored. Spray of water is suggested in the road and construction sites Capacity of truck load should stay below capacity of road	or and SC
ROW along agricultural land, cutting trees growing in Right of way P1 Pipelines and slopes, constraining to rehabilitation of irrigation canals and structures	Distortion of land change of ecological system and biodiversity	Permanent	Moderate	Planting of trees depending on necessity. The planting locations and number of plants to be determined based on results survey to be held prior to construction, without entering into area of private land holders	Package 2 Contractor, MDSC,
Air pollution (SPM, $PM_{2.5}$, PM_{10},	Adverse impact to flora, fauna, human health & surrounding	Temporary	Moderate	-Drilling and transport vehicles shall move only in-designated areas and roads.	

SOx, NO_2 and CO) • Impairment of air quality may have an impact on geotechnical investigation workers, local residents and surrounding environment • Air pollution generates from exhaust of engines. Emission from drilling vehicle and machine				-Water dry drilling areas and access roads to reduce dust emissions -Minimize traffic in villages and other residential areas -Reduce vehicle speed in drilling areas and access roads to 10 km/h -Machines and vehicles must be regularly examined and maintained to comply with requirements of technical specifications	
Construction Access & Traffic	Unsafe access routes and construction traffic hazards, temporary dispersion of dust	Temporary	Moderate	Maximize use of future permanent roads for site access. The project site is located at remote area, no settlements are there, as such sign postings, dedicated parking for construction vehicles, etc, not considered essential. Contractor's yard will be placed as discussed.	
Construction Access to construction site	Access to and disturbance of private properties	temporary	moderate	D&B part 3A-specification-Civil clause 1.4.2: Interference with access to properties and services " Before interfering with access to any property, contractor shall provide alternative arrangement for such access"	Design built contractor

Spoil Disposal	Improper location and treatment of spoil dumps	Permanent	Moderate	Dispose of spoil only at designated sites and by approved methods; methods must consider topsoil conservation and quality, long-term soil stability against shrinking and swelling, erosion and flood waters	
Waste Management and Pollution	Improper disposal of solid and liquid wastes; spills & inadequate clean-up	Permanent	Moderate	Design and prepare Site Waste Management Plan in consultation with Dhaka North City Corporation (DNCC) Dhaka South City Corporation (, DSCC), Department of Environment (DoE)	
Dust	Dust nuisance or hazard at construction sites and surroundings (Dust generates due to stone crushing, equipment staging yards/areas, material storage areas, excavated material disposal areas, uncontrolled emission of solid airborne particulate matter from any source other than combustion, etc,).	Temporary	Moderate	Spray water exposed surfaces and access routes in dry season to prevent dust nuisance	
Occupational health, safety and, fire safety	Harm to laborers	Temporary	Moderate	The scope of works includes the occupational health and labor safety measures, consistent with effective rules and provisions, prevention of incidents and occupational diseases, as well as improvement of working conditions. The primary fire -fighting equipment will be provided at construction site.	
	Noise and Vibration from construction equipment	Temporary	Moderate	The contractor will ensure (i) regular maintenance of vehicles, equipment, and machinery to keep noise from these at a minimum; and (ii) all vehicles and equipment used for construction will be fitted with exhaust silencers. During routine servicing operations, the effectiveness of exhaust silencers will be checked, and if found to be defective, will be replaced.	Design Build Contractor and SC
	Temporary measures for construction activities around habitations/ institutional uses	Temporary	Moderate	The contractor will provide the following measures during the laying of transmission mains for sections in the vicinity of habitations and commercial and institutional areas, to minimize access and livelihood disruption: (i) place walkways and	Design Build Contractor and SC

				metal sheets where required to maintain access across trenches for people and vehicles; (ii) increase workforce in front of critical areas such as institutions, places of worship, business establishments, hospitals, and schools; (iii) consult businesses and institutions regarding operating hours and factoring this into work schedules; and (iv) provide signboards for pedestrians to inform them of nature and duration of construction works and contact numbers for concerns/complaints.	
	Environmental pollution / human health Stockpiling of construction materials, excavated earth/spoil from trenches	Temporary	Moderate	Due consideration will be given to material storage and construction sites such that it doesn't cause any hindrance to daily traffic movement. The contractor will (i) consult with implementing agency on the designated areas for stockpiling of clay, soils, gravel, and other construction materials; (ii) avoid stockpiling of earth fill, especially during the rainy season, unless covered by tarpaulins or plastic sheets; (iii) prioritize reuse of excess spoils and materials in the construction works; and (iv) protect surface water bodies from any source of contamination, such as oily wastes, debris, and spoils that will degrade its quality. • Excavated material shall not enter surface waters, surface water banks or impede flows - in particular, the following shall be done: do not dump material in surface waters, at river banks or in flooding areas, in case rivers have been blocked remove the material	Design Build Contractor / SC
	Improper movement of construction vehicles, Oil spillage, grease and lubricant	Temporary	Moderate	The movement of construction materials and equipment, to the extent possible, will be plan along major roads, with the exception of access roads to the site. In the event of movement of construction vehicles and equipment on the narrow roads, strengthening of these roads will be carried out, and timing of movement of heavy vehicles worked out to avoid peak hours and night time, and to ensure minimal disturbances to the communities and the resident population along these roads.	Design Build Contractor and SC

				• Maintenance will be conducted at safe distance from watercourses so that no oil spills can enter the water. Contaminated soil should be excavated and disposed properly in a confined place outside inundation areas	
	Contamination of soil and groundwater quality	temporary	moderate	• The soil contaminated with drilling mud should be avoided For effluents to be discharged from work place, camps, and offices, treatment arrangements such as retention ponds and septic tanks will be incorporated in the facility designs.	
	Archaeological property chance findings	Permanent	Moderate	In the event of an archaeological chance find at the construction site, the contractor will prevent workmen or any other persons from removing and damaging any chance find artefacts and will, immediately upon discovery thereof, inform the SC of such discovery and carry out the SC's instructions for dealing with the same, awaiting which all work will be stopped for 100 m in all directions from the site of discovery.	Design Build Contractor and SC
	Loss of access to residents, businesses, and institutions during construction.	Temporary	Moderate	The contractor will provide safe and convenient passage for vehicles and pedestrians through diversions to and from side roads, and property access connecting the project roads. The contractor will ensure that (i) the construction works do not interfere with the convenience of the public or access to, use, and occupation of public or private roads, or any other access to properties, whether public or private. Temporary access to properties adjacent to the construction site will be provided through the construction of ramps with concrete slabs for use of pedestrians and light vehicles; (ii) in critical areas such as institutions, operating hours are factored into work schedules and workforce is increased for speedy completion; (iii) advance information on works to be undertaken including appropriate signage, is provided; and (iv) the diversion is done in coordination with the traffic police division for necessary rerouting of traffic and traffic management.	Design-Build Contractor and SC

	Damages to utilities and services during construction	Permanent	Moderate	The contractor will be required to: (i) plan for immediate attendance by the service providers to any damages to utilities during construction; (ii) replace (or compensate for) public and private physical structures damaged due to construction or vibration; and (iii) provide prior public information about the likely disruption of services. In consultation and with support from DWASA, the contractor will provide alternative arrangements for water supply in the event of disruption beyond a reasonable time, for instance, through tankers.	Design-Build Contractor and SC
	Clearing of construction camps and restoration	Temporary	Moderate	The contractor will prepare site restoration plans for approval by the SC. The plan will be implemented by the contractor prior to demobilization. On completion of the works, all temporary structures will be cleared away, all rubbish burned, excreta or other disposal pits or trenches filled in and effectively sealed off, and the site left clean and tidy, at the contractor's expense. The site will be restored to pre-project conditions through the removal of all extraneous material on site. During the site clearance and earthwork, it the necessary to be careful about the following:	Design Build Contractor and SC
	Quarry/borrow pit operations	Permanent	Moderate	Responsibility of the contractor to- (i) obtain approval of implementing agency if new quarries and borrow sites are necessary (ii) store stripped materials as not to disrupt natural drainage and protect them to prevent erosion and migration of soil particles into surface waters; (iii) provide temporary ditches and/or settling basins to collect run-off water and to prevent erosion and contamination of surface water; (iv) plant exposed areas with suitable vegetation at the earliest opportunity and prevent ponding of water through temporary drains discharging to natural drainage channels; (v) restore sites after construction activities by stabilizing contours and slopes, spreading stripped materials to promote percolation and re- growth of vegetation, and draining any standing water. Land utilized for quarry sites access roads will also	Design-Build Contractor and SC

				restored, and (vi) ensure adequate safety precautions during transportation of quarry material from quarries to the construction site (vii) Ensure all employee and labor covered by proper PPE and safety net program. Vehicles transporting the material will cover to prevent spillage.	
	Disposal of bituminous wastes / construction waste / debris / cut material	Temporary	Moderate	For project components involving demolition of structures, the contractor will prepare and implement a waste management plan. Safe disposal of the extraneous material will be ensured in the pre-identified disposal locations. To enable minimization of waste disposal and do this in an environmentally safe manner, the waste management plan will (i) recover used oil and lubricants and reuse or remove from the site; (ii) manage solid waste according to the following preference hierarchy: reuse, recycle, and dispose of in designated areas;	Design Build Contractor and SC
	Stripping, stocking, and preservation of topsoil	Permanent	Moderate	The topsoil from productive agricultural lands at the intake site, borrow areas, and areas to be permanently covered will be stripped to a specified depth of 150 mm and stored in stockpiles. The stockpile will be designed such that the slope does not exceed 1:2 (vertical to horizontal), and the height of the pile will be restricted to 2 m. Stockpiles will not be surcharged or otherwise loaded, and multiple handling will be kept to a minimum to ensure that no compaction will occur. The stockpiles will be covered with gunny bags or tarpaulin. It will be ensured by the contractor that the topsoil will not be unnecessarily trafficked, either before stripping or when in stockpiles. Such stockpiled topsoil will be returned to cover the disturbed area and cut slopes.	Design-Build Contractor and SC
	Use of explosive materials	Permanent	Moderate	Except as may be provided in the contract or ordered or authorized by the SC, the contractor will not use explosives. The contractor will, at all times, take every possible precaution, and will comply with appropriate laws and regulations relating to the importation, handling, transportation, storage, and use of explosives and	Design-Build Contractor and SC

				will, at all times when engaged in blasting operations, post sufficient warning flagmen. The contractor will carry out the use of explosive materials only after obtaining written approval of the SC of the procedures to be followed.	
	Material handling at site	Temporary	Moderate	All workers employed for mixing asphaltic material, cement, concrete, etc. will be provided with protective footwear and goggles. Workers engaged in welding works will be provided with welder's protective eye shields. The use of any toxic chemical will be strictly in accordance with the manufacturer's instructions.	Design Build Contractor and SC
Soil and water pollution	Soil and water pollution due to fuel, lubricants, and construction waste	Temporary	Moderate	The fuel storage and vehicle cleaning area will be stationed such that runoff from the site does not drain into the water bodies/ponds abutting the construction sites. Oil interceptors will be provided at construction vehicle parking areas, vehicle repair areas, and workshops, ensuring that all wastewater flows into the interceptor prior to its discharge. All work sites will be cleaned and restored to pre-project conditions. Discharge standards promulgated under Schedule 10, standards for waste from industrial units or projects waste will be strictly adhered to.	Design Build Contractor and SC
Operation phase					
Pipeline route along agricultural land, pipeline access road	Possible waterlogging	Permanent	Moderate	Canalization of water through the internal Canals and rivers Section 6-D&B part 2E- Access Roads and Crossing Requirements, Clause 1.3 Pipeline Access Road-Para 3 : "Culverts and other appropriate means of drainage shall be provided such that the pipeline access road shall not interface with natural drainage paths" D&B part 3A-specification-Civil Clause 1.4.7: Works affecting watercourse and surface water drains- 2nd para: "The Contractor shall maintain watercourses and drains within the	Design build contractor

				site in effective working condition at all time" 4th para " The Contractor shall take all reasonable precautions to ensure that no work in any water course or drain is done in such a manner as to cause unnecessary damage. And if any damage is done, he will repair such immediately and for such repair no payment will be made to the Contractor."	
	Survival of trees, maintenance, of landscaping, and the green buffer zone	Permanent	Moderate	Proper care will be taken to increase the survival rate of saplings, like regular watering, pruning, provision of tree guards, provision of manure for better nourishment, etc., including timely replacement of perished saplings.	DWASA
	Environmental conditions	Permanent	Moderate	DWASA will undertake seasonal monitoring of air, water, noise, and soil quality through an approved monitoring agency. The parameters to be monitored, frequency and duration of monitoring, as well as the locations to be monitored will be as per the monitoring plan prepared.	DWASA
	Occupational health and safety at the water transmission main	Permanent	Moderate	DWASA will establish procedures and systems to maintain sound occupational health and safety for the personnel at the various facilities, including the use of PPE, provision of training on occupational health and safety to all workers, etc. To address environmental risks, during the operation of the facilities, DWASA will develop and implement an emergency action plan, which will include training and systems on emergency response systems and procedures.	DWASA

Q. SITE SPECIFIC GUIDANCE FOR ENVIRONMENTAL PONITORING PROGRAM, WTP

1. **INTROCUCTION (see Appendix O)**
2. **PROJECT DESCRIPTION (see Appendix O)**
3. **ENVIRONMENTAL MONITORING (see Appendix O)**
4. **ENVIRONMENTAL MANAGEMENT (see Appendix O)**
5. **Template for the Environmental Monitoring Report (see Appendix O)**

Table 6: Site Specific Environmental Management Plan (SSEMP)

Water Treatment Plant

Activity	Environmental Impact	Duration /Extent	Magnitude	Mitigation Measures	Responsibility
Pre-construction (Design Phase)					
water treatment plant	Damage to trees and clearance of vegetation at the project locations	Permanent	Moderate	Trees within the area required for construction will be felled after prior approval.	DBO Contractor
Erosion	Soil erosion	Permanent	Moderate	The measures to address soil erosion at the proposed facilities will consist of measures as per design, or as directed by the SC to control soil erosion, sedimentation, and water pollution. All temporary sedimentation, pollution control works, and maintenance thereof will be deemed incidental to the earthwork or other items of work.	DBO Contractor
Seismic considerations in design of structures	Structure at seismic risk	Permanent	Moderate	The designs of the project components, including intake structures and transmission mains, will conform to Bangladesh National Building Code, 2006.	Design Build Contractor, and SC
Contractor's Camps	Temporary loss of land and implications of insufficient physical and social management of camps and labor resources	Permanent	Moderate	Temporary construction camps and any auxiliary objects will be located in places adjacent to project sites. The particular place for construction camps and auxiliary objects (vehicle parking lots, storage areas and etc.) will be determined jointly with local administration authorities	Design Build Contractor, and SC
Construction Materials	Procurement from non-environmentally & socially responsible suppliers	Permanent	Moderate	Give preference to goods and services sourced from organizations implementing an EMS (provision in tender documents).	Design Build Contractor, and SC
Spoil Disposal	Improper location and treatment of spoil dumps	Permanent	Moderate	Require Method Statement for spoil disposal, with details of authorization, location, placement, closure etc. (tender documents).	Design Build Contractor, and SC
Cutting of trees	Damage to trees and clearance of vegetation at the project locations	Moderate	moderate	Only trees that will require removal within the proposed construction areas of the sites will be cut. After the finalization of the designs and layout of the project components,	Design Build Contractor, and SC

				the trees within proposed construction areas will be marked. For trees not proposed to be cut, taking all precautions to protect them from any damage from construction activities, including placement of tree guards will be taken up.	
Assets/facilities lost, including common property resources and religious structures	Assets/facilities lost, including common property resources and religious structures	Permanent	Moderate	Designs to be worked out to minimize impacts on these assets. Compensation and assistance will be provided in accordance with the provisions of the RP. Designs to ensure cross-drainage through the provision of balancing culverts and sufficient cross-movement, including movement of fishes, shall be done to minimize severance impacts on khals and fish ponds cut across by the alignment.	Design Build Contractor, and SC
Drinking water availability	Lacking of drinking water availability and water arrangement	Temporary	Moderate	Prior to the initiation of construction activities, the contractor will be responsible for the arrangement of water in every workplace at suitable and easily accessible places for the whole construction period. Sufficient supply of cold potable water should provide and maintain at the construction camps and other ancillary work areas.	Design Build Contractor / SC
	Relocation of utility lines along the transmission mains	Permanent	Moderate	All utilities and services impacted due to the proposed components should be shifted/relocated, with prior approval of the concerned agencies.	PMU
	Sludge management and disposal	Temporary	Moderate	Design of WTP to include sludge-drying beds, and sludge management plan to be prepared.	Design Build Contractor / SC
	Environmental clearance	Temporary	Moderate	The draft EIA should be updated to prepare government's EIA implemented as a single unified document and submitted to DoE as part of environmental clearance requirement. The EC is to obtain prior to the commencement of civil works.	Design Build Contractor / SC / DWASA

Waste Management and Pollution	Improper disposal of solid and liquid wastes; spills & inadequate clean-up	Permanent	Moderate	Design and prepare Site Waste management plan in accordance with DoE	BDO contractor
Construction Phase					
Relocation of utilities	Damage of utility lines	Permanent	Moderate	All utilities and services impacted due to the proposed components will be shifted/relocated, with prior approval of the concerned agencies.	Design Build Contractor, and SC
Health and Safety	Hazards to workers	Temporary	Moderate	Project proponent and financier signal that best practice H&S standards should apply. At every workplace, a readily available first aid unit, including an adequate supply of sterilized dressing material and appliances, will be provided as per the factory rules. Suitable transport will be provided to facilitate the transfer of injured or ill persons to the nearest hospital. At every workplace and construction camp, equipment and nursing staff will be provided. The contractor will, at his own expense, conform to all anti-malaria instructions given to him by the SC. All relevant provisions of the Bangladesh Labor Act, 2006 and Bangladesh National Building Code, 2006 will be adhered to, concerning the provision of adequate safety measures during construction. The contractor will comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, trenches, and safe means of entry and egress.	Design Build Contractor, and SC
Conflict among the work personnel and labor	Conflict among the work personnel and labor	Temporary	Moderate	Proper work distribution plan with maintenance authority.	Build Contractor
Child labor	Child labor Risk of contractors or subcontractors hiring child labor in the construction activities.	Temporary	Minor	• National laws on child labor will strictly followed. No child labor will be allowed by the contractors or subcontractors in any of the project activities.	Design Build Contractor, and SC

Health and safety	Accident prevention and work safety procedures	Temporary	Moderate	Awareness of workers about hazardous materials and proper handling methods. Warning signs, labels and signals. Provide helmets, safety shoes and other PPE for workers in accordance with accident prevention and work safety procedures	build contractor
	Safety measures during construction -First aid -Malaria risk	Temporary	Moderate	At every workplace, a readily available first aid unit, including an adequate supply of sterilized dressing material and appliances, should be provided as per the factory rules. Suitable transport should be provided to facilitate the transfer of injured or ill persons to the nearest hospital. At every workplace and construction camp, equipment and nursing staff should be provided. The contractor will, at his own expense, conform to all anti-malaria instructions given to him by the SC. All relevant provisions of the Bangladesh Labor Act, 2006 and Bangladesh National Building Code, 2006 should be adhered to, concerning the provision of adequate safety measures during construction. The contractor will comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, trenches, and safe means of entry and egress.	Design Build Contractor and SC
	Conflict among the work personnel and labor	Temporary	Moderate	Proper work distribution plan with maintenance authority.	Build Contractor
	Construction Impact	Temporary	Moderate	During construction period pedestrian and vehicle movement and business should be restricted and hampered.	Build Contractor
	Hygiene in the construction camps and sites	Temporary	Moderate	All temporary accommodations should be constructed and maintained in such a fashion that uncontaminated water is available for drinking, cooking, and washing. Safe drinking water in sufficient quantity for the workforce should be provided at the construction site	Design Build Contractor and SC

				as well as at the construction camps. Adequate toilets, separate for women and men, shall be provided at the construction sites, with septic tanks. Garbage bins should be provided in the camps and regularly emptied, and the garbage disposed of in a hygienic manner. Adequate health care should be provided for the workforce. Unless otherwise arranged for by the local sanitary authority, the local medical health or municipal authorities will make arrangement for disposal of excreta. On completion of the works, all such temporary structures should be cleared away, all rubbish burned, excreta tank and other disposal pits or trenches filled in and effectively sealed off, and the outline site left clean and tidy, at the contractor's expense. The site should be restored to pre-project conditions through the removal of all extraneous material on site.	
	Worker health & safety Risk caused by force majeure	Temporary	Minor	All reasonable precaution should be taken to prevent danger to the workers and the public from fire, flood, drowning, etc. Specifically, the contractor will (i) provide medical and accident insurance for workers; (ii) provide first aid in the construction campsite; and (iii) provide access to hospitals/clinics within the project site that can be accessed in case of emergency by arranging necessary transport for safe carriage of the injured.	Design Build Contractor and SC
	Accident prevention and work safety procedures -May loss or injury of human	Temporary	Moderate	• Awareness of workers about hazardous materials and proper handling methods. Warning signs, labels and signals. Provide helmets, safety shoes and other PPE for workers in accordance with accident prevention and work safety procedures	Design Build Contractor and SC
	River Water Pollution	Temporary	Moderate	Protect river water during construction of WTP. Confined the river water area of to prevent the turbidity, DO level of water.	Design Build Contractor and SC

	Noise and Vibration from construction equipment	Temporary	Moderate	The contractor will ensure (i) regular maintenance of vehicles, equipment, and machinery to keep noise from these at a minimum; and (ii) all vehicles and equipment used for construction should be fitted with exhaust silencers. During routine servicing operations, the effectiveness of exhaust silencers should be checked, and if found to be defective, should be replaced.	Design Build Contractor and SC
	Temporary measures for construction activities around habitations/ institutional uses	Temporary	Moderate	The contractor will provide the following measures during the laying of transmission mains for sections in the vicinity of habitations and commercial and institutional areas, to minimize access and livelihood disruption: (i) place walkways and metal sheets where required to maintain access across trenches for people and vehicles; (ii) increase workforce in front of critical areas such as institutions, places of worship, business establishments, hospitals, and schools; (iii) consult businesses and institutions regarding operating hours and factoring this into work schedules; and (iv) provide signboards for pedestrians to inform them of nature and duration of construction works and contact numbers for concerns/complaints.	Design Build Contractor and SC
Dust and air quality	Dust Pollution • Impact Sources Emissions from construction related traffic and machinery. • Dust from works, carrying machinery equipment to the site, and traffic from trucks and vehicles. • Create nuisance Road damage	Temporary	Moderate	The contractor will (i) take every precaution to reduce the levels of dust at construction sites, and not exceeding the pre-project ambient air quality standards; (ii) fit all heavy equipment and machinery with air pollution control devices that are operating correctly; (iii) reduce dust by spraying stockpiled soil, excavated materials, and spoils; (iv) cover with tarpaulin vehicles transporting soil and sand; and (v) cover stockpiled construction materials with tarpaulin or plastic sheets. • Implement measures in Environmental Code of Practice of Air Quality Management. Dust generation will be restricted as much as possible and water sprinkling carried out as	Design Build Contractor and SC

				appropriate, especially where earth moving and excavation are carries out. • Emissions during bore logs digging, equipment and traffic will comply with ADB EHS guidelines and will be monitored. Spray of water is suggested in the road and construction sites Capacity of truck load should stay below capacity of road	
	Emission from construction vehicles, equipment, and machinery	Tempora ry	Moder ate	All vehicles, equipment, and machinery used for construction should be regularly maintained to ensure that pollution emission levels comply with the relevant requirements of DoE. Copies of conformance should be submitted regularly to the SC.	Design Build Contract or and SC
	Environmental pollution / human health Stockpiling of construction materials, excavated earth/spoil from trenches	Tempora ry	Moder ate	Due consideration should be given to material storage and construction sites such that it doesn't cause any hindrance to daily traffic movement. The contractor will (i) consult with implementing agency on the designated areas for stockpiling of clay, soils, gravel, and other construction materials; (ii) avoid stockpiling of earth fill, especially during the rainy season, unless covered by tarpaulins or plastic sheets; (iii) prioritize reuse of excess spoils and materials in the construction works; and (iv) protect surface water bodies from any source of contamination, such as oily wastes, debris, and spoils that will degrade its quality. • Excavated material shall not enter surface waters, surface water banks or impede flows - in particular, the following shall be done: do not dump material in surface waters, at river banks or in flooding areas, in case rivers have been blocked remove the material	Design Build Contract or and SC
	Movement of construction vehicles Oil spillage, grease and lubricant	Tempora ry	Moder ate	The movement of construction materials and equipment, to the extent possible, should be plan along major roads, with the exception of access roads to the site. In the event of movement of	Design Build Contract or and SC

				construction vehicles and equipment on the narrow roads, strengthening of these roads should be carried out, and timing of movement of heavy vehicles worked out to avoid peak hours and night-time, and to ensure minimal disturbances to the communities and the resident population along these roads. • Maintenance should be conducted at safe distance from watercourses so that no oil spills can enter the water. Contaminated soil should be excavated and disposed properly in a confined place outside inundation areas	
	Contamination of soil and groundwater quality			• The soil contaminated with drilling mud should be avoided For effluents to be discharged from work place, camps, and offices, treatment arrangements such as retention ponds and septic tanks should be incorporated in the facility designs.	Design Build Contractor and SC
Air pollution (SPM, $PM_{2.5}$, PM_{10}, SO_x, NO_2 and CO) • Impairment of air quality may have an impact on geotechnical investigation workers, local residents and surrounding	Adverse impact to flora, fauna, human health & surrounding	Temporary	Moderate	-Drilling and transport vehicles shall move only in-designated areas and roads. -Water dry drilling areas and access roads to reduce dust emissions -Minimize traffic in villages and other residential areas -Reduce vehicle speed in drilling areas and access roads to 10 km/h -Machines and vehicles must be regularly examined and maintained to comply with requirements of technical specifications	Package 2 Contractor, MDSC,

environment • Air pollution generates from exhaust of engines.					
Spoil Disposal	Improper location and treatment of spoil dumps	Permanent	Moderate	Dispose of spoil only at designated sites and by approved methods; methods must consider topsoil conservation and quality, long-term soil stability against shrinking and swelling, erosion and flood waters	
Dust	Dust nuisance or hazard at construction sites and surroundings (Dust generates due to stone crushing, equipment staging yards/areas, material storage areas, excavated material disposal areas, uncontrolled emission of solid airborne particulate matter from any source other than combustion, etc,).	Temporary	Moderate	Spray water exposed surfaces and access routes in dry season to prevent dust nuisance	
Occupational health, safety and, fire safety	Harm to laborers	Temporary	Moderate	The scope of works includes the occupational health and labor safety measures, consistent with effective rules and provisions, prevention of incidents and occupational diseases, as well as improvement of working conditions. The primary fire - fighting equipment will be provided at construction site.	
Air quality	Air pollution (SPM, $PM_{2.5}$, PM_{10}, SO_x, NO_2 and CO) • Impairment of air quality may have an impact on geotechnical investigation	temporary	moderate	• Drilling and transport vehicles shall move only in-designated areas and roads. • Water dry drilling areas and access roads to reduce dust emissions	Design Build Contractor and SC

	workers, local residents and surrounding environment • Air pollution generates from exhaust of engines. • During GI bore logs work Emission from drilling vehicle and machine			• Minimize traffic in villages and other residential areas • Reduce vehicle speed in drilling areas and access roads to 10 km/h • Machines and vehicles must be regularly examined and maintained to comply with requirements of technical specifications Repair and maintain access roads, as necessary	
	Noise and Vibration from construction equipment	Temporary	Moderate	The contractor will ensure (i) regular maintenance of vehicles, equipment, and machinery to keep noise from these at a minimum; and (ii) all vehicles and equipment used for construction will be fitted with exhaust silencers. During routine servicing operations, the effectiveness of exhaust silencers will be checked, and if found to be defective, will be replaced.	Design Build Contractor and SC
	Temporary measures for construction activities around habitations/ institutional uses	Temporary	Moderate	The contractor will provide the following measures during the laying of transmission mains for sections in the vicinity of habitations and commercial and institutional areas, to minimize access and livelihood disruption: (i) place walkways and metal sheets where required to maintain access across trenches for people and vehicles; (ii) increase workforce in front of critical areas such as institutions, places of worship, business establishments, hospitals, and schools; (iii) consult businesses and institutions regarding operating hours and factoring this into work schedules; and (iv) provide signboards for pedestrians to inform them of nature and duration of construction works and contact numbers for concerns/complaints.	Design Build Contractor and SC
	Environmental pollution / human health Stockpiling of construction materials, excavated earth/spoil from trenches	Temporary	Moderate	Due consideration will be given to material storage and construction sites such that it doesn't cause any hindrance to daily traffic movement. The contractor will (i) consult with implementing agency on the designated areas for stockpiling of clay, soils, gravel, and other construction materials;	Design Build Contractor / SC

				(ii) avoid stockpiling of earth fill, especially during the rainy season, unless covered by tarpaulins or plastic sheets; (iii) prioritize reuse of excess spoils and materials in the construction works; and (iv) protect surface water bodies from any source of contamination, such as oily wastes, debris, and spoils that will degrade its quality. • Excavated material shall not enter surface waters, surface water banks or impede flows - in particular, the following shall be done: do not dump material in surface waters, at river banks or in flooding areas, in case rivers have been blocked remove the material	
	Improper movement of construction vehicles, Oil spillage, grease and lubricant	Tempora ry	Moder ate	The movement of construction materials and equipment, to the extent possible, will be plan along major roads, with the exception of access roads to the site. In the event of movement of construction vehicles and equipment on the narrow roads, strengthening of these roads will be carried out, and timing of movement of heavy vehicles worked out to avoid peak hours and night-time, and to ensure minimal disturbances to the communities and the resident population along these roads. • Maintenance will be conducted at safe distance from watercourses so that no oil spills can enter the water. Contaminated soil should be excavated and disposed properly in a confined place outside inundation areas	Design Build Contract or and SC
	Contamination of soil and groundwater quality	Tempora ry	moder ate	• The soil contaminated with drilling mud should be avoided For effluents to be discharged from work place, camps, and offices, treatment arrangements such as retention ponds and septic tanks will be incorporated in the facility designs.	
	Archaeological property chance findings	Permane nt	Moder ate	In the event of an archaeological chance find at the construction site, the contractor will prevent	Design Build Contract

				workmen or any other persons from removing and damaging any chance find artifacts and will, immediately upon discovery thereof, inform the SC of such discovery and carry out the SC's instructions for dealing with the same, awaiting which all work will be stopped for 100 m in all directions from the site of discovery.	or and SC
	Loss of access to residents, businesses, and institutions during construction.	Tempora ry	Moder ate	The contractor will provide safe and convenient passage for vehicles and pedestrians through diversions to and from side roads, and property access connecting the project roads. The contractor will ensure that (i) the construction works do not interfere with the convenience of the public or access to, use, and occupation of public or private roads, or any other access to properties, whether public or private. Temporary access to properties adjacent to the construction site will be provided through the construction of ramps with concrete slabs for use of pedestrians and light vehicles; (ii) in critical areas such as institutions, operating hours are factored into work schedules and workforce is increased for speedy completion; (iii) advance information on works to be undertaken including appropriate signage, is provided; and (iv) the diversion is done in coordination with the traffic police division for necessary rerouting of traffic and traffic management.	Design-Build Contract or and SC
	Damages to utilities and services during construction	Permane nt	Moder ate	The contractor will be required to: (i) plan for immediate attendance by the service providers to any damages to utilities during construction; (ii) replace (or compensate for) public and private physical structures damaged due to construction or vibration; and (iii) provide prior public information about the likely disruption of services. In consultation and with support from DWASA, the contractor will provide alternative arrangements for water supply in the event of disruption beyond a reasonable time, for instance, through tankers.	Design-Build Contract or and SC

	Compensation • Loss or impairment of private property			• written compensation arrangement and consent between property owner and contractor	
	Clearing of construction camps and restoration	Tempora ry	Moder ate	The contractor will prepare site restoration plans for approval by the SC. The plan will be implemented by the contractor prior to demobilization. On completion of the works, all temporary structures will be cleared away, all rubbish burned, excreta or other disposal pits or trenches filled in and effectively sealed off, and the site left clean and tidy, at the contractor's expense. The site will be restored to pre-project conditions through the removal of all extraneous material on site. During the site clearance and earthwork, it the necessary to be careful about the following:	Design Build Contract or and SC
	Quarry/borrow pit operations	Permane nt	Moder ate	Responsibility of the contractor to- (i) obtain approval of implementing agency if new quarries and borrow sites are necessary (ii) store stripped materials as not to disrupt natural drainage and protect them to prevent erosion and migration of soil particles into surface waters; (iii) provide temporary ditches and/or settling basins to collect run-off water and to prevent erosion and contamination of surface water; (iv) plant exposed areas with suitable vegetation at the earliest opportunity and prevent ponding of water through temporary drains discharging to natural drainage channels; (v) restore sites after construction activities by stabilizing contours and slopes, spreading stripped materials to promote percolation and re- growth of vegetation, and draining any standing water. Land utilized for quarry sites access roads will also restored, and (vi) ensure adequate safety precautions during transportation of quarry material from quarries to the construction site (vii) Ensure all employee and labor covered by proper PPE and safety net program. Vehicles transporting the material will cover to prevent spillage.	Design-Build Contract or and SC

	Disposal of bituminous wastes / construction waste / debris / cut material	Temporary	Moderate	For project components involving demolition of structures, the contractor will prepare and implement a waste management plan. Safe disposal of the extraneous material will be ensured in the pre-identified disposal locations. To enable minimization of waste disposal and do this in an environmentally safe manner, the waste management plan will (i) recover used oil and lubricants and reuse or remove from the site; (ii) manage solid waste according to the following preference hierarchy: reuse, recycle, and dispose of in designated areas;	Design Build Contractor and SC
	Stripping, stocking, and preservation of topsoil	Permanent	Moderate	The topsoil from productive agricultural lands at the intake site, borrow areas, and areas to be permanently covered will be stripped to a specified depth of 150 mm and stored in stockpiles. The stockpile will be designed such that the slope does not exceed 1:2 (vertical to horizontal), and the height of the pile will be restricted to 2 m. Stockpiles will not be surcharged or otherwise loaded, and multiple handling will be kept to a minimum to ensure that no compaction will occur. The stockpiles will be covered with gunny bags or tarpaulin. It will be ensured by the contractor that the topsoil will not be unnecessarily trafficked, either before stripping or when in stockpiles. Such stockpiled topsoil will be returned to cover the disturbed area and cut slopes.	Design-Build Contractor and SC
	Use of explosive materials	Permanent	Moderate	Except as may be provided in the contract or ordered or authorized by the SC, the contractor will not use explosives. The contractor will, at all times, take every possible precaution, and will comply with appropriate laws and regulations relating to the importation, handling, transportation, storage, and use of explosives and will, at all times when engaged in blasting operations, post sufficient warning flagmen. The contractor will carry out the use of explosive materials only after obtaining written	Design-Build Contractor and SC

				approval of the SC of the procedures to be followed.	
	Material handling at site	Temporary	Moderate	All workers employed for mixing asphaltic material, cement, concrete, etc. will be provided with protective footwear and goggles. Workers engaged in welding works will be provided with welder's protective eye shields. The use of any toxic chemical will be strictly in accordance with the manufacturer's instructions.	Design Build Contractor and SC
Soil and water pollution	Soil and water pollution due to fuel, lubricants, and construction waste	Temporary	Moderate	The fuel storage and vehicle cleaning area will be stationed such that runoff from the site does not drain into the water bodies/ponds abutting the construction sites. Oil interceptors will be provided at construction vehicle parking areas, vehicle repair areas, and workshops, ensuring that all wastewater flows into the interceptor prior to its discharge. All work sites will be cleaned and restored to pre-project conditions. Discharge standards promulgated under Schedule 10, standards for waste from industrial units or projects waste will be strictly adhered to.	Design Build Contractor and SC
Operation phase					
Pipeline route along agricultural land	Possible waterlogging	Permanent	Moderate	Canalization of water through the internal Canals and rivers	Design Build Contractor and SC
	Survival of trees, maintenance, of landscaping, and the green buffer zone	Permanent	Moderate	Proper care will be taken to increase the survival rate of saplings, like regular watering, pruning, provision of tree guards, provision of manure for better nourishment, etc., including timely replacement of perished saplings.	DWASA
	Occupational health and safety at the water transmission main	Permanent	Moderate	DWASA will establish procedures and systems to maintain sound occupational health and safety for the personnel at the various facilities, including the use of PPE, provision of training on occupational health and safety to all workers, etc. To address environmental risks, during the operation of the facilities, DWASA will develop and implement an emergency action plan, which will	DWASA

				include training and systems on emergency response systems and procedures.	
	Management of sludge at the treatment plant	Permanent	Moderate	During operation of the WTP, physical and chemical sludge will generate. This drinking water treatment sludge usually contains colloidal alum hydroxides, colloidal or dissolved organic matter, clay, silt and microorganisms. It should not contain heavy metal and toxic chemicals. After dehydration and drying the sludge is proposed to use as fill material for lowlands as reclaimed land for public parks, roadsides, golf courses, lawns and home in nearby areas after analysing characteristics of the sludge if it doesn't contain any toxic chemical. The disposal of the alum sludge is proposed at the landfill site of Dhaka at Matuail, about 10 km from the proposed WTP if it is not possible to use as fill material after confine.	DWASA
	Effective maintenance of the sludge-drying beds at the WTP	Permanent	Moderate	DWASA will ensure regular maintenance of the sludge-drying beds at the WTP. Utilization of dried sludge for horticultural/ agricultural purposes, as suitable, should be carried out. Disposal of alum sludge should be at the sanitary landfill site in Dhaka. Reuse of sludge should be explored after testing to meet government safety standards.	DWASA
	Management of solid waste at the treatment plant	Permanent	Moderate	A waste collection system should be in operation to handle solid wastes, oily rags, and used fuel and lube oil filters in a leak-proof container that should be stored and disposed of at the landfill site, to ensure effective management of solid wastes at the treatment plant site.	DWASA

R. EMP BUDGET IN CONTRACT DOCUMENT

MILESTONES			
Activity Ref.	Activity Description	Unit	Supporting Document
B1.10.1	Social and environmental requirements (Bidder to list below)		
B1.10.1.1	Social and environmental requirements		
B1.10.1.1	First submission of the part of the Health and Safety Management System dealing with Design	LS	Project Sync / _B-001464_GWT_HS_G00_MP_0007
B1.10.1.2	First submission of the part of the Health and Safety Management System dealing with Construction	LS	Project Sync / _B-001464_GWT_HS_G00_MP_0007
B1.10.1.3	First submission of the part of the Health and Safety Management System dealing with Operations	LS	
B1.10.1.4	First submission of the part of the Health and Safety Management Plan dealing with Design	LS	Project Sync / _B-001464_GWT_HS_G00_MP_0008
B1.10.1.5	First submission of the part of the Health and Safety Management Plan dealing with Construction	LS	Project Sync / _B-001464_GWT_HS_G00_MP_0008
B1.10.1.6	First submission of the part of the Health and Safety Management Plan dealing with Operations	LS	
B1.10.1.7	First submission of the part of the Environmental Management System dealing with Design	LS	Project Sync / _B-001464_GWT_EN_G00_MP_0008
B1.10.1.8	First submission of the part of the Environmental Quality Management System dealing with Construction	LS	Project Sync / _B-001464_GWT_EN_G00_MP_0008
B1.10.1.9	First submission of the part of the Environmental Quality Management System dealing with Operations (at least prior to Tests on Completion)	LS	
B1.10.1.10	First submission of the part of the Environmental Management Plan dealing with Design	LS	Project Sync / _B-001464_GWT_EN_G00_MP_0009
B1.10.1.11	First submission of the part of the Project Environmental Management Plan dealing with Construction	LS	Project Sync / _B-001464_GWT_EN_G00_MP_0009
B1.10.1.12	First submission of the part of Environmental Management Plan dealing with Operations (at least prior to Tests on Completion)	LS	
0	0	0	

P1 - Budget Total 158,600,315 BDT.

13,216,693 BDT each section.

S. O&M – Service Requirements

T. O&M – Monitoring and Metering