

**Terms of Reference
for
Consultancy Services for
Design Review and Construction Supervision
(Package- CWSIP/S1)**

Chattogram Water Supply and Improvement Project (CWSIP)

Chattogram Water Supply and Sewerage Authority (Chattogram WASA)



**Terms of References for Design Review and Construction Supervision Consultant
(Package- CWSIP/S1)**

1. GENERAL BACKGROUND AND ASSIGNMENT SCOPE

1.1. Introduction

The Chattogram Water Supply and Sewerage Authority (CWASA) was established in 1963 as an autonomous entity under the Ministry of Local Government, Rural Development and Cooperatives (LGRD&C).

The Chattogram (formerly Chittagong) is the second-largest City and the largest Sea Port as well as the commercial capital located south-eastern Bangladesh on the banks of the Karnaphuli River and is surrounded by Sea, River, Hill and natural beauties. The Chattogram is major center of trade, commerce and industry activities in South Asia which is considered as the lifeline of the economy of Bangladesh. The country's first Export Processing Zone was established in this City. Over the last 3 decades, Chattogram has grown at a great pace due to the growth of the economy of the Country. There has been rapid industrial development, and especially unprecedented growth in the garment industry. These developments have resulted into rapid increase of the population of the City mainly due to migration from the countryside which has resulted highly congested dwellings and extremely compressed habitats in some parts of the City as well as in the adjacent Municipalities.

1.2. Existing Water supply system in Chattogram

Municipal water supply in Chattogram originally relied on deep tube wells (DTW). The Kalurghat Iron Removal Plant (IRP) was constructed in the 1960s to provide a centralised treatment and distribution facility for the city centre. The first surface water treatment plant was constructed at Mohara in 1987, with an intake at the confluence of the Halda river with the Karnaphuli river. The demand for water progressively outstripped the capacity of these sources, leading to serious water shortages in the early 2000s. CWASA initiated an investment programme from 2009, backed by the GoB and CCC, that has radically improved its services, with technical assistance and funding from JICA and the World Bank. CWASA currently serves over 80,000 customers in all 41 wards of Chattogram City, but there are still significant areas that are beyond the reach of its distribution system, where residents, institutions and businesses continue to rely on untreated water from private deep and shallow tube wells.

Water Production: CWASA has phased out its use DTW sources and currently operates three surface water treatment plants viz. Mohara WTP (90 Mld), Modunaghat WTP (90 Mld) and Karnaphuli WTP (286 Mld) with a total capacity of 466 Mld. The Iron removal plant at Kalurghat was decommissioned in late 2022 but continues to provide a ground level reservoir and booster pumping station for the Modunaghat supply. A new WTP at Bhandal Juri will add another 60 Mld South of the Karnaphuli river, but this is an area that gets no water from the existing WTPs north of the river and is not due to be connected to the networks north of the Karnaphuli for the time being.



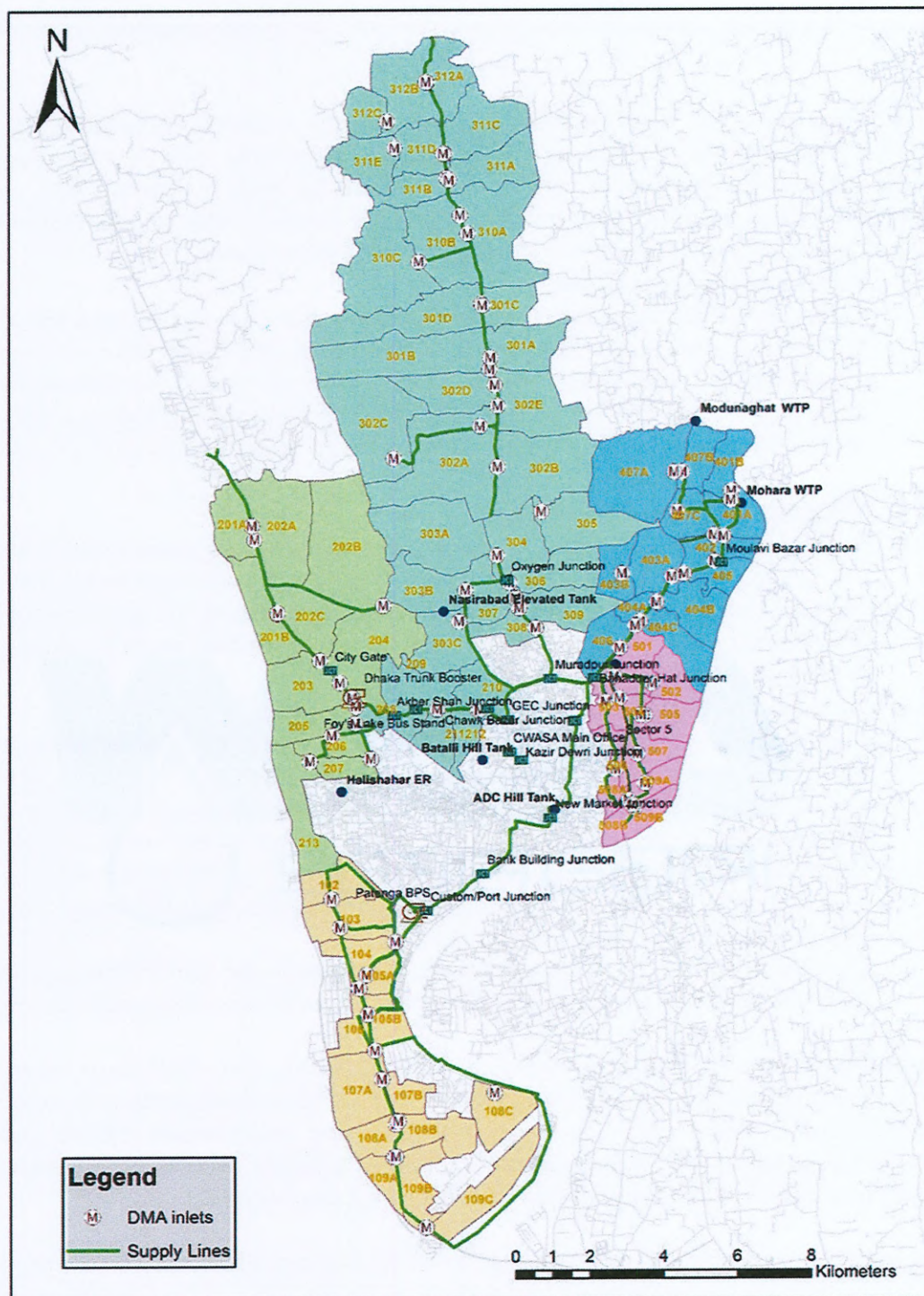


Figure-1: Project Location (Sector 1, 2, 3, 4 and 5)

Water Transmission: At present, Chattogram WASA is establishing District Metering Areas (DMA) in the central part of the city called Karnaphuli Service Area (KSA) with dedicated treated water supply from Karnaphuli water treatment plant under KWSP- Phase 2. The KSA is fully isolated from the surrounding systems just after the completion of KWSP- Phase 2. The Project Area proposed under the WB-supported

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project covers the city outside the KSA that is served from the Mohara and Modunaghat water treatment plants.

Treated water from each water treatment plant is transferred to pumping stations located within water treatment plant premises. The systems downstream of each of those pumping stations are designed to operate independently and supply water to the KSA and the other 5 Sectors. Three systems can be distinguished based on the water treatment plant pumping stations. These are described in the following sections, for the Mohara, Modunaghat and Karnaphuli transmission systems.

- **Mohara Transmission system**

The Mohara system was originally designed to transmit treated water to Battali Hill reservoir, ADC Hill reservoir, Dhaka Trunk Road BPS and Patenga BPS. After Battali Hill reservoir and the service area of ADC Hill reservoir are connected to KSA system, the system supplies water to Dhaka Trunk Road BPS, Patenga BPS and some direct distribution zones within Sector 4, 2 and Sector 3. The system is operated manually to suit the demand and tank water levels.

- **Modunaghat Transmission system**

Treated water from Modunaghat WTP is transmitted to the underground reservoir at the Kalurghat iron removal plant (IRP) and Patenga BPS through the 1200 diameter ductile iron pipe installed under CWSISP project. Operation is controlled with continuous manual monitoring of water level in water reservoirs as there is no automated data transfer system between WTP pumping stations and receiving reservoirs.

- **Karnaphuli Transmission system (KSA System)**

Almost all production of the Karnaphuli WTP is transferred to the Nasirabad Ground Reservoir by means of DI 1200 mm twin pipe transmission main. However, there is a branch off to the adjacent Modunaghat WTP treated water tank just downstream of the Halda river pipe bridge.

Water is pumped from the Nasirabad Ground Reservoir to three service reservoirs, namely: Nasirabad Elevated reservoir, Battali Hill ground reservoir and Halishahar elevated reservoir. Then water is gravitated to the KSA distribution system which was upgraded recently under Karnaphuli Water Supply Project – Phase 2 (KWSP2)

As KSA is not fully isolated as planned yet, some areas in the sector 2 and sector 3 are supplied from Halishahar elevated reservoir and Nasirabad Elevated reservoirs through direct tapings.

Water Distribution: The existing distribution system is nominally sub-divided into six sectors, sector 1 to 5 and the KSA. This project area only covers sectors 1 to 5. However, at present there is no specific physical separation within these sectors. The project distribution area covers around 390 km pipe length with different types of pipes which include asbestos cement (AC), ductile iron (DI), Galvanized Iron (GI), High density polyethylene (HDPE), mild steel (MS) and Polyvinyl chloride (PVC).

The sector 5 network currently covers around 80% of the total area while the sector 3 network only covers 20% of the total area. The sector 4 and 1 networks cover around 50% to 60% of their respective areas while the sector 2 network only covers around 30% of its total area. The sector 1 through 5 networks comprise 81km, 137km, 61km, 56km and 53km of pipe respectively.

1.3. Chattogram Water Supply Improvement Project

The Government of Bangladesh has signed a financing agreement with International Development Association (IDA) to implement the Chattogram Water Supply Improvement Project (CWSIP). This project comprises a 04 (four) components as follows-



Component 1: Improving Efficiency, Quality, and Coverage of Water Supply Services

Component 1 will help CWASA provide safe and reliable water supply services (in terms of quantity, quality, timing, and duration) and enhance the service delivery system's operational efficiency. Under this component, measures will be undertaken to enhance the duration and pressure (hence, the quantity and reliability) of the water supply services, following the DMA approach, and to address a changing climate scenario. The project activities will be aligned with the current interventions in the Karnaphuli Service Area for water supply and NRW reduction and will extend these measures to the remaining five hydraulic sectors. The rehabilitation of the water supply system will be designed to improve flood resilience and reduce service disruptions during floods. The component includes the following activities:

- Replacement, rehabilitation and expansion of water distribution pipelines, and service lines for reduction of NRW to increase water availability and improve the infrastructure's resilience to floods.
- Installation of new water meters and DMA establishment for improved quality and reliability of supply, leak detection, and real-time tracking of water consumption at inlet point of the DMA.
- Upgrading of existing groundwater extraction facilities with improved treatment processes, installation of Variable Frequency Drive (VFD) controlled local booster pumps, and construction of new pumping stations and reservoirs.
- Purchase of machinery and equipment for monitoring, demand management, and operational sustainability.
- Provision of new connections in unserved areas.
- Advisory support and training for CWASA's technical capacity improvement in the areas of NRW reduction, energy efficiency activities, public awareness program on demand management, and storage and inventory management.

The project will adopt a Design-Build (D-B) approach for leveraging private contractors and plan upon project implementation, aiming to pave the way for build-operate-transfer arrangements and later attract private financing. Capacity building and standard operating procedures for DMA operations will be integrated as part of the D-B contractor's responsibility, so that CWASA personnel and other CWASA contractors can fully take over and operate the assets at the end of the contract period.

Component 2: Improving Water Supply and Non-network Sanitation Management Services for LICs

Component 2 focuses on providing both water supply and non-network sanitation options for selected Low Income Communities (LICs). It includes two subcomponents: subcomponent 2.1 will support the implementation of sustainable management models for water services in the LICs, building on the experience from pilots tested under the CWSISP; and subcomponent 2.2 will support innovative investments for sanitation services in LICs, including non-network sanitation, given that sewerage systems are not feasible in these locations. Both water supply and non-network sanitation options for LICs would rely on private operators to be deployed by CWASA under service contract arrangements. The project would enable services involving septage emptying, transport, and treatment, including leasing of emptying and transport equipment to private operators. Private sector agencies would benefit from capacity-building and market development activities supported by the project. Initial market assessments carried out during preparation of this project confirmed the private sector's interest in construction contracts and undertaking operations of WSS facilities in LICs. This effort will build on the experience from previous World Bank water projects in Chattogram in which private sector participation was successfully tested.

Subcomponent 2.1: Water Supply for LICs will finance expanded coverage of water supply services to selected urban LICs in Chattogram through the extension of the water distribution system. Women will be trained and employed to operate water pumps and collect bills as part of these efforts. Formalizing the piped water supply system in these LICs, and safely managed water supply even during extreme weather events, are likely to reduce negative public health outcomes and the time spent by women in fetching water, and increase resilience to floods.

Subcomponent 2.2: Non-network Sanitation Options for LICs will finance: (i) new and improved toilets, where needed, including shared toilets that are common in LICs; (ii) containment improvement in the form



of community septic tanks (connected to a group of households) or decentralized wastewater treatment systems (DEWATS); (iii) design of a management information system (MIS) for the city's Fecal Sludge Management (FSM) system, integrated with CWASA's organization-wide MIS and geographic information system (GIS); and (iv) communications. The communications program will target behavioral change in households to encourage them to connect to the system and minimize untreated septage discharges to the environment, along with improving tank management practices to achieve effective FSM for the city. This would also enhance resilience to climate impacts by reducing pollution and enhancing the efficiency of wastewater management systems. To implement the scheduled emptying of toilet pits/tanks and disposal of sludge at designated fecal sludge treatment plants, the project will support the development of GIS-enabled MIS of households that will enable CWASA to monitor and track FSM services for the entire city. Proper sanitation through improved toilets and DEWATSs will help manage wastewater effectively and, thereby, reduce health risks from waterborne diseases, especially during floods. An MIS integrated with GIS would enable better planning and decision-making in response to climate events.

Component 3: Developing Utility Systems and Capacities

Component 3 will provide Technical Assistance (TA) to CWASA to enhance the utility's systems, financial performance and creditworthiness, and climate resilience. This component will enhance CWASA's capacity to effectively address the city's water security challenges. The TA covers the five core domains and crosscutting dimensions of the Bank's Utilities of the Future (UoF) framework and is informed by CWASA's performance improvement plan. Key activities include:

- Development of a citywide water supply master plan, business plan, capital investment plan with financing strategy, and debt management plan.
- Implementation of a revised tariff framework to adopt two-part tariff structure (fixed and variable)—a differential tariff structure reflective of consumption levels.
- Development of digital transformation strategy and implementation of integrated data management system for financial management (FM) and MIS functions.
- Strengthening of CWASA's asset management practices and implementing a GIS-enabled asset management system.
- Development of a customer relationship management system, including a customer engagement and communication strategy, GIS-enabled customer database, and regular implementation of customer satisfaction surveys.
- Strengthening of the resilience and disaster preparedness of WSS services by conducting hazard assessments, developing standard operating procedures, and designing guidelines and emergency response plans.
- Delivery of periodic training for capacity building across various CWASA functions.
- TA to conduct gender assessment and recommend required update of CWASA's Human Resources (HR) policy.
- TA to help CWASA examine the feasibility of more advanced financing options to mobilize private capital investments and improve the efficiency of operations, such as build-operation-transfer arrangements.

Component 4: Project Implementation and Management Support

Component 4 will finance the operations of the project management unit (PMU) in CWASA to support project management and implementation and ensure compliance with the Bank's fiduciary procedures and the requirements of the Environmental and Social Framework. Key activities include:

- Creation of the PMU and recruitment of the specialists (for project management, procurement, FM, monitoring and evaluation (M&E), etc.).
- Provision of specialists and consulting services for environmental and social management, gender, and the Grievance Redress Mechanism (GRM).
- Procurement of a consulting firm for design review and supervision services for major contracts.
- Provision of an independent verification agency (IVA) for PBCs.
- Purchase of office equipment and materials.
- Audits of internal project processes.



CWASA has decided to engage well experienced consultants to implement the project. Amongst others, a consultant shall be responsible for providing services of contractor's design review, and construction supervision of the relevant infrastructure as described hereafter.

The population of the Chattogram City is growing rapidly and CWASA is making consistent efforts to make improvement in the Water Supply System through various investment projects including the World Bank financed earlier CWSIS Project and JICA financed projects of Karnaphuli Water Supply Project (KWSP) Phases 1 & 2. It is anticipated that, the population will further increase in future and would trigger the expansion of City to new areas, causing the requirement of larger coverage of Water Supply Facilities.

The project will enable CWASA to increase the population it can supply in the areas served by its existing distribution networks, enhance CWASA's capacity to provide excellent service and expand its customer base. This will be achieved solely by:

1. Improving the condition of its network assets, with new pipes replacing unsatisfactory, inadequate water mains and customer services and infilling the gaps in its present supply area,
2. Largely eliminating any existing backlog of unrepaired leaks and unrecorded customer connections to its networks and providing a state-of-the-art NRW control system based on Smart DMAs that will serve to prevent their return,
3. Removing bottlenecks in the existing system with transmission system improvements and the upgrading of existing facilities at the Kalurghat DTWs and IRP, refurbishing the strategically placed but under-used ADC Hill Reservoir, redeveloping the existing DT Booster site to provide balancing storage and increased pumping capacity to one of the most water deprived areas in the city and replacing the existing Kulshi Booster with much increased pumping capacity to serve a larger area
4. Ensuring that all of these improvements have the capacity to meet increased demand as CWASA increases its supply capacity by developing sources and extends its distribution system to all corners of the urban area by 2052.

The project activities for Component-1 has been sub-divided into 4 major contract packages summarised in Table 1-1.

Table 1-1:Contract Package Summary

Package	Name	Model	Mode
CWSIP/W1	Lot 1: Construction, Design, Supply, Installation, Testing & Commissioning for System Improvement and DMA Formation of MOHARA Water Supply System	Design Build	ICB
	Lot-2: Construction, Design, Supply, Installation, Testing & Commissioning for System Improvement and DMA Formation of Modunaghat & Kalurghat Water Supply System	Design Build	
CWSIP/G3	Supply, Installation, Testing & Commissioning of SMART Meters including SCADA in CWASA	Supply	ICB
CWSIP/W-2 and CWSIP/W-3	Construction/Rehabilitation of Deep Tubewells of Chattogram WASA	Design Bid Build	NCB
CWSIP/W-4	Construction of Ware House at Halishahar and Nasirabad Store, CWASA	Design Bid Build	NCB

Bid Package No. (RFB No.): CWSIP/W1: Construction, Design, Supply, Installation, Testing & Commissioning for System Improvement and DMA Formation of Modunaghat & Kalurghat Water Supply System

Lot 1

The major Work Components of the Package-1-Lot I comprises Designs, Construction & Completion of;

- i. Ductile Iron (DI) Primary Distribution Main to Supply Water to unserved Areas of the Sector- 3.
- ii. Formation of 11 Nos. and 7 Nos. Smart DMAs within the Sector 2 & 3 Areas respectively and Supply & Laying of Distribution Pipelines including Construction & Completion of required DMA & Sector Chambers.
- iii. Supply & Replacement of the existing defective/unserviceable AC/PVC Pipes, Fittings & Valves with HDPE Pipes, Fittings and DI Valves within the Sector 2 & 3 Areas respectively, including replacement PVC Pipes and DI Pipes & Fittings in Sector 2.
- iv. Replacement of all the existing Service Connection with new Service Pipelines including all necessary PE Pipes, Fusion Welded Fittings & Accessories and maintain an unbroken length of HDPE Pipeline up to the legal limit of the CWASA/Consumer Boundary. The Contractor to install the Consumer Water Meter arrangement as depicted in the Standard Drawing and connect the Service Pipeline to the existing Water Meter* as a temporary measure, which will later be replaced by the Package -3 Contractor of the Project.
- v. Design, Supply and installation of Street Booster Pumps to cater for the Local high Elevation Areas of the Sectors including design & construction of RCC Chambers, Outdoor Control Panels & Power Supply.
- vi. Conduct Zero Pressure Tests for the Sector, and all the DMAs within the Sector and reduce NRW to the target leakage levels by replacing defective Pipes, Fittings & Valves etc., wherever necessary.
- vii. Optimized Pumps, Pump Controls and Pump operation for off-peak pressure control and network calming.
- viii. Continuous Controlling, Operate & Maintain the Completed System for a 12 month period with 10% NRW and provide the Training for CWASA Staff of Operation and Maintenance of the optimized Distribution System.
- ix. Designs, Construction & Completion of Dhaka Booster Pump Station with Ground Level Reservoir
- x. Designs, Construction & Completion of Khulshi Pump Station & Supply and Installation of Booster Pumps

Lot 2: Construction, Design, Supply, Installation, Testing & Commissioning for System Improvement and DMA Formation of Modunaghat & Kalurghat Water Supply System

The major Work Components of the Package- 1-Lot 2 comprise Designs, Construction & Completion of;

- i. DI Primary Distribution to supply Water to unserved Areas of the Sector - 1.
- ii. DI Secondary Distribution Mains to Supply Water to unserved Areas of the Sector - 4.
- iii. DI Primary Distribution Mains to Supply Water to unserved Areas of the Sector - 5.
- iv. Formation of 8, 9 & 11 Nos. Smart DMAs within the Sector 1, 4 & 5 respectively and Supply & Laying of approximately Distribution Pipelines including the Design & Construction of required RCC DMA Chambers and Sector Inflow Meter Chambers.
- v. Supply & Replacement of the defective/unserviceable Asbestos Cement (AC)/PVC Pipes, Fittings & Valves with HDPE Pipes, Fittings and Valves within the Sector 1, 4 & 5 Area respectively, including of replacement of 1.62km AC Pipes with DI Pipes & Fittings, AC/MS Pipes with DI Pipes & Fittings in Sector 1.
- vi. Replacement of all the existing Service Connections Pipelines within the Sector 1, 4 & 5 Areas respectively with new Service Pipelines including all necessary PE Pipes, Fusion Welded Fittings & Accessories and maintain an unbroken length of HDPE Pipeline up to the legal limit of the CWASA/Consumer Boundary. The Contractor to install the Consumer Water Meter arrangement as depicted in the Standard Drawing and connect the Service Pipeline to the existing Water Meter* as a temporary measure, which will later be replaced by the Package - 3 Contractor of the Project.



- vii. Supply, Installation & Completion of Street Booster Pumps to cater the Local High Elevation Areas including Design, Construction & Completion of RCC Chambers, Outdoor Control Panels & Power Supply.
- viii. Conduct Zero Pressure Tests for the Sector and all the DMAs within the Sector and reduce NRW to the target leakage levels by replacing defective Pipes, Fittings & Valves etc., wherever necessary.
- ix. Optimized Pumps, Pump Controls and Pump operation for off-peak pressure control and network calming.
- x. Continuous Controlling, Operate & Maintain the Completed System for 01 years Period with 10% NRW and provide the Training for CWASA Staff of Operation and Maintenance of the optimized Distribution System.
- xi. Rehabilitation Works of ADC Hill RCC Ground Level Reservoir.
- xii. Chlorination Works - Supply and Installation of Chlorination System at Patenga Booster Pump station.
- xiii. Improvements at Kalurghat Pump station
- xiv. Improvements of Pumps with VFDs
- xv. Construction & Completion of new Pump station, supply & Installation of Pumps
- xvi. Rehabilitation Works of Existing Iron Removal Plant (IRP)
 - a. Allow for Demolition/Abandoning of old Unusable Buildings, Existing Aeration Tower, Sedimentation Pond and other unusable items as required including filling up to ground level & surface preparations, wherever necessary.
 - b. Introducing and Installation of Pre - Chlorination Units and Pipe Works for Old Plant (10 MGD) and New Plant (5 MGD) (existing Building will be used for installation of Chlorination Unit)
 - c. Provide Aeration Facility to obtain 40 MLD Treated Water with all necessary Pipes and Fittings & Abandoning the existing Aeration Pond including necessary connection to old and new Filters
 - d. Construction of two numbers of Contact Tanks
 - e. Replacement of Filter media in Old R/S Filters (8 Nos. with Capacity of 10 MGD) and Filter Bed preparation with all necessary Pipe Works for improvement of Back Washing Facilities as directed.
 - f. painting, Cleaning, repairing works of corroded parts and allow for rehabilitate existing pipes, fittings within the Kalurghat IRP Premises and remove/Repair defective parts
 - g. Replacement/Rehabilitation of Electromechanical Instrumentation of the Plant

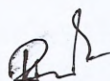
*The installation of the Service Connection Meters, shifting/relocation/modification of existing arrangements of premises/houses and other water supply consumer properties shall be carried out with the consent of the CWASA

Bid Package No. (RFB No.): CWSIP/G3: Supply, Installation, Testing & Commissioning of SMART Meters including SCADA in CWASA

The proposed Package's major Components comprise;

- i. Establishment of Command-and-Control System
- ii. Supply & Installation of Smart Customer Meters
- iii. Supply & Installation of SMART Sector & DMA Metering
- iv. Supply & Installation of Supplementary Internal Monitoring Points Hydrants for Mobile Sensors in KSA

*The retrofitting of Data Logger Units of the Service Connection etc., to premises/houses and other water supply consumer properties shall be carried out with the consent of the CWASA.

Bid Package No. (RFB No.): CWSIP/W2 & W3

Construction/Rehabilitation of Deep Tubewells of Chattogram WASA

- i. Drilling, Testing and Commissioning of minimum 55 numbers of DTWs at different sites within Chattogram City Corporation Area.
- ii. Investigating soil and water quality, performing well development, well testing and Reporting to the Engineer enabling designing the well, recommending safe yield, pump installation depth and pump specifications by designer nominated by the Employer.
- iii. Installation of riser pipes & Fittings inside the Deep Tube Well and connecting them to the Pipes with all Valves & Fittings.
- iv. Installation of all the Pumps, Pump Controls, Sensors and Protections etc., with all necessary Electrical & Instrumentation Works.
- v. Construction of Pump House and all civil works inside the Pump house premises.

Bid Package No. (RFB No.): CWSIP/W4 : Construction of Ware House at Haliashahar and Nasirabad Store, CWASA.

- i. Construction & Completion of New Secure Stores Buildings, Offices and covered hard standing and handling equipment at existing Nasirabad Storage Depot
 - a. Minimum 2,000 m² of Secure Indoor Storage, with heavy duty racks, automatic lighting, indoor and outdoor security lighting, electronic locking, 2 Nos. battery powered forklifts with 2,200kg, 6.2m Lifting capacity compatible with aisle width, including charging stations
 - b. Minimum 8,000 m² of paved and hard covered outdoor storage, with heavy duty racks, complete with drains, lighting, security cameras
 - c. Controlled entrance and exit barriers with cameras and electronic weighbridge, 50-ton capacity, 18m long x 3m wide, complete with terminal, printer, UPS, including ramps and installation on prepared concrete base slab
 - d. 1 No. wheeled telescopic handler, minimum lift capacity 2750kg and 10m lift height, with accessories for handling pallets, pipes, bulk materials (e.g., sand, gravel, spoil), pipes and fittings and other heavy objects (e.g. aggregate bags, compressors, generators)
- ii. New Secure Stores Buildings, Offices and covered hard standing and handling equipment at existing Haliashahar Storage Depot.
 - a. 1,000 m² of Secure Indoor Storage, with heavy duty racks, automatic lighting, indoor and outdoor security lighting, electronic locking, 1 No. battery powered forklifts with 2,200kg, 6.2m lift capacity compatible with aisle width, including charging stations
 - b. 1,000 m² of paved and hard covered outdoor storage, with heavy duty racks, complete with drains, lighting, security cameras.
 - c. Controlled entrance and exit barriers with cameras and electronic weighbridge, 50-ton capacity, 18m long x 3m wide, complete with terminal, printer, UPS, including ramps and installation on prepared concrete base slab
 - d. Secure Workshop and Recycling Centre for dismantling recovered materials and equipment for repair or regular disposal as sorted scrap

2. OBJECTIVES & EXPECTED RESULTS

2.1. Objectives

The objectives of the consulting services include:

1. To provide procurement support to Chattogram WASA in connection to the DB/DBO contracts mentioned above. The support includes Design Review, participation in the pre-proposal conference, Pre-qualification/IS/pre-bid meeting and preparation of meeting minutes, Bid/Proposal Evaluation,



preparing a draft DB/DBO contract, support during contract negotiations, finalization of the contracts for signing, and assisting CWASA in all aspects of the above procurements.

2. To serve as the Engineer of the Client in dealing with the construction activities to be executed by the construction contractors for the above mentioned packages.
3. To coordinate and liaise with local authorities and the implementing agencies of other projects executed in the Project area that may have an impact on the project implementation.
4. To manage all engineering aspects and necessary procedures to ensure orderly and unimpeded progress of the construction works.
5. To assist the contractors and review and supervise their performance, in implementing the environmental management. Occupational Health and Safety management programs that are part of their obligations under their contracts.
6. To assist the contractors and review and supervise their performance, in designing and implementing plans for maximizing connections/ re-connections to households and properties; and resolving social issues that are part of their obligations under their contracts.
7. To carry out tests on site, witness tests carried out by others, and perform pre-shipment factory tests of equipment to be incorporated in the works.
8. To conduct measurement of works and certification of payments to the contractors.
9. To prepare and negotiate with contractors any variations of work for approval of those variations by the Client.
10. To assist in the start-up and commissioning of the completed works,
11. To strengthen the capacity of Client's staff in design review, supervision and O&M of the relevant facilities;
12. To prepare all reports required and to assist the Client in preparing any other documents required.

3. DETAILED TASKS

3.1. Task Description

The scope of work shall include but not be restricted to the tasks listed below:

TASK A - MOBILIZATION

This task comprises the following activities, but not limited to:

1. Mobilization of Team Leader and other necessary consultants.
2. Review construction contract documents and outline (a) pertinent initial activities to be complied with by the contractors; and (b) obligations of the Client to the contractors, if any. Bring to the attention of the Client any potential contractual issues that warrant early attention;
3. Establish the project office and any sub-offices, or site-offices provided by the contractors for the supervision consulting services;
4. Review and coordinate overall and detailed work programs featuring all pertinent activities and critical paths;
5. Establish means of communication and coordination procedures necessary to ensure orderly and unimpeded progress of the work;
6. Establish a document and filing system for the project office, adopting an internationally recognized management system such as ISO 9000. Set up an electronic and internet-based file sharing system, which allows the Client, as well as all supervision team members and contractors, to have access to all documents and files stored in the Consultant's electronic system, as appropriate and needed;
7. Study the GIS maps of Chattogram service area, update the GIS databases (with necessary verification, if required);
8. Establish a project monitoring system to supervise and document all contractors' performance in a timely manner, including critical path program management and tracking system (using applications



- such as MS Project or Primavera), quality control reports, quantity survey records, requests for variation or change orders, submittals and claims and invoices, etc.;
9. Prepare an Inception Report which shall include information regarding all of the above aspects and, as Appendices, stand-alone sub-reports/plans, as follows:
 - Detailed Implementation Schedule for the packages (aggregating all contractors' implementation schedules to feed into the overall Project Implementation Plan collated by CWASA);
 - Quality Supervision and Management Plan;
 - Indicative plan for Risk mitigation and Management;
 - Environmental and Social Supervision and Management Plan;
 - Health, Safety and Security Supervision and Management Plan;
 10. Any other tasks assigned by the Client/Owner.

TASK B -SUPPORT CHATTOGRAM WASA DURING CONTRACT PROCUREMENT

The Consultant's responsibilities under this assignment regarding procurement support to Chattogram WASA shall be limited to the remaining support tasks and include, but shall not be limited to, the following tasks:

1. Reviewing Design for the contracts of System Improvement and DMA Formation of MOHARA Water Supply System and System Improvement and DMA Formation of Modunaghat & Kalurghat Water Supply System.
2. Support CWASA during Bid evaluations of the DB/DBO contracts
3. Support CWASA during negotiations with the DB/DBO contracts
4. Support CWASA in all respects until the DB/DBO contracts are signed and the contracts have become effective;
5. Preparation of Bidding Documents along with the detailed technical specifications and Drawing, including Bidding support, for the procurement of Construction/Rehabilitation of Deep Tubewells of Chattogram WASA and Construction of CWASA Ware House at Halishahar and Nasirabad.
6. Any other tasks assigned by the Client/Owner.

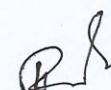
TASK C- HEALTH, SAFETY, ENVIRONMENT, TRAFFIC, SOCIAL MONITORING

This task consists of monitoring the health, environmental, safety, traffic and social issues, prior to and during the construction of the project. It is the responsibility of the consultant to ensure that the consultant and contractors' staff all abide by all required procedures set forth in the contract documents, in the Environmental Management Plan, Social Safeguards Plan, etc. The contractors of different packages will prepare the necessary documents including Environmental Management Plans (EMP) and the consultant shall review/approve the same with necessary modification (if required). The Consultant shall ensure the following but not limited to:

1. The Consultant shall ensure that the Design Build /Design Bid Build Contractors carry out the construction works in accordance with the above-mentioned components of the contract documents and supervise Contractors' implementation of necessary measures outlined in the Environmental Management Plan, Social Management and others Plans;
2. The Consultant shall report any relevant issues, including complaints by third parties and any accidents or damages that occurred, to CWASA and shall propose remedies and/or penalties to be imposed;
3. Any other related tasks.

TASK D - REVIEW AND APPROVAL OF PRELIMINARY AND DETAILED DESIGNS FOR CONTRACTS

It is the responsibility of the relevant contractors to prepare and submit, together with their bid, their specific designs of the facilities concerned. Upon selection, Design-Build (DB) contractors must then refine these bid designs into comprehensive preliminary designs before proceeding to the detailed design stage. The Detailed Designs (DDs) are meant to be used for construction purposes.



The DB contractors may also opt to carry out general site preparation works that may not require prior approval by the authorities, such as site clearance. At the request of the contractors and the Client, the Consultant shall facilitate the contractors to initiate works and process approvals for such works.

It shall also be noted that the contractors are expected to design and build in accordance with a fast-track method, designing in such a way that an early start can be made with construction, while other elements of the designs and drawings are still being elaborated. Within reason, and considering local approval processes, the Consultant shall facilitate the contractors in the fast-track construction process, where and when possible.

During the Detailed Design period, the DB contractors may opt to obtain approvals for equipment they want to incorporate into the permanent works. The Consultant shall assist in arranging for approvals of such equipment, automation etc., within reasonable time frames. This will require flexibility in the mobilization of some of the Consultant's specialized staff involved, and the Consultant shall also review the relevant documents in the Consultant's home office, when such reviews need to be delivered at short notice.

The Consultant shall be responsible for the checking, commenting on errors and shortcomings of both preliminary and detailed designs and drawings, and assist the Client in obtaining approvals for construction from the local authorities (if necessary).

The consultant of this assignment shall review all such designs professionally and provide necessary recommendations for modification, if required, to assure the techno-economic benefit for CWASA. The consultant of this assignment shall be responsible to assure the quality of the designs of various infrastructures to be constructed by the different contractors to meet the objective of the project. Hence, the consultant shall set up a proper and functional team having expertise in all relevant fields (civil, electrical & electronics and mechanical, sludge treatment process, contract management, contract law, etc.).

It may be mentioned that the consultant shall confer with CWASA before final approval of any detailed design for major infrastructure. It is underscored by CWASA that the consultant must always target the maximum techno-economic benefit for the employer, when comparing different bids in terms of quality, durability, ease of Operation & Maintenance etc.

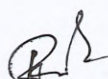
The Consultant's responsibilities regarding review and approval process of designs for the DB contracts include, but shall not be limited to, the following tasks:

1. Review all preliminary designs and drawings from the proposals and verify that they comply with the DB contracts. If non-compliance is observed, make recommendations to the Client on possible solutions to rectify those deficiencies.
2. Collection of relevant data and information from other DB contractors or different sources to be required for the checking of detailed designs.
3. Review the results of sub-soil investigations to be conducted by the contractors or by the authoritative agent/s of the contractors for different components of the project.
4. Check basic design criteria including hydraulic capacity of all components.
5. Agree with the DB contractors and the Client on a schedule of detailed design submittals by contractors and on a priority listing with regard of their approvals by the Consultant and the Client, to allow fast-track construction of the various contracts;
6. Review power supply arrangement of the contractors, discuss and agree with them on the appropriateness of those arrangements, and approve the same, so that sufficient power can be provided to the construction sites along with backup as needed;
7. Review contractors' detailed designs and drawings; verify if they comply with DB contracts and if they are sound from a technology, structural, mechanical and electrical point of view. Approve drawings, or make requests for improvements, as the case may be, generally within 2 weeks from the date of submittal, with longer review periods possible at times, depending on the complexity of the designs and/or drawings submitted and the volume of documents submitted by the contractors at a given time;

8. Review, Approve , or comment (as the case may be) on the DB contractors' detailed construction methodology;
9. Review, comment and process the DB contractors' submittal of proposed procurement of mechanical, electrical and SCADA equipment for CWASA. The Consultant shall comment in writing as necessary on the submittals by the contractors;
10. Attend and recommend for approval any pre-shipment testing of equipment, where so specified in the DB/DBO contracts, and if not arranged in other ways;
11. Review DB contractors' work plans and proposed procedures to assure that they meet the design criteria, protect public and workers' safety, and give full consideration to special conditions and hazardous conditions. Advise on safety and security matters.
12. Review, comment and process the DB contractors' submittal of working methods and working drawings. The Consultant shall comment in writing as necessary on the working drawings prepared by the contractors. All types of related calculations, reports, designs, quantity schedules, and technical specifications shall also be examined;
13. Ensure that approved designs, drawings and equipment submittals are marked "APPROVED FOR CONSTRUCTION" and that no construction or procurement takes place based on documents without such mark;
14. Review, comment on the contractors' proposed implementation schedules and programs. Make recommendations and assist with improving schedules in case of possible conflicts between schedules of different contractors and/or sub-contractors;
15. Any other related tasks.

The Consultant's responsibilities regarding review and approval process of designs for the Design-Bid-Build contracts include-

1. Complete the sub-soil investigations by the authoritative agent/s for different components of the project.
2. Prepare the detail Design, Drawing, Specifications and Bidding Documents for the Bid Package No. (RFB No.): CWSIP/W2 & W3: and Construction/Rehabilitation of Deep Tubewells of Chattogram WASA and Bid Package No. (RFB No.): CWSIP/W4 : Construction of Ware House at Halishahar and Nasirabad Store, CWASA
3. Review power supply arrangement of the contractors, discuss and agree with them on the appropriateness of those arrangements, and recommend the same for approval, so that sufficient power can be provided to the construction sites;
4. Review contractors' Shop drawings; verify if they are sound from a technology, structural, mechanical and electrical point of view. Recommend drawings for approval, or make requests for improvements, as the case may be, generally within 2 weeks from the date of submittal, with longer review periods possible at times, depending on the complexity of the designs and/or drawings submitted and the volume of documents submitted by the contractors at a given time;
5. Review, recommend for approval, or comment (as the case may be) on the contractors' detailed construction methodology;
6. Review, comment and process the contractors' submittal of proposed procurement of mechanical and electrical equipment. The Consultant shall comment in writing as necessary on the submittals by the contractors;
7. Attend and recommend for approval any pre-shipment testing of equipment, where so specified in the contracts, and if not arranged in other ways;
8. Review contractors' work plans and proposed procedures to assure that they meet the design criteria, protect public and workers' safety, and give full consideration to special conditions and hazardous conditions. Advise on safety and security matters.
9. Review, comment and process the contractors' submittal of working methods and working drawings. The Consultant shall comment in writing as necessary on the working drawings prepared by the contractors. All types of related calculations, reports, designs, quantity schedules, and technical specifications shall also be examined;
10. Ensure that approved designs, drawings and equipment submittals are marked "APPROVED FOR CONSTRUCTION" and that no construction or procurement takes place based on documents without such mark;

11. Review, comment on the contractors' proposed implementation schedules and programs. Make recommendations and assist with improving schedules in case of possible conflicts between schedules of different contractors and/or sub-contractors;
12. Any other related tasks.

TASK E - CONSTRUCTION MANAGEMENT/SUPERVISION

The consultant of this assignment shall be treated as the representative of the employer for the contracts mentioned above and shall be responsible to deliver its duties following the terms and condition of World Bank Guidelines in this connection. The role of the consultant shall be to provide full Supervisory and Construction Management services on behalf of the Client.

Hence, the consultant shall set up a team to deliver its services as full supervisory including Contract Management entity comprising the manpower of different disciplines for different activities. An indicative input of professionals is given in Article-5, but the consultants are requested to provide their best judgment to propose their team with requisite members as far as possible drawn from the local market of Bangladesh. It may be mentioned here that - if the list of professionals is deemed not enough to deliver the services - then it is requested to propose a team, which will ensure meeting the demands for an efficient construction supervision and construction management administration, i.e. quality and quantity control, monitoring of progress, health and safety, liaison with statutory authorities and other related parties, cost control and contractual administration of the works contracts.

Thus, the consultant shall assist the Client in all aspects of (i) Managing and administering the contracts (DB/Design and Build) for contracts of i) Construction, Design, Supply, Installation, Testing & Commissioning for System Improvement and DMA Formation of MOHARA Water Supply System, ii) Construction, Design, Supply, Installation, Testing & Commissioning for System Improvement and DMA Formation of Modunaghat & Kalurghat Water Supply System, iii) Construction/Rehabilitation of Deep Tubewells of Chattogram WASA and iv) Construction of CWASA Ware House at Halishahar and Nasirabad., including, but not limited to:

1. Monitor the approved contractors' schedules and make recommendations for remedial action if delays occur;
2. Review contractors' work plans and proposed methodology/procedures to assure that they meet the design criteria particularly: (i) review and approve DMA zero-pressure test procedures and protocols, and (ii) review and approve baseline assessment procedures and protocols on DMA level; protect public and workers' safety, and give full consideration to special conditions and hazardous conditions. Advise on safety and security matters if required;
3. Review and comment on the contractors' submittals of proposed procurement of equipment and materials etc. The Consultant shall comment in writing as necessary on the submittals by the contractors;
4. Check that all permanent works are constructed according to approved designs and specifications;
5. Make and keep records of conditions at each site prior to occupation of the sites by the contractors;
6. Maintain, at site offices, copies of contracts, technical specifications, standards, engineering drawings, relevant legislation and regulations regarding construction management, vendor catalogues, survey records, work measurements, test logs, samples, revision drawings, variation orders, etc. as appropriate for carrying out the daily supervision tasks;
7. Conduct supervision of day-to-day construction and installation works to ensure that the standard of materials and workmanship comply with the designs and specifications;
8. Establish field survey control in accordance with the construction contracts and check contractors' layout and setting out of works to ensure that they comply with the tolerances established by the contract documents;
9. Review all works, reject defective works, conduct continuous inspections of works in progress, oversee tests of materials and review contractors' reported results of such tests;
10. Cooperate with the Client and the contractors in matters relating to permits, licenses, right-of-way, etc., which are within the authority of the Client;



11. Carry out inspections and witness testing, if mentioned in the contracts, at source of equipment and materials to be incorporated into the permanent works;
12. Review all survey and leveling reports in an effort to detect procedural errors on the part of the contractors;
13. Maintain accurate and comprehensive site records including, inter alia, master daily diary, monthly reports, photographs, videos (if necessary), correspondence files, minutes of meetings, measurement books, contractors' staffing and equipment, test results and records on unusual occurrences which may reflect on the progress of work, such as inclement weather, fire, civil commotion, strikes, lack of construction materials, etc.;
14. Maintain permanent reproducible record drawings that include detailed 'as-built' information;
15. Provide coordination at site between the contractors for transmission mains and distribution networks and/or others, including mediation in disputes between these parties;
16. Interpret the meaning of contract documents if required;
17. Assist the contractors in developing alternative methods to overcome unforeseen obstacles to the performance or progress;
18. Review contract drawings and/or specifications as required to reflect any changes in conditions that make such revision necessary;
19. Check adequacy of contractors' work force and equipment and make recommendations regarding any shortfalls;
20. Assess critically progress of the contractors against both contract and overall project schedules;
21. Assist the Client in the coordination with other agencies to solve problems on traffic, public nuisance and others, as may arise from construction;
22. Conduct weekly meetings at the site and report the results to the Client;
23. Assist the contractors in executing the Environmental Management Plan and Social Management Plan, and check if in the implementation of the works the contractors comply with all conditions of the plan;
24. Monitor and report on physical progress of the works and financial disbursements;
25. Periodically check and verify contractors' progress measurements, certify the contractors' claims for progress payments;
26. Assess critically progress of the contractors against both contract and overall project schedules, and recommend and issue instructions to the Contractors on the extent of special inspections and tests required to be carried out in connection with the construction of the works
27. Review, evaluate and process the contractors' requests for changes and claims throughout the contract period, and issue variation orders after having obtained prior approval from the Client;
28. Review, evaluate and advise on any difficulties and disputes that may arise during the contract period, propose solutions to them, and assist in the implementation of the solutions;
29. Review, evaluate and advice on any claims by the contractors for additional time;
30. Throughout the duration of the project implementation, assist in liaison with national and local Government agencies, as well as liaison with the World Bank;
31. Verify completion and issue certificates for completion of the works, including a description and specification of all works that need to be completed and/or remedied if found defective, as well as their required dates of completion;
32. Review and verify "As-built" drawings prepared by the contractors;
33. Assist with preparation of all documents required for handing over of the completed works to the respective division of the Client;
34. Check and certify the scope of works performed by the Contractor;
35. Check, agree with the Contractor and authorize interim payments in accordance with the Contract;
36. Any other tasks assigned by the Client/Owner.

TASK F - DEFECTS LIABILITY PERIOD

During the Defects Liability Period, a number of obligations of the contractors require attendance, supervision and verification by the Consultant. This task comprises, but is not limited, to the following activities:

1. Check all items of works that need to be finalized and/or remedied, as identified in the Completion Certificates;



2. Instruct the contractors to rectify any defect that becomes apparent during the Defects Liability Period and specify the date of completion for each defective item;
3. Scrutinize and verify all statements of completion including financial statements submitted by the contractors during the Defects Liability Period and advise the Client on their acceptability or on any rectification thereof required;
4. Upon completion of the Defects Liability Period and remediation and completion of all works to the satisfaction of the Consultant and the Client, prepare Defects Liability Certificates for issuance to the contractors, indicating that he has satisfactorily carried out the works and is entitled to receive any outstanding amounts due to him;
5. Advise the Client on any outstanding claim, variation or change order;
6. Scrutinize and verify the Final financial statement by the contractors, which shows final values of all works constructed and the final sums to which any contractor is entitled and prepare Final Certificates to be issued to the Contractors;
7. Review and advise on any outstanding issues related to the final as-built drawings prepared by the contractors;
8. Prepare a Final Completion Report, which summarizes important features of the works, including time schedules, reasons for deviation from the schedules, overviews of claims and variation orders, as well as an inventory of all documents and records prepared during the contract period and that were handed over to the Client;
9. Any other tasks assigned by the Client/Owner.

TASK G - START-UP ASSISTANCE

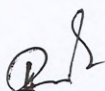
The start-up assistance during pre-commissioning comprises the following tasks for WTP, transmission mains, for pump stations, control systems and smart metering system as relevant:

1. Assess the professional expertise available with the proposed DBO contractor's staff and make recommendations for improvement, if necessary.
2. Verify if counterpart staff employed by the Client is available for the start-up process and suitable for long-term operation and maintenance of the completed Networks/Pump Stations etc.
3. Review the Operation and Maintenance manuals provided by the DB contractors in detail and verify that these Manuals cover all relevant aspects of operation and maintenance of WTP, transmission systems;
4. Review the initial operations of the WTP, Transmission mains, pump stations with Reservoirs, control systems and smart metering systems etc.
5. Prepare a list of all other (physical) defects observed in the WTP, instruct the contractor to rectify these defects and specify the date of completion for each defective item; check all items that needs to be finalized and/or remedied, as identified in the Completion Certificates;
6. Scrutinize and verify all statements of completion including financial statements submitted by the contractor during the Period and advice the Client on their acceptability or on any rectification thereof, if required;
7. Advise/Recommend the Client on any outstanding claim, variation or change order;
8. Scrutinize and verify the Final financial statement for construction by the contractor, which shows final values of all works constructed and the final sums for construction to which the contractor is entitled.
9. Prepare a Final Construction Completion Certificate to be issued to the contractor;
10. Review and advice on any outstanding issue related to the final as-built drawings prepared by the contractor;
11. Assist with preparation of all documents required for handing over of the completed infrastructure to the respective division of the Client/Owner;
12. Any other tasks assigned by the Client/Owner.

4. OFFICE LOCATION AND TIMING

4.1. Location

The Consultant shall set up a central office on a first priority basis at a suitable location in Chattogram City (must be approved/agreed by CWASA) in order to consult and coordinate with personnel of the Client as much as possible into the day-to-day work and to facilitate a maximum transfer of knowledge and

experience, as well as with other Government agencies and organizations and Consultants involved in related projects.

Commencement date, duration and critical milestones of the assignment

The Contract period of this assignment is scheduled for 54 months approximately.

5. PERSONNEL REQUIREMENTS

5.1. General

The Consultant is strongly encouraged to make appropriate use of available local expertise to ensure the local conditions and capacities are best considered. In selection of local individuals, if any, conflicts of interest shall be avoided. The Consultant should also note that public servants and other staff of the public administration of the beneficiary country cannot be recruited as experts.

5.2. Key Experts – Assigned duties and minimum required time input

The following table presents a complete list of Key Experts, both internationally and nationally experienced, describing their duties and responsibilities for the execution of the assignment.

Additionally, the expected time input by those key experts has been estimated, and a minimum total, separate for internationally and nationally experienced key experts, is defined in this table.

Sl. No.	Position	Months
International Key Staff / International Expert (IE)		
1.	Team Leader	54
2.	Civil/Structural Engineer	24
3.	DMA Specialist Pipeline Engineer	30
4.	Non-Revenue Water Specialist	18
5.	Network Modeller	12
6.	GIS Specialist	12
7.	Mechanical Engineer	15
8.	Electrical Engineer/SCADA Engineer	36
International Non-Key Staff		
9.	Contract Specialist	6
10.	HSE Expert	4
11.	Waste Water Specialist	3
		214

Sl. No.	National Key Staff / Local Expert (LE)	Month
1.	Deputy Team Leader/DMA Specialist Pipeline Engineer-1	54
2.	Civil Engineer	24
3.	DMA Specialist Pipeline Engineer-2	42
National Non Key Staff		
4.	Geotechnical Engineer	6
5.	Survey/GIS Specialist	36
6.	Mechanical Engineer	12
7.	Electrical Engineer/SCADA Engineer	12
8.	Quantity Surveyor	48
9.	Architect	2
Sl. No.	National Non Key Staff	Month
10.	Contract Specialist	4
11.	Junior Engineer/Site Supervisor (06 Nos.)	252
12.	Junior Engineer (Electrical)	18
13.	Junior Engineer (Mechanical)	18
		528

Sl. No.	Support Staff (SS)	Month
14.	Secretary/Office Manager	54
15.	Accountant	54
16.	CAD operator-1	42
17.	CAD operator-2	42
18.	Office Assistant	108
		300

Note: Only five key staff will be scored and other key staff will be evaluated based on pass/fail. If any key staff fail to meet the requirement, the key staff will be replaced during contract negotiations with qualified key staff.

It is to be noted that the qualifications and experiences of key-experts will be considered during evaluation of technical proposal and that of non-key experts will not be evaluated.

5.3 Key Experts – Minimum required qualifications

The composition of the team for the implementation of this consultancy shall include the key staff shown below. For the purposes of this Contract, the term ‘international assignments’, as used in the Key Experts’ description, is intended to refer to as having working experience in other than the home country of the relevant staff, with preference given to working experience in countries similar to the Client’s country. “Nationally experienced” refers to working experience in Bangladesh. Experience with “international companies in Bangladesh or abroad” means that personnel must have worked with an international company’s project in Bangladesh or should have experience of international assignments.

Key Expert 1: Team Leader (International)

Qualifications and skills:

The Team Leader should have minimum M.Sc. (Engineering) degree in Water/Sanitary Engineering or Civil Engineering with specialization in the water sector, including proven experience in procurement and contract issues in the water sector; he must be fluent in English and must have proven team management skills.

General professional experience:

Minimum of 20 years professional experience in the design, tendering, implementation and operation of water treatment plants/Water Supply Network, experience in procurement / contract management of water projects, with a minimum 10 years as Project Manager or Team Leader on international assignments and experience with international donor-funded projects.

Specific professional experience:

Well working experience in World Bank/ other MDBs and/or FIDIC procurement policies and procedures and contract management; experience in international donor-funded projects; experience in the implementation of large water projects in developing countries; experience with supervision of large water projects.

Minimum references: (i) Working as a TL in the implementation of a (international donor-funded) water project with investment cost above \$50 million within the last 7 years. (ii) Minimum 1 reference project for the involvement as contract management specialist using FIDIC gold or yellow book, and/or World Bank standard bidding documents for DB/DBO within the last 7 years.

Key Expert 2: Civil/Structural Engineer (International)

Qualifications and skills:

The Civil/Structural Engineer should have minimum M.Sc. (Engineering) degree in Structural Engineering with specialization in the water sector; he must be fluent in English and must have proven team management skills. Higher university degrees will be considered as an added advantage.

General professional experience:

Minimum of 15 years professional experience in the design and implementation of water treatment plants and/or water reservoirs and pump stations, with a minimum 5 years as Structural Engineer on international assignments and experience with international donor-funded projects.

Specific professional experience:

Familiarity with World Bank procurement procedures; experience in international donor-funded projects; experience in the implementation of large water retaining structure projects in developing and tropical countries; experience with design and supervision of large water retaining structure projects.

Minimum references: 1 international donor-funded reference water treatment plant or pump station with ground water tank project as structural engineer, preferably in DBO contract, with investment cost above \$10 million within the last 7 years.

Key Expert 3: DMA Specialist/Pipeline Engineer (International)**Qualifications and skills:**

The DMA Specialist/Pipeline Engineer should have minimum B.Sc. (Engineering) degree in Civil Engineering with specialization in the water sector; he must be fluent in English and must have proven team management skills. Higher university degrees will be considered as an added advantage.

General professional experience:

Minimum of 15 years professional experience in the implementation and operation of water supply systems, with a minimum 5 years as DMA specialist on international assignments and experience with international donor-funded projects.

Specific professional experience:

Familiarity with World Bank procurement procedures; experience in international donor-funded projects; experience in the implementation of large water projects in developing and transition countries; experience with supervision of large water projects.

Minimum references: 1 international donor-funded reference water network pipeline project as specialist engineer with pipe diameter equal or above 1000 mm and length of the pipelines of minimum 50km minimum and with investment cost above \$20 million within the last 7 years.

Key Expert 4: Non Revenue Water Specialist (International):**Qualifications and skills:**

The Non-Revenue Water Specialist should have minimum B.Sc. (Engineering) degree in Water / Sanitary Engineering, or Civil Engineering with specialization in the water technology sector; he must be fluent in English.

General professional experience:

Minimum of 15 years professional experience in DMA establishment, pressure management, leak detection and commercial loss reduction thereof a minimum 10 years on international assignments.

Specific professional experience:

Must have experience in DMA establishment, pressure management, leak detection and commercial loss reduction. Minimum 2 reference projects as NRW Specialist in DMA establishment, pressure management, leak detection and commercial loss reduction of a water supply system of more than 150 km pipeline and over 15000 service connections within the last 7 years.

Key Expert 5: Network Modeller (International)**Qualifications and skills:**

The **Network Modeller** should have minimum B.Sc. (Engineering) degree in Water / Sanitary Engineering, or Civil Engineering with specialization in the water and wastewater technology sector; he must be fluent in English.



General professional experience:

Minimum of 15 years professional experience in the design and Model of Water Distribution systems thereof a minimum 10 years on international assignments.

Specific professional experience:

Must have experience with the design of water supply network. Minimum 2 reference projects as Network Modeler in design of a water supply system of minimum 300 km pipeline and over 20000 service connections within the last 7 years.

Key Expert 6: GIS Specialist (International)**Qualifications and skills:**

The **GIS Specialist** (should have minimum B.Sc. (Engineering) degree in Civil Engineering/Urban and Regional Planning/Geography with specialization in GIS. he/she must be fluent in English.

General professional experience:

Minimum of 15 years professional experience in implementing GIS based systems across water sector.

Specific professional experience:

Must have experience with design and construction of GIS of water supply networks.

Minimum reference: 1 reference project for the Supervision/Implementation of GIS System of water supply system of minimum 400 km pipeline and over 25000 service connections within the last 7 years.

Key Expert 7: Mechanical Engineer (International)**Qualifications and skills:**

The Mechanical Engineer should have minimum B.Sc. (Engineering) degree in Mechanical Engineering; he/she must be fluent in English.

General professional experience:

Minimum of 15 years professional experience in the design & installation of mechanical equipment and experience in supervision of installation of mechanical equipment of water treatment plants, thereof a minimum 5 years on international assignments. Higher university degrees will be considered as an added advantage.

Specific professional experience:

Must have experience with design and construction, as well as construction supervision, of mechanical equipment for large water treatment plants/Pump Stations.

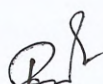
Minimum reference: 1 reference project for the Design and supervision of installation of mechanical equipment for a water treatment plant with investment cost above USD 30 million within the last 7 years.

Key Expert 8: Electrical Engineer/SCADA Engineer (International)**Qualifications and skills:**

The Electrical/SCADA Engineer (should have minimum M.Sc. Engineering degree in Electrical Engineering with specialization in equipment and instrumentation; he/she must be fluent in English. Higher university degrees will be considered as an added advantage.

General professional experience:

Minimum of 15 years professional experience in the design & installation of electrical equipment/ SCADA and experience in supervision of installation of smart metering systems and SCADA components of water supply systems including WTPs.



Specific professional experience:

Must have experience with design and construction, as well as construction supervision, of electrical equipment for large water treatment plants.

Minimum reference: 1 reference project for the supervision of installation of electrical equipment including metering system for a Water Network system (DMA) with investment cost above USD 10 million within the last 7 years.

Key Experts (National):**Key Expert 1: Deputy Team Leader/ DMA Specialist Pipeline Engineer-1****Qualifications and skills:**

The Deputy Team Leader should have minimum B.Sc. (Engineering) degree in Water/Sanitary/Environmental Engineering or Civil Engineering with specialization in the water sector; S/he must be fluent in English and must have proven team management skills. Higher university degrees will be considered as an added advantage.

General professional experience:

Minimum of 15 years professional experience in the implementation and operation of water systems and experience in procurement / contract management of water projects with a minimum 7 years as Resident Engineer/Pipeline Engineer on international assignments and experience with international donor-funded projects.

Specific professional experience:

Familiarity with World Bank procurement procedures; experience in international donor-funded projects; experience in the implementation of large water projects in developing and transition countries; experience with supervision of large water projects.

Minimum references: Reference of 1 international donor-funded water supply Project of DI and HDPE Pipeline laying (including diameter equal or above 400 mm) would be beneficial plus DMA establishment, pressure management and leak detection as resident engineer, and project of a as resident engineer with each investment cost above \$5 million within the last 7 years.

Key Expert 2: Civil Engineer**Qualifications and skills:**

Civil Engineer should have minimum university degree (B.Sc. in Civil Engineering), preferably with specialization in Structural Engineering; he must be fluent in English.

General professional experience:

Minimum of 10 years professional experience in the design & construction of civil works and experience in supervision of civil works components of water treatment plants, thereof a minimum 5 years on assignments with international companies in Bangladesh or abroad.

Specific professional experience:

Must have experience with design and construction, as well as construction supervision, of civil works for large water treatment plants, plus demonstrated knowledge of structural designs.

Minimum reference: 1 reference project for the installation supervision of civil works for a WTP with investment cost above \$10 million within the last 7 years.

Key Expert 3: DMA Specialist Pipeline Engineer-2**Qualifications and skills:**

The DMA Specialist/Pipeline Engineer-2 should have minimum B.Sc. (Engineering) degree in Water/Sanitary Engineering or Civil Engineering with specialization in the water sector; S/he must be fluent

in English and must have proven team management skills. Higher university degrees will be considered as an added advantage.

General professional experience:

Minimum of 15 years professional experience in the implementation and operation of water systems, with a minimum of 5 years as Resident Engineer/Pipeline Engineer on international assignments and experience with international donor-funded projects.

Specific professional experience:

Familiarity with World Bank procurement procedures; experience in international donor-funded projects; experience in the implementation of large water projects in developing and transition countries; experience with supervision of large water projects.

Minimum references: Reference of 1 international donor-funded water supply Project of DI and HDPE Pipeline laying (including diameter equal or above 400 mm) would be beneficial plus DMA establishment, pressure management and leak detection as resident engineer, and project of a as resident engineer, with each investment cost above \$5 million within the last 7 years.

5.4 Non-key Experts & Support staff

In addition to the key experts described above, the Consultant shall mobilize sufficient non-key experts and support personnel. The following only provides some indications for possible such non-key positions and support staff (listing is not complete). The Consultant is not bound by this compilation, and is free to come up with the necessary non-key experts and support staff, as the consultant deems best suited to meet the objectives of this assignment.

Examples for possible International non-key experts:

Sl. No.	Name of Post	Minimum inputs	Educational Qualification and experiences required
1.	Contract specialist	6 MMs	S/he should possess a Bachelor's degree in Civil Engineering with 20 years working experience in civil engineering construction projects, which have 10 years of similar capacity. S/he should have substantial working experience in the successful development and negotiation of complex contractual claim submissions on large scale infrastructure projects (International & Local). The experience in construction law, arbitration, mediations, litigation and dispute and knowledge in various Forms of Standard Construction Contracts are essential. Must have minimum 10 (Ten) years similar professional experiences. Must be fluent in English.
2.	HSE Expert	4 MMs	The Environmental Specialist should have minimum university degree (B.Sc.) in Environmental Sciences /Engineering/ Occupational Health and Safety, or a related field. Minimum of 15 years professional experience in environmental assessments and supervision of HSE plans in large infrastructure construction projects. Must have experience with projects involving construction supervision.
3.	Waste Water Specialist	3 MMs	The Waste Water Specialist should have minimum B.Sc. (Engineering) degree in Water/Sanitary Engineering or Civil Engineering with specialization in the water and wastewater sector. Minimum of 10 years professional experience in the implementation and operation of

Sl. No.	Name of Post	Minimum inputs	Educational Qualification and experiences required
			sewerage systems and experience with international donor-funded projects.

Examples for possible National non-key experts:

Sl. No.	Name of Post	Minimum Inputs	Educational Qualification and experiences
1	Geotechnical Engineer	6 MM	Qualifications and skills: The Geotechnical Engineer should have minimum university degree (B.Sc.) in Civil Engineering; he must be fluent in English. General professional experience: Minimum of 10 years professional experience in the Geotechnical design & experience in supervision of Civil Structures of water treatment plants/Pump Stations/Reservoirs, thereof a minimum 5 years on assignments with international companies in Bangladesh or abroad. Specific professional experience: Must have experience with Geotechnical design & experience in supervision of Civil Structures for large water treatment plants. Minimum reference: 1 reference project for the Geotechnical design of a WTP/Reservoir with investment cost above \$10 million within the last 7 years.
2	Survey/GIS Specialist	36 MM	Qualifications and skills: The Survey/GIS Specialist should have minimum university degree (B.Sc.) in Civil Engineering/Urban and Regional Planning (URP)/Geography or related field; he must be fluent in English. General professional experience: Minimum of 10 years professional experience in the design & supervision of water supply networks, thereof a minimum 5 years on assignments with international companies in Bangladesh or abroad. Specific professional experience: Must have experience with design and construction supervision, of GIS based Water supply networks Minimum reference: 1 reference project for the supervision of GIS mapping works of water supply system with investment cost above \$10 million within the last 7 years.
3	Mechanical Engineer	12 MM	Qualifications and skills: The Mechanical Engineer should have minimum university degree (B.Sc.) in Mechanical Engineering; he must be fluent in English. General professional experience: Minimum of 10 years professional experience in the design& installation of mechanical equipment and experience in supervision of mechanical-electrical components of water treatment plants, thereof a minimum 5 years on assignments with international companies in

Sl. No.	Name of Post	Minimum Inputs	Educational Qualification and experiences
			Bangladesh or abroad. Specific professional experience: Must have experience with design and construction, as well as construction supervision, of mechanical-electrical equipment for large water treatment plants. Minimum reference: 1 reference project for the installation supervision of mechanical-electrical equipment for a WTP with investment cost above \$10 million within the last 7 years.
4	Electrical Engineer	12 MM	Qualifications and skills: The Electrical Engineer should have minimum university degree (B.Sc.) in Electrical and/or Electronics Engineering; he must be fluent in English. General professional experience: Minimum of 10 years professional experience in the design& installation of electrical equipment and experience in supervision of mechanical-electrical components of water treatment plants and SCADA System, thereof a minimum 5 years on assignments with international companies in Bangladesh or abroad. Specific professional experience: Must have experience with design and construction, as well as construction supervision, of mechanical-electrical equipment for large water treatment plants and SCADA system. Minimum reference: 1 reference project for the installation supervision of mechanical-electrical equipment for a WTP and SCADA system with investment cost above \$20 million within the last 7 years.
5	Architect	2 MM	Should have minimum university degree (B. Arch.) Must have minimum 10 years similar professional experiences. Must be fluent in English.
6	Quantity Surveyor	48 MM	S/he should possess a Bachelor's degree in Civil Engineering with 10 years working experience in civil engineering construction projects, S/he should have substantial working experience as quantity surveyor of large scale infrastructure projects (International & Local). Must be fluent in English.
7	Junior Engineer-Civil-06 Nos	252 MMs	Should have minimum university degree (B. Sc. in Civil Engineering) and Minimum of 5 years professional experience in the design& construction of civil works and experience in supervision of civil works components of water treatment plants and pipe installations.
8	Junior Engineer-Mechanical	18 MM	Should have minimum university degree (B. Sc. in Mechanical Engineering degree. and Minimum of 5 years professional experience in the

Sl. No.	Name of Post	Minimum Inputs	Educational Qualification and experiences
			Supervision of installation of mechanical equipment of a water treatment plant
9	Junior Engineer-Electrical	18 MM	Should have minimum university degree (B. Sc. in Electrical Engineering) and Minimum of 5 years professional experience in the Supervision of installation of electrical equipment/ SCADA/experience in supervision of installation of smart metering systems and SCADA components of water supply systems including WTPs.

The consultant shall ensure sufficient support staffs with logistics including but not limited to the following disciplines:

- CAD operator;
- Office Managers;
- Accountant
- Office Assistant

The necessary non-key experts and support staff can be defined by the consultant, as is deemed most appropriate to meet the tasks of the present assignment. Based on the required progress and quantity of services as well as the Consultant's own experience, he shall propose the man-months for those necessary non-key experts and support staff.

5.5 Staff Mobilization and Scheduling

Regardless of the Consultant's proposal, and approval thereof by the Client during contract negotiations and subsequent signing of a contract, no Consultant's staff shall be mobilized unless expressly having obtained prior clearance by the Client. No payment will be made for any staff, proposed and approved, or not, whose mobilization has not been cleared prior to employment on the project.

Further, the Consultant shall take into account the following conditions:

- (i) A minimum total time input for Key Experts, separately for international and national ones, has been defined earlier in this ToR. For national key-experts also individual minimum time input requirements have been defined. These requirements must be met always.
- (ii) The Consultant shall propose a Personnel Schedule in line with the tasks required and use his own experience to decide the optimum mix of internationally experienced and nationally experienced experts and support staff. During the preparation of the proposal, the Consultant will have to consider and propose the most suitable and effective Team composition for completion of the tasks assigned.
- (iii) A maximum 30% of input of the international key staff may be allowed from their home country, if it is required to deliver the services in a comprehensive manner.
- (iv) The Consultant may take the payment to the home with the permission of the relevant authority following the rule of the People's Republic of Bangladesh. In such case, the Consultant will be responsible to take permission for the relevant authority/ies and all concerned expenditure related to this shall be borne by the Consultant. CWASA will provide necessary assistance by issuing letter to the different authority/ies. It may be mentioned that the Consultant should be acquainted fully with the rules and regulation of transferring money from Bangladesh to home of the Consultant and for any ambiguity in this connection likely to be arisen afterwards shall not be the responsibility of the Client.




- (v) The Consultant shall assure the presence of TL and/or DTL at field during the execution of this assignment at all times.
- (vi) The input of relevant key-staffs may be in staggered manner to supervise the pertinent works as per requirement during execution.
- (vii) Expert opinion on international procurement law is likely to be required to combat claims of contractors during the execution of those contracts. It is expected that the Consultant shall be aware of that.
- (viii) In his proposal, the Consultant shall clearly identify the number of man-months allocated to each of the internationally and nationally experienced experts, including the elaboration of a detailed work schedule.

6. SERVICES AND FACILITIES

6.1 Data, services and facilities to be provided by the Client

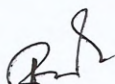
The Client will provide, free of charge, to the Consultant the subsequently described assistance. Notwithstanding this assistance, the final responsibility of all those activities stays exclusively with the Consultant. Some of the data, services and facilities to be provided by the Client are-

- (i) Counterparts who are responsible for all coordination activities with the Consultant;
- (ii) Other suitably qualified counterpart personnel to co-ordinate with the Consultant on technical issues;
- (iii) Studies, reports, plans etc., as available, will be provided at no costs to the Consultant;
- (iv) Coordination assistance with respect to introduction to relevant authorities, professionals etc.;
- (v) Assistance in obtaining other relevant information and materials from government institutions and state authorities, at no costs to the Consultant;
- (vi) Assistance in obtaining all staff permits, authorizations and licenses required for the performance of the Consultant's services;
- (vii) Assistance in customs clearance of all equipment, materials and personal effects to be imported (and exported upon completion of the Consultant's assignment) for the purposes of this project.

6.2 Services and Facilities to be provided by the Consultant

The Consultant will be responsible for:

- (i) Providing assistance to the Client of the highest professional standards;
- (ii) Preparation of Reports to the highest professional standards;
- (iii) Providing accommodation, international and local transport and freight expenditures of the Consultant's staff. All means of local transport, including cars and motor bikes for the Consultant's experts and support staff shall be provided by the Consultant. The Consultant will also have to provide a Jeep/Sport Utility Vehicle (2400-3000 cc) for the exclusive use of the PMU. Also, all the costs such as fuel, maintenance, salary of driver etc. during the contract period shall be at the Consultant's expense. The Brand and Model of the said vehicle should be approved by the client before procurement.
- (iv) Providing local office support services for report production and international and national communication for the full assignment period;
- (v) Providing outputs and reports, as requested in this TOR;
- (vi) The Consultant will be responsible for all other arrangements and cover in its budget for the assignment all expenses for all kinds of logistics as required to successfully complete the assignment.

7. OUTPUTS AND REPORTS

7.1 Reporting requirements

Paper copies of all reports, in the numbers as shown in the table in the next section, with CD-ROM or flash drive containing the electronic version of the reports must be submitted with every paper copy of all required reports.

Reports shall be prepared using commonly used software, notably Word, Excel, AutoCAD, GIS, as well as in pdf format. All reports shall be prepared in A4 size paper but separate volumes in A3 format or larger may be used to contain plans, drawings, photographs, etc. The title of the project and the identification of the specific volume shall be printed on the front cover and the spine of every volume of all Final Documents.

7.2 Submission of reports

The Consultant shall prepare at least, but not limited to, the following reports. All reports (must be in English) shall be submitted in the numbers and at the times shown below.

Report	No. of reports	Submission date
Draft Inception Report	10	1 month after contract signing
Final Inception Report	10	1 week after receiving Client's comments
Monthly Progress Reports	05	Within 1 week after the end of each month
Semi-annual Progress Reports	05	Within 2 weeks after the end of each (calendar) half year
Review of As-Built drawings	05	Within 30 days after receiving the As-built drawings from the contractor
Review of DMA Baseline Report	05	Within 30 days after receiving the DMA Baseline report from the contractor
Report on GIS database	05	Within 30 days after receiving the GIS data from the contractor
Review of Manual(s)	05	Within 30 days after receiving the draft operation manual from the contractor
Completion Report	10	7 days prior to the ending of this Contract.

Inception Report (draft and final)

A Draft Inception Report has to be submitted within 1 Month after the signing of the contract. The Inception Report shall present an updated and well-defined work plan and the schedule for completing all components of the project, planned staffing and outline indications of any reports to be provided or services planned. It shall include all the components listed under Task A. The Final Inception Report shall be completed, taking into account all of Client's comments, within 1 week after receiving those comments in writing.

Monthly Progress Reports

Within 1 week after the end of each (calendar) month, monthly progress reports shall be submitted. The progress reports shall show progress of the all construction contracts under the supervision of the Consultant in a narrative form, but using tables and graphs as appropriate or agreed with the Client and the Bank.

The reports shall show progress made, milestones achieved, problems encountered and possible solutions, proposed activities in the next month, as well as the Consultant's staffing during the past month and cumulative since the start of the assignment and shall include a list of variations approved during the month and those under review.

Semi-annual Progress Reports

Within 2 weeks after the end of each half year (calendar) period, i.e. before mid-July and before mid-January of each year, semi-annual progress reports shall be submitted. The reports shall provide detailed information regarding the progress of all the construction contracts under the supervision of the Consultant, problems

encountered, overcome or still outstanding, and describe proposed activities in the next period, and other matters as appropriate. A complete financial overview shall be prepared, complete with past and projected disbursements, an overview of variations approved and pending and liquidity requirement forecasts for each contract. These Progress Reports shall be prepared throughout the duration of the assignment and shall include an estimate of the completion dates of key milestones in each contract.

Review of As-Built Drawings (separately for each package)

Upon the submission of As-Built Drawings by the contractors, the Consultant shall review the drawings and compare them with Consultant's records made during the construction period. The Consultant shall comment on the completeness and accuracy of the As-Built Drawings made by the contractors and make recommendations to improve their quality and/or accuracy, if and as needed.

Report on GIS database: The Consultant will extract the different data from the As-Built Drawings submitted by the Contractors or others and update the same in the existing/new GIS database of water networks for the entire town. After the finalization of GIS database, the Consultant will be responsible to hand over the same to the respective division of CWASA.

Review of Manual(s), (separately for each package)

Contractors must prepare Operation and Maintenance manuals well before the completion and commissioning of respectively WTP and WPS, etc. The Consultant shall prepare a review report of the manuals supplied and comment on their quality and completeness, as well as shortcomings, if any, and make recommendations to improve their quality and/or accuracy, if and as needed.

Completion Report

The Completion Report shall describe the achievements of all the contracts supervised under this consultancy services in different sections separately, including completion dates of key milestones, problems encountered and overcome, and any problems outstanding. It shall also describe lessons learned from the project implementation and the ability of Client's staffing to successfully continue O&M of the completed works. The completion report shall include financial overviews, including all payments made to the contractors under the contracts, complete overviews of all approved variations and any outstanding payments or issues.

