

**Bangladesh**  
**Dhaka Water Supply and Sewerage Authority (DWASA)**  
**98, Kazi Nazrul Islam Avenue**  
**Kawranbazar, Dhaka.**

Memo No.: 46.113.605.00.00.000.2017-18/115

Date: 26/09/2017

**REQUEST FOR EXPRESSIONS OF INTEREST (REOI)**  
**(CONSULTING SERVICES – FIRMS SELECTION)**

**Country:** Bangladesh

**Name of Project:** Technical Assistance Project for the Preparatory Activities of the proposed Dhaka Sanitation Improvement Project (DSIP) (Phase-I).

**Assignment Title:** Consultancy Services for Feasibility Studies and Preparation of Conceptual Designs and Bidding Documents for DB/DBO Contracts.

**Reference No:** S-2

1. The Government of the People's Republic of Bangladesh (GoB) is in the process of receiving a credit from the International Development Association (IDA) towards the cost of project preparatory activities of the proposed 'Dhaka Sanitation Improvement Project (DSIP)(Phase-I), to be implemented by Dhaka Water Supply and Sewerage Authority (DWASA) and intends to apply a part of the proceeds of this credit to pay for the Consultancy Services for Feasibility Studies and Preparation of Conceptual Designs and Bidding Documents for DBO/DB Contracts (Package No.: S-2).

2. The main objective of the proposed consultancy assignment is to determine techno-economic solutions to provide an efficient sewage collection, conveyance, treatment and disposal system within the command of Pagla Catchment thereby bestow a healthy and environment friendly urban area to the dwellers of the relevant areas of Dhaka City.

3. DWASA will appoint an independent engineering consulting (EC) firm to achieve the above objective considering the availability of resources.

The consultant shall render the following, but not limited to, services:

- Feasibility Studies.
- Data Collection.
- Reviewing the relevant reports - especially the reports produced by the Sewerage Master Planning Consultant (November-2012) and provide necessary feedback to DWASA.
- Necessary surveys/studies to select the best option of the treatment process considering the climatic condition and economy of Bangladesh, technology adoptability of DWASA etc.
- Preparation of conceptual design and employer's cost estimates of the different sewerage infrastructures for the above-mentioned works.
- Preparation of bidding documents (DBO/DB) for construction/reconstruction/rehabilitation of the sewerage infrastructures to be needed for Dhaka South- the Pagla Catchment area.
- Training for capacity building of DWASA Engineers to design the relevant infrastructures.

4. DWASA now invites eligible consulting firms ("Consultants") to indicate their interest in providing the services. Interested Consultants should provide information demonstrating that they have

the required qualifications and relevant experience to perform the Services. The short-listing criteria are:

- (a) General experience of the Firm(s);
- (b) Experience in similar projects of compatible size, complexity and technical specialty in the required area;
- (c) Financial soundness of the firm; and
- (d) Staffing and logistics of the firm.

Consultants are requested to submit the following supporting documents in support of the above-mentioned criteria:

- (a) Registration paper of the firm (s);
- (b) JV agreement/letter of intent (if applicable);
- (c) Firm's brochure;
- (d) Audited financial reports for last three years;
- (e) service experience record (including nature, total cost, total input in terms of man month, employer, location of service etc.)

5. The attention of interested Consultants is drawn to Section III, paragraphs, 3.14, 3.16, and 3.17 of the World Bank's "Procurement Regulations for IPF Borrowers" July 2016 ("Procurement Regulations"), setting forth the World Bank's policy on conflict of interest.

6. Consultants may associate to enhance their qualification, but should mention whether the association is in the form of a "joint-venture" or of "sub-consultancy". In the case of an association, all members of such "association" should have real and well-defined inputs to the assignment and in such "association" it is preferable to limit the total number of firms including the associates to a maximum of four.

7. The consultant will be selected in accordance with the Quality and Cost Based Selection (QCBS) method set out in the Procurement Regulations.

8. It is expected that the services will be commenced tentatively in December, 2017 and shall be completed in November, 2018. Terms of Reference (ToR) will be available in the office of the undersigned and also in the DWASA's website ([www.dwasa.org.bd](http://www.dwasa.org.bd)). Interested consultant may obtain further information from the office of the undersigned from 09:00 to 17:00 hours (Except holidays).

9. Expression of Interest (both hard and soft copy) must be delivered to the address below (in person or by mail) by 17:00 hours (GMT+ 6 hours) on or before October 30, 2017. EOIs received after the last date of submission will not be considered for short listing. DWASA will not be responsible for any delay in submission including delay due to postal or any other reason. The authority reserves the right to accept or reject any or all EOI proposals without assigning any reason, whatsoever.

Engr. Taqsem A Khan  
Managing Director, Dhaka WASA  
WASA Bhaban (2nd Floor)  
98, Kazi Nazrul Islam Avenue  
Dhaka 1215, Bangladesh.  
Phone: 880-2-8189626  
E-mail: [taqsem@yahoo.com](mailto:taqsem@yahoo.com)



**TA Project  
for the Preparatory Activities of  
DHAKA SANITATION IMPROVEMENT PROJECT  
(DSIP)(PHASE-I).**

**Terms of References  
for  
Consulting Services for Feasibility Studies and Preparation of  
Conceptual Designs and Bidding Documents for DBO/DB  
Contracts (Package No.: S-2).**

## Acronyms

CAPEX	Capital Expenditure
CSO	Combined Storm Water Overflow
DB	Design, Build
DBO	Design, Build & Operate
DCC	Dhaka City Corporation (DCC North, DCC South)
DoE	Department of Environment
DSIP	Dhaka Sanitation Improvement Project
DWASA	Dhaka Water Supply & Sewerage Authority
DWSSP	Dhaka Water Supply and Sanitation Project
EIA	Environmental Impact Assessment
FS	Feasibility Study
HSET	Health, Safety, Environment and Traffic
IBRD	International Bank for Reconstruction and Development
ICB	International Competitive Bidding
IDA	International Development Association
IT	Information Technology
MLGRD&C	Ministry of Local Government, Rural Development & Cooperatives
O&M	Operation and Maintenance
OPEX	Operational Expenditure
PPF	Project Preparation Fund
QCBS	Quality and Cost-based Selection
RAJUK	Rajdhani Unnayan Kartripakhya (Capital Development Authority)
STP	Sewage Treatment Plant
ToR	Terms of References
USD	United States Dollar
WB	The World Bank
BTCL	Bangladesh Telecommunication Company Ltd.
DESCO	Dhaka Electric Supply Company Ltd.
DPDC	Dhaka Power Distribution Company Ltd.
TGTDCL	Titas Gas Transmission & Distribution Company Ltd.

## 1. Background

### 1.1 General

Dhaka city, the capital of Bangladesh is one of the fastest growing mega cities in the world. Dhaka's population has been increasing continuously and at a very high rate since Bangladesh's independence. The city has also expanded tremendously in an unplanned manner. Today the city is home to an estimated 15 million people. The rapid and haphazard urbanization is exerting immense pressure on Dhaka's urban environment, and city authorities (who often do not have sufficient expertise and resources to deal with the rapid growth) are struggling to deal with pressing environmental issues such as solid waste management, wastewater management and drainage. As a result, the overall environmental situation is deteriorating rapidly to the extent that Dhaka is now considered one of the most polluted cities in the world.

### 1.2 Existing Wastewater Management Situation in Dhaka City

The administrative authority for wastewater management in Dhaka City is vested with Dhaka Water Supply and Sewerage Authority (DWASA). DWASA was established in 1963 as an autonomous entity under the Ministry of Local Government, Rural Development and Cooperatives (LGRD&C). Currently DWASA provides three services to the city dwellers i.e. potable water supply, collection and safe disposal of sewage and storm water drainage.

The first piped sewer system for Dhaka City was constructed in 1923. Since then, the sewerage system in Dhaka has been developed slowly due to various limitations. At present, almost after a century, only about 20% of the city is served by a piped sewer network. Sanitation in the remaining areas is based on septic tanks and pits, many of which are provided with an overflow to the nearest drain or combined sewers constructed and maintained by other public organizations. Dhaka has no organized system for septic sludge management. Most of the septic sludge is handled by individuals or private contractors who often dispose the sludge in an unhygienic manner. This unhygienic disposal of septic sludge and indiscriminate disposal of untreated sewage is another major source of pollution in Dhaka City.

In terms of infrastructure, the city has only 881 km of sewer network (of varying pipe materials, status and sizes from Ø100mm to Ø1350mm<sup>1</sup>) and 64,059 sewer connections (compared to 3036 km of water network and 311,064 water connections). More than 80% of the city is not covered by any formal piped sewer network, although many areas are served by local combined sewers<sup>2</sup> that discharge untreated sewage to local drains and storm water canals.

The Dhaka central sewer network consists of networks of relatively small diameter sewers that are connected via branch lines to the main transmission mains known as 'trunk sewers'. Within the city, there are 30 sewage 'lift/pump' stations and one central pumping station at Narinda that are designed to raise the hydraulic level of the sewage so that it can flow by gravity via the trunk sewers to the treatment plant at Pagla. Manholes have been provided on the route of the mains but most are now inaccessible and in a very poor state of repair, with many being used as receptacles for household waste.

DWASA has adopted two different technologies in its sewage management system i.e. conventional sewerage system and the small-bore sewer system. The small-bore sewer system

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<sup>1</sup>The larger pipe size is an equivalent diameter to a circular pipe as the larger trunk sewers are of a semi-circular type, usually described as brick-arch or horseshoe

<sup>2</sup>Many constructed by the Dhaka City Corporation

was constructed in the Mirpur area (North West part) of the city with ADB funding. However, it was never operated properly, and is no longer functional. Properties in central Mirpur are connected to local combined sewers constructed by Dhaka City Corporation. The rest of the DWASA sewers in the city are conventional sewers. The salient information about the existing sewerage infrastructures is provided below:

- Total length of sewer network: 881 km
- Numbers of Pumping/Lifting Stations: 30 nos.
- Sewage Treatment Plant: 1 no. at Pagla, extreme south of the city with a treatment capacity of 120 MLD and the treatment technology is primary settlement followed by facultative waste stabilization ponds.
- Sewer construction materials: Bricks sewer, vitrified clay pipes, reinforced concrete pipes, ductile cast iron pipes and PVC pipes.

At present, nearly all of the sewer pipelines have fallen into disuse and disrepair either through sediment build-up, damage or collapse, external construction impacts or overloading. During the condition survey and site visits it was noted that sewage flows collected in the northeast (Gulshan/Tejgaon) and old/central (Narinda) in addition to the Bashaboo and Swamibagh areas are not being conveyed to Pagla STP and are simply by-passed by necessity to local drainage water courses. These are immediate problems which DWASA are prioritizing.

In terms of coverage, the existing sewer network is concentrated mainly in the Southern part (old town and the central part) of the city. Most of the Northern part of the city, in which rapid population growth is taking place, has no formal sewer network. On the other hand, existing sewerage facilities of Dhaka City have deteriorated and are now inadequate to serve even the small section of the city. The result is that most of the sewage and/or wastewater generated in the city is directly discharged into storm water drainage canals without treatment and ultimately flows to the nearby open canals or surrounding rivers, contaminating all the surface water bodies in and around the city and creating health hazards, offensive odor and unhygienic environment.

### **1.3 Previous Studies**

DWASA has conducted a number of studies on the wastewater management system in Dhaka. The studies that are relevant to this assignment are outlined below:

- In response to a request of the Government of the People's Republic of Bangladesh, Japan International Cooperation Agency (JICA) conducted a study, "Basic Design Study Report on the Sewerage Construction and Rehabilitation Project for Dhaka City" in 1988. DWASA rehabilitated the Pagla Sewerage Treatment Plant (PSTP) as well as some Sewage Lift Stations (SLS) and Sewer Lines in the light of the recommendation of this study.
- Later on, the Government of the People's Republic of Bangladesh requested the Government of Japan to conduct a study on the Sewerage System in North Dhaka and Japanese Government assigned M/s Nippon Jogesuido Sekkei Co., Ltd through JICA to conduct the study in 1997. The consultant submitted a comprehensive report named The Study on The Sewerage System in North Dhaka in the People's Republic of

Bangladesh covering all probable aspects in 1998. But DWASA could not implement the recommendation of that study due to resources constraints.

- In 2004, Institute of Water Modelling, Bangladesh (IWM) was requested to prepare a concept paper on the Sewerage Master Plan for Dhaka City and they submitted a Map over “Dhaka WASA Sewerage System Master Plan”, based on the above Study and other considerations.
- In 2006, SWECO International AB submitted a report on “Saidabad Raw Water Quality and Pollution Control Study” financed by Sida INEC, Swedish International Development and Co-operation Agency.
- In 2007, DWASA has conducted a “Waste Water Management Study in Dhaka City (Package DS-2)” under “Project Preparation Facilities (PPF)” financed by the IDA.
- Recently (2011-2012) an Updated Sewerage Master Plan has been developed by DWASA with the financial assistance of the World Bank under Dhaka Water Supply and Sanitation Project (DWSSP).

#### 1.4 Components and cost of the proposed DSIP, phase I:

Dhaka Sanitation Improvement Project (DSIP) is planned to be implemented in phases, which are defined according to project readiness. The components, which are currently envisaged under phase I, can be summarized as follows:

*Table: Components of the DSIP, phase I*

No.	Component	Remarks	Approximate cost
1	Institutional Support for Sanitation Service Delivery	<ul style="list-style-type: none"> <li>• Sewerage Directorate</li> <li>• Financial management DWASA</li> <li>• Documents for phases 2 and 3</li> <li>• PMU support</li> <li>• Incremental Operating Cost</li> <li>• Public awareness campaign</li> <li>• Training</li> </ul>	<b>350 million USD</b>
2	Wastewater Management	<ul style="list-style-type: none"> <li>• Renovation of existing Pagla STP</li> <li>• Expansion of Pagla STP (DBO)</li> <li>• Trunk Main: Madhubgh – Pagla (14 km, DB)</li> <li>• Trunk Main: Hazaribag to Narinda SPS (DB)</li> <li>• Pagla Catchment sewerage networks (except Trunk Mains) (new: 147 km; rehabilitation/reconstruction: 700 km).</li> </ul>	
3	Non-Network Sanitation	<ul style="list-style-type: none"> <li>• Septage management</li> <li>• Septage treatment</li> </ul>	
4	Project Implementation and Management	<ul style="list-style-type: none"> <li>• Environmental and Social Safeguards.</li> <li>• Project Management Consultant</li> </ul>	

	Support		
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## 2. Updated Dhaka Sewerage Master Plan (as mentioned in the Master Plan):

The Master Plan covers the entire area of the Dhaka Metropolitan Development Plan (DMDP) of RAJUK (which is about 1500 km<sup>2</sup>). The planning horizon is 2035. Key features of the master plan include: (i) separate sewerage systems would be adopted (including on-site sanitation) for different parts of the city; (ii) the total city area has been divided into 12 command areas, and infrastructure requirements for each area have been identified; and (iii) the master plan identifies US\$1.7 billion worth of investments in wastewater collection and treatment infrastructure in Dhaka city over the next 20 years – to be implemented in a phased manner. The shortlisted consultants can obtain the executive summary of the master plan report from the DWASA office.

### 3.0 Description of relevant DSIP Component -1 (Wastewater Management)

#### Pagla Catchment Sewerage Network

The Dhaka South - Pagla Sewerage Catchment encompasses *approx.* 73 km<sup>2</sup>, including nine thanas, namely Ramna, Khilgaon, Sabujbagh, Motijheel, Lalbagh, Kotwali, Sutrapur, Demra and Shyampur Thanas. The river Buriganga borders along the south-western side and the river Balu borders along the eastern side of the Catchment.

The Catchment is characterised as being predominantly urbanized with a well-functioning and planned road network. The south-east, namely Shyampur and Demra areas, are emerging.

Old Dhaka, the historic urban core of the city which runs along the eastern bank of the Buriganga River, comprises the thanas Lalbagh, Kotwali, and Sutrapur. Old Dhaka consists of a complex mixture of commercial and residential establishments. The physical infrastructure is overloaded and inadequately maintained. Roads are narrow and congested, and generally flanked by old multi-storied low to medium rise apartment buildings. Old Dhaka has developed freely with mixed land use showing little regard to any urban planning. The drainage network of Old Dhaka is characterized by the presence of both covered and open drains. Unfortunately most of these remain in poor state of repair and are clogged due to careless disposal of solid waste and other refuse items. The piped water-borne sewerage system covers the majority of the built-up areas of Old Dhaka.

Beyond Old Dhaka, the other urbanized areas within the Catchment area, except the Khilgaon Rehabilitation Area, have been largely developed in an unplanned manner, without sufficient regard to respecting the norms of formal planning institutions. The unplanned development of the area has resulted in congestion and compact inhabitation and settlement. In addition, insufficient development of internal road networks is rampant across the area.

A considerable part of the population are served via the existing piped water-borne sewerage system of DWASA, but the dwellers of slum, squatter and fringe settlements have no access to the existing sewerage system and instead are reliant on the use of septic tanks and pit latrines. Except Khilgaon, Shahjahanpur, Malibagh and Bashaboo, most of the areas have no sewerage line.

Drainage facilities are nearly non-existent in the area, and the majority of the existing surface drains are shallow open drains. Being a low-lying area, most of the area is flooded and remains submerged during the monsoon season. Construction of storm sewers in the area to carry off wastewater and storm water has been started.

The Catchment is presently high density and is expected to reach very high densities within the planning horizon of the project. The present (2011) population of *est.* 3.4 million has been projected to increase to 6.0 million by 2035.

The basic elements of the proposed sewerage system and network information as mentioned in the master plan are as follows:

1. Area of the catchment: 72.55 km<sup>2</sup>
2. No. of population within service coverage area: 5.1 million
3. Percentage (%) of population connected in sewerage network: 65%
4. Total sewage production: 380000 m<sup>3</sup>/day
5. Type of sewerage system: separate
6. Network Information:
  - a) Total Length of different pipes: 147 km + 700 km (Existing)
  - b) No. of sewage pump stations: 6 + 24 (Existing).
7. Area of Sewage Treatment Plant: 51 ha
8. Location of sewage treatment plant: Pagla
9. Receiving water body: Buriganga River

### **Trunk Main: Madhubagh – Pagla STP:**

Sewer of 14 km in length and diameter ranging from 450mm to 1360mm routed from Madhubag to Pagla STP through the lift stations of Bashaboo and Swamibagh. The pumping stations are used for collection & transportation of sewage towards the Pagla sewage treatment plant.

The Trunk Sewer from Gulshan to Pagla STP is in poor operational condition and only a fraction of the sewage collected along this route is actually transported to Pagla STP. In view of the proposed construction of the Dasherikandi STP, sewage from Gulshan and Banani will be diverted to the new Treatment Plant via the Hatirjheel Lake pipe interceptors which are currently under construction. The remaining length of the trunk sewer to Pagla will have to be rehabilitated/reconstructed to allow for sewage from all areas, south of Hatirjheel, along its line to be transported to Pagla STP. This section includes the trunk sewer from Madhubag to Pagla STP, following the DWASA easement, as well as the two existing Pumping Stations at Bashaboo and Swamibag, the latter of which will be relocated to Golapbag.

The existing trunk sewer was constructed as a 36"-54" equivalent brick arch sewer in 1971. The type, shape, size and condition of the pipeline does not allow for relining or other form of repair, so a full replacement has been recommended. The new trunk sewer has been designed to cater for the needs of the service area up to the design horizon of 2035 as described in the relevant reports.

The pumping stations at Bashaboo and Swamibag are currently in dire condition and require full reconstruction. Swamibag Pumping Station's location however would require very complicated and costly construction methods to construct both the new Pumping Station as well as the inlet and outlet pipelines. It has therefore been recommended to relocate Swamibag pumping station to a much more suitable location at Golapbag or at any suitable location.

### **Trunk Main: Hazaribagh to Narinda/Pagla:**

Sewer of 6 km in overall length and sewer diameter ranging from 600 mm to 900 mm, routed from Bashbari and Mohammadpur to Narinda PS through Hazaribagh, Nilkhet, Segunbaghicha, Purana Paltan and Motijheel. This trunk sewer starts in the area adjacent to the Hazaribag tannery and ends at Tipusultan road near Narinda graveyard. At this point the main is connected to trunk sewer Hazaribagh Nawabganj - Narinda main, and after these two sewers are combined the sewage is conveyed to

Narinda central pumping station There are five sewage lift pumping stations (SLS) associated with this trunk sewer, viz.: Hazaribag, New Market, Moghbazar T&T and Zikatola. These lift stations collect wastewater from the related catchments and deliver to this trunk sewer which forwards flow by gravity to the Narinda central pumping station.

Condition:

- This 600 mm dia. RCC Trunk main traverses from Mohammedpur to Hazaribagh.
- This Trunk main was constructed in a low lying swampy land. The bed was not properly compacted during construction. As a result some parts of this Trunk main have settled.
- The joints of the pipes have dislocated.
- The sewer network of the part of Mohammedpur, Royerbazar and Zigatola area have been connected with this Trunk main.
- Due to non-functioning of this trunk main, sewage from the related areas are discharged to the nearby low lying areas through the drainage system
- The extended part of this trunk main from Hazaribagh to Nilkhet is in good condition and a part of this trunk main has been rehabilitated recently.
- The end part of this trunk main from Nilkhet to Narinda is functioning partially.

### **Pagla STP**

DWASA operates a sewage treatment plant at Pagla (PSTP) located on an 110.5 ha site approximately 8km from the city centre in the south-east of Dhaka City and approximately 1km north of the Buriganga River. The Pagla STP was originally constructed in 1978 and provides treatment of the wastewater collected by the central sewerage system and is currently the only treatment facility in the city, although another is proposed for construction to service the Hartijheel scheme located at Dasherbandi. The current design capacity is 96MLD (average flowrate) and 120 MLD (peak flowrate) while the current sewage generated within the catchment served by the centralized sewerage system is approximately 250-300MLD, and is expected to exceed 500MLD at the Master Plan design horizon. Due to damage of the trunk mains and sewerage system, the actual flowrate entering the Pagla STP is approximately 30-40MLD, *i.e.* the treatment plant is significantly under-loaded and should provide a high level of treatment.

Pagla STP has undergone a number of refurbishments, the last of which was in 1991-92, financed by JICA. A condition assessment was undertaken on the treatment plant and which was the subject of Design Memorandum No. 1 submitted by the consultant, Grontmij A/S.

There is limited unused area remaining on the existing site hence the existing treatment process of facultative ponds cannot be utilized to meet the long-term requirements of the Pagla catchment. Further, the existing treatment plant suffers from a number of operations and maintenance problems which decreases the quality of the effluent, *incl.:*

- Primary sedimentation tank scrapers do not efficiently cover the tank floor hence sludge is not collected and removed. It is recommended to de-rate the capacity of the primary sedimentation tanks to 100 MLD.

The facultative ponds have accumulated sludge which should be emptied; the disinfection system is not operational.

#### **4.0 The DWASA and other competent authorities**

Dhaka Water Supply and Sewerage Authority is the Client and the implementing agency for the proposed DSIP, it will be supervised by and has to report to its line ministry:

- The Ministry of Local Government, Rural Development & Cooperatives (MLGRD&C);

Authorities with whom the DWASA will cooperate for the benefit of the project, including:

- The Dhaka City Corporation- North (DCC North);
- The Dhaka City Corporation- South (DCC South);
- The Department of Environment (DoE)
- The Rajdhani Unnayan Karttripakhya (RAJUK);
- Bangladesh Water Development Board.
- BTCL,
- DESCO,
- DPDC
- TGTDCCL etc.

At the request of DWASA, the Consultant shall attend meetings with these authorities and/or prepare special reports on project related issues that are subject of coordination between DWASA and one or more of such authorities.

### **5.0 Special communication issues requiring attention**

While conducting the assignment, the Consultant shall coordinate, communicate and coordinate with other agencies and management units of projects, including:

- The Dhaka City Corporation- North (DCC North);
- The Dhaka City Corporation- South (DCC South);
- The Department of Environment (DoE)
- The Rajdhani Unnayan Karttripakhya (RAJUK);
- Bangladesh Water Development Board.
- BTCL
- DESCO,
- DPDC
- TGTDLetc.

## **6.0 CONTRACT OBJECTIVES & EXPECTED RESULTS**

### **6.1 Objectives**

The objectives of this consultancy assignment are to determine feasible technical and cost effective solutions, and prepare conceptual designs and tender documents (DB/DBO) for efficient sewage collection, conveyance, treatment and disposal system (whether it may be new construction/reconstruction/rehabilitation) within Pagla Catchment Area as per the updated Dhaka sewerage master plan, including areas to be covered by decentralized collection and treatment when appropriate, as well as separate collection and treatment of faecal sludge/septage.

### **6.2 Expected results of this assignment**

The expected results are described in details in the next sections. The main results can be summarized as follows:

- **Conceptual Design for Expansion of Pagla STP (200,000 m<sup>3</sup>/day):** A complete review of earlier studies on wastewater treatment. Based on a thorough analysis, the Consultant shall recommend confirmation, or modification as the case may be, of all relevant parameters of the Pagla STP, including recommendations related to preferred

processes for the waste water line and sludge treatment, type and size of tanks, aeration, chemicals dosing, SCADA, etc., complete with updated cost estimates;

- **Conceptual Design for Renovation of Pagla STP (120,000 m<sup>3</sup>/day):** A complete review of earlier studies on wastewater treatment. Based on a thorough analysis, the Consultant shall recommend renovation as the case may be, of all relevant parameters of the Pagla STP, including recommendations related to preferred processes for the coarse screen, fine screen, grit removal chamber and primary clarifiers, as well as associated electrical and control systems, implementation of SCADA system etc., complete with updated cost estimates;
- **Conceptual design for the Trunk Main Madhubagh – Pagla:** A complete review of earlier studies on the Trunk Main Madhubagh – Pagla. Based on a thorough analysis, the Consultant shall recommend confirmation, or modification as the case may be, of all relevant parameters of this trunk main, including recommendations related to preferred alignment, diameter, pumping stations, SCADA, construction method (micro-tunneling/MT), etc., complete with updated cost estimates;
- **Conceptual design for the Trunk Main Hazaribagh – Narinda:** A complete review of earlier studies on the Trunk Main Hazaribagh – Pagla. Based on a thorough analysis, the Consultant shall recommend confirmation, or modification as the case may be, of all relevant parameters of this trunk main, including recommendations related to preferred alignment, diameter, renovation of existing pumping stations, SCADA, construction method (MT), etc., complete with cost estimates;
- **Complete prequalification/ initial selection and bid documents** for the DBO (Design, Build and Operate) of the Pagla STP Expansion and Renovation, and the DB (Design and Build) of the Trunk Mains: (i) Madhubagh – Pagla STP and (ii) Hazaribagh – Narinda, (iii) Sewerage Networks (secondary/tertiary) of Pagla Catchment Area (if needed) under ICB conditions.

## 7.0 SCOPE OF WORKS

### 7.1 Detailed task description

#### **TASK A: REVIEW OF PREVIOUS STUDIES AND SITE CONDITIONS**

The expected outcome of this task is: The available data basis for the works to be designed and tendered is well defined and documented. This relates to all elements for secondary and tertiary sewer system, and for all equipment needs, including automation and control (SCADA), including all interfaces with the secondary sewer connections to the Trunk Main Madhubagh – Pagla<sup>3</sup>, Hazaribagh to Narinda, Pumping Stations, tertiary sewer connections to households etc.

The Consultant is expected to perform all necessary works to achieve these results, including but not limited to the following:

#### ***Subtask A.1 – Review of previous studies and site conditions***

1. Review of the following documents:

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<sup>3</sup> The primary sewer network is called “Trunk Mains“, while secondary sewers are those that connect to “Trunk Mains“, and tertiary sewers are those that connect to secondary sewers.

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- Dhaka Sewerage Masterplan (Grontmij-DHI-IWM, 2013);
  - Storm Water Drainage Master Plan for Dhaka City (JPZ-FCEA-SARM, 2015);
  - Dhaka Water Supply and Sanitation Project Review (Mott MacDonald, 2015);
  - DRAFT Bidding Documents for Construction of Trunk Sewer from Madhubag to Narinda-Jurain Road – Pagla STP and Two Sewage Pumping Stations (Mott MacDonald, 2016 and Grontmij A/S, 2013);
  - DRAFT Prequalification of Bidders for “Rehabilitation and Expansion of Pagla Sewage Treatment Plant”;
  - DRAFT Bidding Documents for “Rehabilitation and Expansion of Pagla Sewage Treatment Plant”;
  - TTI Consulting Engineer’s (Pvt.) Ltd.’s report on Deeper Gravity Trunk Sewer Concept (preliminary);
  - Any other relevant document.
2. Review of all other existing studies, reports, implementation documentation, operation recordings and relevant information from various sources. The DWASA will make all possible efforts to provide any kind of information available. Nonetheless, it is the Consultant’s responsibility to supplement and/or support this data with his own investigations if deemed necessary. Likewise, if some information is not forthcoming on time, it is the Consultant’s responsibility to get such data from other sources or through his own surveys;
  3. On-site visits of key experts of the Consultant working on this assignment to all relevant installations and locations;
  4. Visits to relevant project owners and their consultants and/or contractors that prepare or implement projects that will affect the design and construction of the Pagla sewer system;
  5. Compile and critically assess all O&M cost for the Pagla sewer system for the last 2 complete calendar years, split into appropriate cost elements (e.g. personnel, energy, chemicals, O&M, etc.). Perform plausibility checks on all data and derived parameters, wherever possible. Discuss with the staff and management in charge of sewer network, drainage network, and pumping stations regarding their O&M practices and problems. Prepare a summary of all findings and include in Conceptual Design Report;
  6. Collect and review the results of all flow data / pumping stations data in the Pagla sewer system. Perform plausibility checks on all data. The data should also be used to derive/confirm a reliable estimate of the intrusion of groundwater into the sewer system, e.g. through comparison with night-time dry-weather wastewater flow rates and/or water balances. The information from this review will be used to confirm / adjust input parameters used for the design of sewers;
  7. Review and summarize all relevant Bangladesh legislation and design norms regarding sewerage works, wastewater treatment, sludge disposal / treatment / reuse, air & noise emissions etc.;
  8. Confirm, or recommend changes with regard to the choice of combined or separate systems for drainage and wastewater collection, the final routing and invert levels of the

works, as well as basic design parameters, including preferred construction methods, sewer pipe material and diameter(s) and pumping station details;

9. Prepare a “Design Criteria Report” as an appendix to the Conceptual Design Report. In this report, the Consultant shall present all criteria he proposes to apply for the designs, including hydraulic and pollution load assumptions, hydraulic calculation assumptions, explanation of the software used for hydraulic modelling, filling level of pipes, proposed pipe materials, requirements of local regulations, standard designs for trunk mains, how to tap the overflow of septic tanks, how to by-pass septic tanks; under what local conditions to connect houses directly, etc. Design criteria shall also be outlined for the design of Combined Storm Water Overflows (CSOs), including which portion of storm water shall be intercepted, with special attention to ensure interception of the most polluting “first flush” that arrives at CSOs in the initial phases of a storm event. As part of the project area is prone to flooding, the design criteria should include also appropriate design solutions and mitigation measures for construction of sewers, pumping stations and CSOs in flood prone areas. Design criteria shall also be developed for economic comparison of different options of works;
10. Clarify landownership along the proposed alignment of the Trunk Main and for the STP;
11. Update/Prepare the resettlement strategy for households affected by the construction of the Pagla sewer system.
12. Organize and pay for the costs of a Kick-off workshop, within one week of submission of the Inception Report.

#### ***Subtask A.2 – Project indicators***

13. Develop a methodology for definition and quantification of all Project Indicators, which shall be presented in the Inception Report and constantly updated in the subsequent Monthly Progress Reports.

### **TASK B – FIELD INVESTIGATIONS**

Preliminary topographical and geotechnical surveys in the Pagla catchment were carried out during the previous study period, the results of which will be made available to the Consultant. As needed, additional detailed field investigations (topographical and geotechnical surveys) shall be conducted by the consultant. The surveys and investigations may be sub-contracted to experienced local companies, but the works must be supervised by the Consultant and the Consultant shall bear the responsibility for the final outcome of the surveys and investigations. The costs for the field investigation shall be included in the financial proposals but consultants shall provide detailed unit rates for the topographical and geotechnical surveys and the geo-technical laboratory test.

The Consultant is expected to undertake the following services, including but not limited to:

#### ***Subtask B.1 – Topographical surveys:***

14. Carry out all necessary topographical works in the Pagla catchment, as needed for the Conceptual Design Report, in order to fill any data gaps in the data from previous studies. Topographical works shall also include a detailed survey of the areas around the pumping stations in sufficient detail.
15. The survey results shall be suitable and sufficiently detailed to be included in the bidding documents for DB (Design-Build) sewer construction / rehabilitation/reconstruction.

***Subtask B.2 – Geotechnical investigations:***

16. Carry out all necessary geotechnical and soil investigations and soil analysis, in order to fill any data gaps in the data from previous studies. Sufficient drillings shall be made at the planned location of each treatment unit and operation building, provisionally estimated at 50 drillings. The drilling depth has to be defined as needed for proper and reliable technical and financial planning. The investigation drillings shall be sufficiently deep to determine the foundation levels and methods for all treatment units of the STP and lifting pump station, siphon, chamber, deep shaft. And the drillings along the Trunk Main alignment shall be sufficiently deep to permit an assessment of trenchless technology as suggested in the TTI Consulting Engineers (Pvt.) Ltd. / Mott MacDonald study reports and recommendation of in-situ enforcement for the nearby structure along the trunk main routing, including not limited to grouting, the cost estimate and the time schedule. If sufficient drilling results already exist for certain locations, these results can be accepted, and it is not necessary for the Consultant to repeat drillings at exactly the same locations.
17. The geotechnical investigations shall be as detailed as required under the Bangladesh standards for detailed engineering designs and the results shall be suitable and sufficiently detailed to be included in the bidding documents for construction.
18. For bidding a minimum of 50 drillings (or as per upon the discretion of DWASA will vary) has to be considered. However, these numbers should be acceptable to DWASA. The price for geotechnical investigations as estimated by the Consultant shall be part of the lump sum contract.

***Subtask B.3 – CCTV camera inspection of existing sewer systems:***

19. Carry out CCTV camera inspection of existing sewers to come up with a conclusion on typical physical conditions of the existing sewers, as needed for the Conceptual Design Report. To that ends a minimum of 10 km of sewers (Eastern and Western Trunk Main) in Pagla sewer network area has to be inspected and its physical state documented according to an internationally acknowledged standard systematic. The investigated sewers should cover a representative cross-section of the existing sewer system in terms of age, diameter, and pipe material.
20. The Consultant shall be responsible to make his own estimates of the required quantities of sewer inspections, however must never be less than the above indicated minimum requirement. The price for sewer inspections as estimated by the Consultant shall be part of the lump sum contract.

21. The Consultant should conduct the sewer pipe condition assessment and prepare the report. To assess the condition of the sewer system, data and information will be gathered through observation, direct inspection, investigation, and indirect monitoring and reporting. An analysis of the data and information will determine structural and operational issues, and performance of the overall system. The system will also include failure analysis to determine the causes of any infrastructure failures and to develop ways to prevent future breakdowns. The steps to perform the assessments include: (i) setting objectives for the assessment; (ii) identification of assets and available data; (iii) asset inspection; (iv) data analysis; and, (v) decision making.

***Subtask B.4 – Wastewater survey:***

22. Carry out, as a minimum, a 1-week quality and quantity monitoring program at the Pagla STP inlet Narinda/Basaboo/Golapbag Lifting PS. Also take at least 30 grab samples from different locations in the Pagla sewer network. The parameters for analyses shall be defined by the Consultant, based on the STP design input requirements. The outcome of these monitoring efforts shall be utilized to confirm and/or adjust wastewater related design assumptions. For that reason, to obtain, representative samples, efforts should be made to conduct this survey during the dry and rainy seasons.

***Subtask B.5 – Prepare GIS database:***

23. The outcome of the topographical, geotechnical and CCTV camera surveys, Wastewater surveys and inspections has to be analyzed, processed and summarized in an electronic GIS database. The GIS software shall be proposed by the Consultant and approved by DWASA. Upon completion of the GIS, the completed database and user's licenses shall be handed over to DWASA, to be used by bidders during bidding and project implementation.

**TASK C: CONCEPTUAL DESIGN AND COST ESTIMATES**

A Conceptual Design has to be prepared for the planned sewerage system in Pagla catchment, complete with pumping stations, outfalls, manholes, etc. This design has to be agreed upon with DWASA and the World Bank. The Conceptual Design shall be of such level of detail that bidders can elaborate their bids on that basis, however without forcing them into too rigid limitations. Bidders should still be able to come up with design optimizations and alternatives, thereby utilizing market forces and know-how to the benefit of the Client. As much as possible, the Consultant shall take into account that bidders for the DB construction contract will be able to offer alternative construction methods and sewer alignments.

The Consultant is expected to undertake the following services, including but not limited to:

***Subtask C.1 – Conceptual Design, cost estimate:***

24. Provide justification and definition of design flows in the Trunk Main, and of design influent flows and pollution loads reaching the Pagla STP, including groundwater inflow and infiltration. The definitions shall take into account seasonal fluctuations of flows, rainfall and infiltration rates;

25. Analyze options and provide a final recommendation of the construction method for the Trunk Main. Currently it is assumed that the preferred construction method for the Trunk Main is Micro-Tunnelling. Even though this method requires extra cost, as compared to open cut construction, it brings about the decisive benefits of less risky, socially more accepted and faster implementation. Since this DSIP project is a very long-lasting effort, and a heavy focus is placed on fast implementation, it is hence considered favorable to accept the higher cost for Micro-Tunnelling. – Should the Consultant come to the conclusion that other construction methods are more beneficial in terms of fast implementation and cost saving, this has to be discussed and agreed upon with DWASA;
26. Conceptual designs shall be prepared for the Trunk Mains using micro-tunneling construction method and associated lifting pump station (However, this should be agreed upon with DWASA and the World Bank) that include a hydraulic calculation, layout plan of the planned alignment, depicting starting and receiving shafts, complete with details of major features such as pipe diameter, pipe material, bottom level and slope, flow direction, siphon, chamber and deep shaft etc. Likewise, a longitudinal section of the Trunk Main and drawings of any relevant details and recommendation of in-situ enforcement for the nearby structure along the trunk main routing, including not limited to grouting, the cost estimate and the time schedule have to be elaborated. The results shall be suitable to be included in the bidding documents for construction.
27. Analyze options and provide a final recommendation including the life-cycle cost analysis for the treatment processes at Pagla STP. The resulting Conceptual Design has to include a process design, process scheme, layout plan, and hydraulic longitudinal profile. The Consultant's recommendation has to be discussed and agreed upon with DWASA. The results shall be suitable to be included in the bidding documents for construction.
28. Derive the estimated quantity of produced sludge to be disposed and/or reused. Adjust the suggested sludge treatment technology to properly match the requirements of the suggested disposal / reuse pathways, by considering cost-effectiveness and applicable environmental disposal standard.
29. Prepare a System Operation Protocol for the Trunk Main and STP that is based on the operational need to keep all important units running at all times. Define actual and future staff numbers for operating Trunk Main and STP, with required education levels, job requirement for each post and an organizational structure for the O&M of all infrastructure to be constructed under this bidding document. Also document available equipment for sewer operation & maintenance and make recommendations and justifications for procurement of any additional equipment for improved sewer O&M practices. This could include amongst others equipment for sewer cleaning and maintenance, modern vacuum trucks, an excavator for rapid repair needs and modern maintenance workshop and administration equipment.
30. In case certain control and monitoring installations will be required to be able to operate the system at its optimum (e.g. online measurements, flow meters, water level probes etc., all of them to be connected to a central SCADA system) at Pagla, these installations shall be included in the bidding documents.

31. Provide a design brief, with a summary and definitions of all prevailing design parameters for drains, sewers, trunk mains, wastewater pumping stations, wastewater treatment, sludge disposal/reuse, outfall etc.;
32. Prepare a work plan (time schedule) for the implementation of all Trunk Main and STP works, including critical path activities, showing relationships with other components of DSIP and relationships/dependencies with other projects as applicable;
33. Based on the conceptual design, prepare bill of quantities and cost estimates according to local legislation and requirements of the World Bank;
34. Obtain positive agreement on the Conceptual Design and cost estimates from relevant agencies or authorities according to the requirements set by local Bangladesh legislation for bidding.

***Subtask C.2 – Summary tasks and comparison with project budget:***

35. Based on the outcome of the tasks and sub-tasks shown above, summarize the overall investment cost estimate and compare with the project budget;
36. Based on the outcome of the tasks and sub-tasks shown above, summarize the overall impact of the suggested measures on future O&M cost and energy consumption;
37. Based on the outcome of the tasks and sub-tasks shown above, prepare a final scope of work, a procurement plan with well-justified lots (Packages) in terms of number and size, as well as a project schedule for implementation, thereby taking into account that dispensing of funds should start as fast as possible, and not be left to a compressed implementation period later in the project;
38. Organize and pay for the costs of a Conceptual Design workshop, within 2 weeks of submission of the Draft Conceptual Design Report.

***Subtask C.3 – Market study:***

39. Conduct comparative study for procurement modalities in terms of pros and cons, industry practices, capacity of DWASA in managing such contracts for the proposed DBO (Design, Build and Operate) of the Pagla STP Expansion and Renovation, and the DB (Design and Build) of the Trunk Mains: (i) Madhubagh – Pagla STP and (ii) Hazaribagh – Narinda, (iii) Sewerage Networks (secondary/tertiary) of Pagla Catchment Area. Suggest the most suitable procurement modalities (number of packages, size etc.)
40. Provide detailed market information for the selected procurement modality (as stated in para 38 above). Market information will include number of international contractors, name of contractors, notable similar experience, technical and financial capacity of these contractors.
41. Propose suitable bidding modality RFB/ RFP (one stage/two stage), selection arrangements (e.g. competitive dialogue) for each package and possibility of using different features of the Bank's Procurement Regulations (such as Best and Final Offer (BAFO), Negotiations, Sustainable Procurement, Value Engineering, KPI based contract management).

## **TASK D – PREQUALIFICATION (PQ)/ INITIAL SELECTION (IS)**

The Consultant shall prepare Prequalification/ Initial Selection documents for the DB of the new construction / rehabilitation/reconstruction of Pagla sewer system. The contract will be procured through Request for Bids (RFB)/ Request for Proposals (RFP) (International - Open), with a prequalification/ initial selection stage ensuring that proper selection criteria are applied so as to retain prequalified/ initially selected contractors who meet requirements regarding financial resources, technical capacity & experience, in particular in handling large sewer projects, both with and without trenchless technology. During the PQ process, the Consultant shall support DWASA and prepare draft clarification notices (if required) and prepare draft and final PQ/ IS evaluation reports (if required).

The Consultant is expected to undertake the following services, including but not limited to:

### ***Subtask D.1 – Prequalification/ Initial Selection documents:***

1. Prepare selection criteria that will ensure the prequalification/ initial selection of contractors who meet requirements regarding financial resources, technical capacity & experience, in particular in handling large sewer projects, both with and without trenchless technology, and confirm selection criteria with the Client and the World Bank;
2. Prepare complete prequalification/ initial selection documents acceptable to DWASA and to the World Bank, based on RFB/ RFP (Open-International) procurement;
3. Prepare draft Notice of Prequalification/ Initial Selection that can be used by DWASA for advertising purposes.

### ***Subtask D.2 – Support the Client with the Prequalification/ Initial Selection process***

4. Review the Notice of Prequalification/ Initial Selection prepared as draft by the Consultant and help DWASA to revise the draft notice, and complete and/or adjust, if necessary;
5. Assist with opening of PQ/ IS documents and prepare the minutes of the PQ/ IS opening;
6. Check all PQ/ IS documents received and prepare letters of request for clarification (if necessary) and conduct clarification meetings, if needed.
7. Assist DWASA in the preparation of the draft PQ/ IS evaluation report (if needed) and the final PQ/ IS evaluation document (if needed), which will be subject to the approval of DWASA and No Objection of the World Bank.

## **TASK E – BIDDING**

The Consultant shall prepare Bidding documents for the DB of the new construction / rehabilitation/reconstruction of Trunk Main: Madhubagh – Pagla and Hazaribagh – Narinda,

other sewer networks of Pagla catchment and DBO of Pagla STP (Renovation and Expansion), as agreed upon with DWASA.

The Consultants shall also support DWASA (if needed) with the bidding process and prepare notices for advertising, clarification notices, bid evaluation reports, as well as providing assistance with contract negotiations between DWASA and the successful bidder, which will focus, among others on the proposed work methodology to implement the contract, mobilization time, personnel arrangements, equipment, materials and clarification of tax duties of the Bidder, including VAT payment.

The Consultant is expected to undertake the following services, including but not limited to:

***Subtask E.1 – Bidding Documents***

8. Confirm with DWASA and the World Bank the type of bidding approach (DB, DBO or otherwise), determine the number of contracts and agree with the Client and the World Bank on the Conditions of Contract to be used;
9. Prepare complete Bidding documents for the agreed DB and/or DBO contract(s), using the World Bank Standard Documents as much as possible, specifications and drawings of the Conceptual Design prepared under earlier tasks in this ToR. The Conceptual Design and bid documents shall be of sufficient detail that tendering is acceptable according to local legislation and requirements of the World Bank;
10. Specifications shall describe the work to be done or materials to be procured, supplementing the information shown on the drawings & plans. They shall also set forth the details of the performance of work including necessary time schedules and requirements of insurance, permits, licenses and other special procedures or requirements. Reference to brand names, catalogue numbers and other details that limit any materials or items to a specific manufacturer shall be avoided. Where standard specifications or codes of practice are referred to, a statement must be added to the effect that other national or international standards that ensure substantial equivalence are also acceptable. Specifications shall cover technical provisions of the contract as well as those non-technical items, which are unique to the contract. The two types of provisions shall not be intermixed and may be kept separate by classifying one group as General Specifications and the other as Specific Technical Specifications. The General Specifications shall include individual characteristics regarding conditions of the work, procedures, access to site, any special scheduling requirements and other details, which will be applicable to this work/contract. The Specific Technical Specifications shall be fully descriptive and give the full requirements in respect of, but not limited to, the following:
  - (i) Standards of Materials;
  - (ii) Standards and Procedures of Workmanship;
  - (iii) Details of Manufacturing/Factory Tests or Other Tests required;
  - (iv) Details of Pre-commissioning and Commissioning Activities.

11. Prepare bills of quantities for the DB and/or DBO contracts for the new construction / rehabilitation/reconstruction of Pagla sewer system (Trunk Main: Madhubagh – Pagla and Hazaribagh – Narinda, Renovation of Pagla STP, Sewerage Networks (secondary/tertiary) of Pagla Catchment Area, and for Expansion of Pagla STP etc.) of sufficient detail that are expected to provide a solid basis for the measurement of progress of the works and subsequent payments to the contractor;
12. Prepare the “Engineer’s Cost Estimates” of the Conceptual Design by completing the Bills of Quantities and Schedule of Prices of the Bidding Documents with the Engineer’s Estimate (priced Bill of Quantities). All cost estimates shall be treated as confidential documents;
13. Provide an indicative list of essential ‘Construction Plant and Equipment’ that would be needed by the Contractors for execution of the required ‘Works’;
14. Recommend list of reports, data, topographical, geotechnical and other information to accompany the bid document and to be approved for release to bidders;
15. Obtain positive approval for the bidding documents from relevant bodies according to the requirements set by local Bangladesh legislation and from the World Bank.

#### ***Subtask E.2 – Bidding process***

16. Complete the Invitation to Bid to prequalified/ initially selected contractors (if required);
17. Together with DWASA conduct the Pre-bid meeting(s), reply to questions by bidders and prepare any necessary circular letters, including those related to pre-bid meeting report(s), that will be sent to all bidders, if necessary;
18. Assist with opening of bids and prepare the minutes of the bid opening, if required;
19. Check all bids received and prepare letters of request for clarification (if necessary). Evaluate the technical and financial components of the bids in accordance with the criteria stipulated in the Instructions to Bidders, including review of completeness of Bid, eligibility, qualifications, statement of work methods, equipment, personnel, schedule, provision of priced schedules, bid security, etc. Make arithmetic corrections and convert into one currency, evaluate quality and costs, etc., and compare substantially responsive bids to determine the lowest evaluated bid. After clarification (if any), prepare the draft bid evaluation report, including recommendation of award of Contract to the Bidder whose offer has been determined to be the lowest evaluated bid and is substantially responsive to the Bidding Document. Discuss and agree upon the outcome with DWASA. Assist DWASA in the preparation of final bid evaluation report (if needed), which will be subject to the approval of DWASA and No Objection of the World Bank;
20. Prepare the letter of notification to the successful bidder, if required;
21. Assist in the preparation of contract(s) between DWASA and the Contractor(s) and provide advisory support services during the contract negotiations, if required. Check sufficiency of all documents necessary for the contract(s) as submitted by the contractor, including the validity and compliance of bank guarantees, etc.

## **7.2 Project Management**

The suggested methodology of executing the assignment would be through a ‘task force’ approach wherein the Consultant is expected to assemble a task force of specialist engineers and technicians who would be assigned to carry out the required services.

Client’s comments, as deemed necessary, shall be taken into account when preparing the final output and in related project activities. In order to enable a smooth continuation of the project, it is strongly recommended to co-ordinate essential assumptions and conclusions with the Client even before the submission of any Draft Reports or documents.

### **8.0 Financial and Economic Analysis of Sewerage Interventions**

Under this task the Consultant shall conduct a detailed financial and economic analysis of all the sewage collection and treatment infrastructure under the proposed DSIP. The objective is to determine whether these interventions as whole contribute to the economic welfare of Dhaka city residents under the catchment and whether they are financially viable. Assuming that these interventions are part of one ‘investment project’, the Consultant shall:

- i. Identify and quantify annual financial costs and revenues from the project. Entire life-cycle costs should be estimated, including initial capital investment costs; future operation and maintenance; and re-investments during the life cycle. Similarly, entire life-cycle revenues shall be estimated, including tariff revenues from DWASA customers, and any other project-related revenues;
- ii. Identify, quantify and value annual economic costs of the project, based on life-cycle financial costs. Externalities (such as environmental costs) shall be valued in monetary terms and included in the estimation of economic costs;
- iii. Identify, quantify and value annual economic benefits of the project in monetary terms;
- iv. Determine net benefits; economic net present value (ENPV); economic internal rate of return (EIRR), financial net present value (FNPV); and financial internal rate of return (FIRR) for the project;
- v. Evaluate the financial sustainability of the project based on the net flow of cash during both the implementation and operating periods; and
- vi. Conduct sensitivity analysis and test the effects of variations in selected cost and benefit variables on the project’s F/EIRR or F/ENPV.
- vii. Prepare a Feasibility Report of the proposed DSIP(Phase-I).

### **9.0 Workshops**

Good communication and transfer of knowledge and experience from the Consultant to the Client (and vice versa) is an important issue for this assignment. To enhance these aspects, the Consultant shall organize and pay the costs for a number of workshops to be held during the assignment period, each for approximately 40 participants to be invited by the Client. As a minimum, the following workshops shall be held:

1. Kick-off workshop, within one week of submission of the Inception Report;

2. Conceptual Design workshop, within 2 weeks of submission of the Draft Conceptual Design Report.

### **10.0 Training and Knowledge Transfer**

Capacity development and training of local staff is an important objective of DWASA. The consultant shall on an intermittent basis, provide training to engineering staffs of DWASA. The training shall include all technical aspects of sewerage design (STP and Collection Networks).

The training on design of STP and Collection Network shall be carried out through as follows, but not limited to:

- a. On-the-job training on different stages which may be conducted in Bangladesh(to be agreed with DWASA);
- b. Classroom training based on a planned curriculum(to be agreed with DWASA),
- c. Short overseas formal courses (minimum 3 weeks) at reputable training institutes (to be agreed with DWASA) for at least 4 (four) persons who are involved in the project implementation of such nature as well as who are involved in the design activities of sewerage system.

### **11.0 LOGISTICS AND TIMING**

#### **11.1 Location**

The Consultant shall open an office in Dhaka (within a stone's through of WASA Bhaban) within 2 weeks after having signed the contract for this assignment, and shall carry out all the work in Dhaka, in order to consult and coordinate with personnel of the Client, other Government agencies and consultants involved in related projects as much as possible into the day-to-day work, and to facilitate a maximum transfer of knowledge and experience.

#### **11.2 Commencement date, duration, and critical milestones of this assignment**

##### **Duration of Assignment:**

The Consultant will be engaged under a Lump Sum contract.  
The duration of the assignment shall be approximately 12 calendar months.

##### **Specifics of this assignment:**

The contract signing for the present assignment is tentatively estimated to be in September, 2017 and the Consultant shall start works in Dhaka within one month of signing the contract. In their proposals, Consultants shall present a schedule of activities that takes into account the critical reporting milestones for the project, including how the execution of Task B (Field Investigations) will be planned in order to comply with the requirements of the project. According to the tentative schedule presented above, the Consultant shall be deemed to have priced his services in such a way that the tasks for this assignment will be completed within 12 months of signing the Consultant's contract with the Client; no extra payment is foreseen in case of longer project duration.

### **12.0 Team Composition and Estimated Time Input**

### 12.1 General personnel requirements

DWASA intends to engage a consultancy firm with experience in feasibility studies, engineering design of large urban sewerage infrastructure of similar nature and complexity, including experience in managing projects that utilize a variety of construction technologies and methods for sewer construction, rehabilitation and replacement. The engineering firm also needs to hold expertise in design and management of decentralised collection and treatment of sewage as well as in collection and treatment of faecal sludge/septage.

The consultant shall ensure that a team of experts and professional staff with necessary education, skill and experience would be deployed for all tasks in the field of design of large scale sewerage projects. Furthermore, the consultant must provide specific professionals on wastewater treatment, collection, disposal technology, decentralized collection and treatment of sewage, collection and treatment of faecal sludge/septage, as well as on deep sewer construction for a large urban sewerage projects.

An indicative list of the positions of the key professional staff /experts who will be evaluated for this assignment is given in Tables below. The estimated staff-months are indicative but minimum for field input. The consultant is free to propose their own estimate of professional input required to deliver the services in line with the Terms of Reference.

<b>A. Key Staff</b>		
<b>Sl. No.</b>	<b>Position</b>	<b>Man-Month(MM)</b>
<i>International Key Staff</i>		
1.	Team Leader	12
2.	Wastewater Treatment Process Engineer	6
3.	Wastewater Treatment Plant Designer	10
4.	Electrical Engineer	6
5.	Mechanical Engineer	6
6.	Sewer Design Specialist	10
7.	Sewer Construction/Rehabilitation Technology Specialist	5
8.	Procurement Specialist	4
9.	Geotechnical Specialist	3
10.	Economic and Financial Specialist	3
<b>Sub-total</b>		<b>65</b>
<i>National/International Key Staff</i>		
11.	Deputy Team Leader	12
12.	Civil /Structural Engineer	12
13.	Fecal Sludge Management Specialist	10
14.	Decentralized Wastewater Collection and Treatment Specialist	10
15.	Electrical Engineer	10
16.	Mechanical Engineer	10
17.	Hydraulic Engineer	6
18.	Architect	5
19.	Economic and Financial Analyst	5

<b>Sub-total</b>	<b>80</b>
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The total number of anticipated man-months for internationally and nationally experienced experts for this contract is estimated at about 145 man-months, without support staff.

N.B.: Apart from the above-mentioned input, the consultant shall take into account the following aspects:

1. A cautious planning of staffing schedule for providing such services is expected.
2. The **Home Input** for the international professionals should not be allowed.
3. The estimated man-months are indicative and the consultant may propose their own estimate of professional input in order to deliver the services in conformity with the scope of services. Professional input may be staggered over the contract period, considering the project tenure as 12 calendar months.

In addition to above listed positions of key professionals; the consultant should make arrangements for other experts and support professionals with adequate experience in relevant fields. Indicative list of other staffs / experts / support professionals who may be required for the assignment are given in Table below. During technical evaluation process, these staffs will not be evaluated individually. However, they will be considered collectively along with other support staffs, if any, under “Organization and Staffing” criteria of evaluation.

#### Estimated Input of other Professional Staff

	<b>Key Professional Staff Position</b>	<b>Man-Months (Indicative)</b>
1	Civil Engineers (3 Nos.)	36
2	Sanitary Engineers (2 Nos.)	20
3	Engineering Surveyors (4 Nos.)	24
4	Social-Economists (2 Nos.)	8
5	Geologist/Geotechnical surveyor (2 Nos.)	12
6	CAD Operators (4 Nos.)	32
7	Office Manager (1 No.)	12
8	Accountant (1 No.)	11
	<b>Total</b>	<b>155</b>

The qualification, experience and competency of the key staffs, whose CV's will be considered for evaluation to be required for the proposed services are as follows:

<b>B. Required Qualification &amp; Experiences of the Key Staffs</b>					
<b>Sl. No.</b>	<b>Type of staff</b>	<b>Minimum Educational qualification</b>	<b>Back ground</b>	<b>Overall Experience</b>	<b>Specific Experience &amp; responsibilities.</b>
<i>International Key Staffs</i>					
1.	Team Leader	Graduate	Civil/Sanitary Engineering	Working experience about 20 yrs.	The Team Leader should have about 12 yrs. international managerial experience and sufficient experience in the field of design of sewage/waste water treatment design infrastructures. He/she should have working experience as <b>Team Leader in minimum 5 projects among which at least 2 assignments of similar Sewerage Project.</b> Team Leader (TL) shall be responsible for overall activities of the consulting team for the following but not limited to: <ul style="list-style-type: none"> <li>• Full responsibility for overall activities of the team under this assignment including all relevant aspects e.g. technical, financial, legal/statuary, health/social etc.</li> <li>• Provide advice and direction to the multi-disciplinary team of</li> </ul>

					<p>the Consultant to perform the duties of the team in a comprehensive manner to deliver the duties of the team in an efficient manner to meet the requirement of the employer.</p> <ul style="list-style-type: none"> <li>• Orient the work plan and necessary training program in consultation with Project Director so as to ensure maximum technology transfer and develop usable capacity in DWASA.</li> <li>• Preparation of different procurement documents following the procurement guideline of the development partner and/or PPA-2006/PPR-2008.</li> <li>• Maintaining liaison with the client to achieve the ultimate goal of the assignment.</li> <li>• Reviewing of previous relevant studies and data.</li> <li>• Taking part to all relevant meetings with concerned stakeholders and feedback the PIU on pertinent issues.</li> <li>• Reporting.</li> </ul>
2.	Wastewater Treatment Process Engineer	Graduate	Civil/ Sanitary Engineering/Waste Water Treatment Process Engineering.	Working experience about 15 yrs.	<p>This professional staff should have sufficient international experience in sewage/wastewater treatment process selection and design with modern technologies. He/she must be experienced in designing of at least 2 sewage treatment plants out of which at least 1 treatment plants are of 100 MLD capacities. This key staff shall be responsible for but not limited to:</p> <ul style="list-style-type: none"> <li>❖ Collect relevant studies reports and data.</li> <li>❖ Reviewing the relevant reports.</li> <li>❖ Assisting the employer in selection of treatment process to optimize the benefit of DWASA in terms of quality of treatment and best practice, ease of least cost operation and maintenance etc.</li> <li>❖ Conducting training programs on selecting of waste water treatment process and design to scale-up the technical knowledge of the project supervising team.</li> <li>❖ Assisting the TL and the team.</li> <li>❖ Any other relevant duties to be required for the team.</li> </ul>
3.	Wastewater Treatment Plant Designer	Graduate	Civil/ Sanitary Engineering/Waste Water Treatment Process Engineering.	Working experience about 15 yrs.	<p>This professional staff should have sufficient international experience in designing of sewage/wastewater treatment plant. He/she must be experienced in designing at least 2 wastewater/sewage treatment plants out of which at least 1 wastewater/sewage treatment plants are of 100 MLD capacities. This key staff shall be responsible for but not limited to:</p> <ul style="list-style-type: none"> <li>❖ Hydraulic Design of the sewage/wastewater treatment plants including the assessment of sewage/wastewater into the particular catchment and prepare relevant specifications.</li> <li>❖ Collect and review the relevant documents, reports and data.</li> <li>❖ Conducting training programs on designing the relevant infrastructures to scale-up the technical knowledge of DWASA engineers.</li> <li>❖ Assisting the TL and the team.</li> <li>❖ Any other relevant duties to be required for the team</li> </ul>
4.	Electrical Engineer	Graduate	Electrical Engineering	Working experience about 15 yrs.	<p>This professional staff should have sufficient international experience in designing of relevant electrical components of such infrastructure (similar wastewater/sewage treatment plant). He/she must be experienced in designing of electrical component in at least 2 sewage/waste water treatment plants out of which at least 1 treatment plants are of 100 MLD capacities. This key staff shall be responsible for but not limited to:</p> <ul style="list-style-type: none"> <li>❖ Collect and review the relevant documents, reports and data.</li> <li>❖ Preparation of Designs and drawings of electrical components of STP and Sewage Lift/Pump Stations (SLS) and prepare relevant specifications.</li> <li>❖ Conducting training programs on designing the relevant infrastructures to scale-up the technical knowledge of DWASA engineers.</li> <li>❖ Assisting the TL and the team.</li> <li>❖ Any other relevant duties to be required for the team.</li> </ul>

5.	Mechanical Engineer	Graduate	Mechanical Engineering	Working experience about 15 yrs.	<p>This professional staff should have sufficient international experience in designing of relevant mechanical components of such infrastructure (similar wastewater/sewage treatment plant). He/she must be experienced in designing of mechanical component in at least 2 wastewater/sewage treatment plants out of which at least 1 treatment plants are of 100 MLD capacities. This key staff shall be responsible for but not limited to:</p> <ul style="list-style-type: none"> <li>❖ Collect and review the relevant documents, reports and data.</li> <li>❖ Designing and drawing of mechanical components of STP and Sewage Lift/Pump Stations (SLS) and prepare relevant specifications.</li> <li>❖ Conducting training programs on designing the relevant infrastructures to scale-up the technical knowledge of DWASA engineers.</li> <li>❖ Assisting the TL and the team.</li> <li>❖ Any other relevant duties to be required for the team.</li> </ul>
6.	Sewer Design Specialist	Graduate	Civil/ Sanitary Engineering	Working experience about 15 yrs.	<p>This professional staff should have sufficient international experience in designing of sewer networks. He/she must be experienced in designing of sewer networks at least 2 projects out of which at least 1 large projects in the mega city. This key staff shall be responsible for but not limited to:</p> <ul style="list-style-type: none"> <li>❖ Collect and review the relevant documents, reports and data.</li> <li>❖ Designing and Drawings of sewer networks and select the pipe/conduit material including specifications.</li> <li>❖ Conducting training programs on designing the relevant infrastructures to scale-up the technical knowledge of DWASA engineers.</li> <li>❖ Assisting the TL and the team.</li> <li>❖ Any other relevant duties to be required for the team.</li> </ul>
7.	Sewer Construction/ Rehabilitation Technology Specialist	Graduate	Civil/ Environmental Engineering.	Overall Working experience of 20 years of which at least 10 years shall be in sewerage works.	<p>(1) The specialist shall have worked in a responsible capacity, not less than of a Project Engineer, in at least one (1) Trenchless sewer Construction project He/she shall also possess experience in design, costing and construction supervision of a minimum 100 m of deep trunk sewer of depth greater than 10m using micro-tunneling technology or other trenchless method..</p> <p>(2) The specialist shall worked in a responsible capacity, not less than of a Project Engineer, at least in one sewerage master planning project involving sewer network, pumping stations, sewage treatment plants etc. for a city of not less than 1,000,000 population.</p> <p>The specialist shall also have good exposure to mechanical and electrical work associated with pumping stations and sewage/waste water treatment plants as a member of a project management team supervising the construction of treatment plants and pumping stations and associated M&amp;E works.</p> <p>Experience in the operation and maintenance of sewage/waste water treatment plants and /or Pumping stations is desirable.</p>
8.	Procurement Specialist	Graduate	B. Sc (Engineering) / Masters in Procurement/ Relevant Subject	Working experience about 15 yrs.	<ul style="list-style-type: none"> <li>▪ Preparation of prequalification and PQ evaluation documents;</li> <li>▪ Preparation of bidding plans and packaging schedules;</li> <li>▪ Preparation of general parts of all bid documents;</li> <li>▪ Supervise others who prepare technical specifications and bills of quantities;</li> <li>▪ Responsible for production of complete final bidding documents, including bills of quantities and cost estimates;</li> <li>• Prepare procedures and guidelines for evaluation of contractors' bids;</li> </ul>
9.	Geo-technical Specialist	Graduate	Geology /Civil/ Structural / Soil Engineering	Working experience about 15 yrs.	<ul style="list-style-type: none"> <li>▪ Responsible for definition of geotechnical investigations;</li> <li>▪ Responsible for contract with field investigation contractor;</li> <li>▪ Guidance of field works;</li> <li>▪ Supervision of laboratory testing of soil samples;</li> <li>• Geotechnical reports and geotechnical components of main reports.</li> </ul>

10.	Economic and Financial Specialist	Graduate	Economics or Finance or equivalent.	Working experience of 8 years	-At least 8 yrs. of experience in financial and economic analysis of infrastructure projects -Should be permanent employee of the firm or have an extended and stable working relationship with the firm.
<b><i>National/International Key Staff</i></b>					
11.	Deputy Team Leader	Graduate	Civil/Sanitary Engineering.	Working experience about 18 yrs.	This key staff should have about 12 yrs managerial experience including planning, studying and designing experience of sewer network for the city having minimum 2.5 million dwellers. He/she will play the role of Team Leader in absence of the evaluated Team Leader. This key staff shall be responsible for but not limited to: <ul style="list-style-type: none"> <li>❖ Reviewing of previous relevant studies and data's.</li> <li>❖ Design the sewer networks or assisting the team to do so.</li> <li>❖ Selecting the pipe/conduit materials including the specification.</li> <li>❖ Preparation of Schedule of Prices.</li> <li>❖ Assisting the TL and the team.</li> <li>❖ Any other relevant duties to be required for the team.</li> </ul>
12.	Civil/Structural Engineer	Graduate	Civil/Sanitary Engineering.	Working experience about 15 yrs.	This professional staff should have sufficient experience in designing of wastewater/water treatment plant. He/she must be experienced in designing at least 2 wastewater/water treatment plants out of which at least 1(one) treatment plants are of 20 MLD capacities. This key staff shall be responsible for but not limited to: <ul style="list-style-type: none"> <li>❖ Collect and review the relevant documents, reports and data's.</li> <li>❖ Assisting the relevant international staff in designing and drawing of STP and SLS and preparation of specifications.</li> <li>❖ Assisting the relevant international staff in conducting training programs on designing the relevant infrastructures to scale-up the technical knowledge of DWASA staffs.</li> <li>❖ Assisting the TL and the team.</li> <li>❖ Any other relevant duties to be required for the team.</li> </ul>
13.	Fecal Sludge Management Specialist	Graduate	Civil/Sanitary Engineering or equivalent.	Working experience about 15 yrs.	This professional staff should have sufficient experience in designing faecal sludge/septage management systems from collection to treatment and final endues/disposal relevant for the Bangladeshi context, including institutional, organisational and management aspects of the systems. This key staff shall be responsible for, but not limited to: <ul style="list-style-type: none"> <li>• Contribute to the team with deep knowledge of service delivery to customers outside centralised sewerage collection systems.</li> <li>• In cooperation with the sewage team, the decentralised wastewater specialist and DWASA prepare the strategic plan outlining the limitations of each type of technical system within each catchment area.</li> <li>• In cooperation with the full team obtain a deep understanding for the current situation in Mirpur and Uttara.</li> <li>• In cooperation with the WWTP designer and DWASA assess different faecal sludge/septage treatment options for the Mirpur and Uttara WWTPs on catchment level.</li> <li>• In cooperation with DWASA, relevant stakeholders plus the customer interaction specialist design the technical, institutional, O&amp;M, and business components of the business model for faecal sludge/septage management as well as the spin-off products from work with the business model.</li> <li>• In cooperation with DWASA and the on-site team develop and implement the customer interaction strategy.</li> <li>• Training of DWASA staff.</li> </ul>
14.	Decentralized wastewater	Graduate	Civil/Sanitary	Working experience	This professional staff should have sufficient experience in

	collection and treatment specialist		Engineering or equivalent.	about 15 yrs.	<p>designing relevant systems for decentralized collection and treatment of wastewater in a context similar to low-income communities in Dhaka including institutional, organizational and management aspects of the systems. This key staff shall be responsible for, but not limited to:</p> <ul style="list-style-type: none"> <li>• Contribute to the team with deep knowledge of service delivery to customers outside centralized sewerage collection systems.</li> <li>• In cooperation with the sewage team, the faecal sludge/septage management specialist and DWASA prepare the strategic plan outlining the limitations of each type of technical system within each catchment area.</li> <li>• In cooperation with the full team obtain a deep understanding for the current situation in Mirpur and Uttara, including special responsibility to understand why existing simplified sewerage in Mirpur failed.</li> <li>• In cooperation with the full team and DWASA, design a number of decentralized collection and treatment systems from a technical, financial, O&amp;M, institutional and organizational perspective. It is possible that innovation is needed both technically and institutionally to meet the challenges of service delivery in Dhaka.</li> <li>• In cooperation with DWASA and the on-site team develop and implement the customer interaction strategy.</li> <li>• Training of DWASA staff.</li> </ul>
15.	Hydraulic Engineer	Graduate	Water Resource Engineering / Hydraulic Engineering or equivalent	At least 10 years of experience.	<ul style="list-style-type: none"> <li>• Collection and analysis of all relevant reports and data regarding flows and pollution loads in the project catchment.</li> <li>• Recommendations regarding design flows and pollution loads for Trunk Main and inlet flows STP;</li> <li>• Responsible for definition of topographical surveys;</li> <li>• Recommendations regarding final routing of Trunk Main;</li> <li>• Hydraulic design criteria for Trunk Main and calculation of diameter, slope, invert levels, etc.;</li> <li>• Designs of details of Trunk Main, shafts, etc., and interfaces with other infrastructure;</li> <li>• Preparation of O&amp;M manual for Trunk Main.</li> </ul>
16.	Electrical Engineer	Graduate	Electrical Engineering	Working experience about 15 yrs.	<p>This professional staff should have sufficient experience in designing of relevant electrical components of such infrastructure (wastewater/water treatment plant). He/she must be experienced in designing of electrical component in at least 2 water/wastewater treatment plants/Sewage Treatment Plant/Power Station. This key staff shall be responsible for but not limited to:</p> <ul style="list-style-type: none"> <li>❖ Collect and review the relevant documents, reports and data's.</li> <li>❖ Assisting the international relevant staff in designing and drawing of electrical components of the STP/SLS.</li> <li>❖ Preparation of Schedule of Prices and Specifications.</li> <li>❖ Conducting training programs on designing the relevant infrastructures to scale-up the technical knowledge of DWASA staffs.</li> <li>❖ Assisting the TL and the team</li> <li>❖ Any other relevant duties to be required for the team</li> </ul>
17.	Mechanical Engineer	Graduate	Mechanical Engineering	Working experience about 15 yrs.	<p>This professional staff should have sufficient experience in designing of relevant mechanical components of such infrastructure (wastewater/water treatment plant). He/she must be experienced in designing of mechanical component in at least 2 water treatment plants/Sewage Treatment Plant/Power Station. This key staff shall be responsible for but not limited to:</p> <ul style="list-style-type: none"> <li>❖ Collect and review the relevant documents, reports and</li> </ul>

					<p>data's.</p> <ul style="list-style-type: none"> <li>❖ Assisting the international relevant staff in designing and drawing of mechanical components of the STP/SLS.</li> <li>❖ Preparation of Schedule of Prices and Specifications.</li> <li>❖ Conducting training programs on designing the relevant infrastructures to scale-up the technical knowledge of DWASA staffs.</li> <li>❖ Assisting the TL and the team</li> <li>❖ Any other relevant duties to be required for the team.</li> </ul>
18.	Architect	B. Sc	Architecture or equivalent	Working experience about 15 yrs.	This professional staff should have sufficient working experience in designing architectural components of infrastructural projects.
19.	Economic and Financial Analyst	Graduate	Economics or Finance or equivalent.	Working experience of 10 years	<p>-At least 10 yrs. of experience in financial and economic analysis of infrastructure projects</p> <p>-Should be permanent employee of the firm or have an extended and stable working relationship with the firm.</p>

### 13.0 FACILITIES

#### 13.1 Facilities to be provided by the Consultant

The Consultant will be responsible for:

- (i) Providing accommodation, international and local transport and freight expenditures of the Consultant's staff;
- (ii) Providing sufficient office space and office equipment in Dhaka. The office shall be paid for directly by the Consultant. The standard and location of the office shall be determined in close consultation with DWASA.
- (iii) Providing local office support services for report production and international and national communication for the full assignment period;
- (iv) The Consultant will be responsible for all other arrangements and cover in its budget for the assignment of all expenses for all kinds of logistics as required to successfully completing the assignment.

#### 13.2 Data, services and facilities to be provided by DWASA

DWASA will provide, free of charge, to the Consultant the following assistances:

- (i) Suitably qualified, English speaking counterpart personnel to co-ordinate with the Consultant;
- (ii) Studies, reports, plans etc. as available, preferably in electronic format;
- (iii) Assistance in the preparation and implementation of the surveys;
- (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;
- (vi) Assistance in obtaining all staff permits, authorizations and licenses required for the performance of the Consultant's services in Bangladesh;
- (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, if needed.

Notwithstanding this assistance, the final responsibility of all those activities stays exclusively with the Consultant.

## 14.0 REPORTS

### 14.1 Reporting requirements

All reports in English will have to be submitted in both softcopy and hard copy. A CD-ROM or flash drive containing the electronic version of the report must be submitted with every paper copy of all required reports. The hard copy of the draft reports are to be submitted in 5 copies and the final report in 10 copies. Reports shall be prepared using commonly used software. All reports shall be prepared in DIN A4 format. Separate volumes in DIN A3 format may be used to contain plans, drawings, schedules, photographs, etc.

Upon receipt of the draft reports from the consultants, the reports will be reviewed by DWASA. The consultants will be asked to give a presentation on the report. DWASA may also obtain comments from the World Bank on the consultants' reports. DWASA shall, in writing review and provide consolidated comments; or review and approve each document no later than 30 days after DWASA receives the document. If DWASA fails to meet the deadline, the Consultant shall notify DWASA of such failure. If DWASA does not respond to the Consultant's notice prior to the expiration of 5 days after the notice is received by DWASA, the applicable document shall be considered to be approved. These provisions shall be applied to both the first and all subsequent drafts of a document submitted by the Consultant.

### 14.2 Submission of reports

The Consultant shall prepare at least, but is not limited to, the following reports. All reports shall be submitted in English and at the times defined in the table below:

*Table: Reporting requirements:*

<b>Report</b>	<b>Description</b>	<b>Submission date</b>
Inception Report	Inception Report shall cover the following aspects but not limited to: <ul style="list-style-type: none"> <li>• Revised work plan</li> <li>• Revised methodology (if any)</li> <li>• Description on logistics and office facility as per contract etc.</li> </ul>	4 weeks after contract signing
Monthly Progress Reports	-	10 days after the end of each calendar month
Interim Report-1	This report consists of <ul style="list-style-type: none"> <li>- Detailed survey of Dhaka South (Pagla) catchment; preliminary assessment of technical options for sewage collection and treatment, including also decentralized collection and treatment of wastewater as well as faecal sludge/septage management.</li> <li>- Assessment of Sewerage Systems of Pagla Catchment: Identifications of the sewerage systems which needs for replacement/reconstruction/rehabilitation/new construction.</li> <li>- Guidelines (including methodology, simplified evaluation criteria, templates</li> </ul>	2 months after contract signing.

Report	Description	Submission date
	<p>etc) for selection of construction methods and technologies for sewer rehabilitation / replacement or construction/reconstruction in Pagla Catchment Area.</p> <p>- Design Criteria Report for the rehabilitation/reconstruction/ construction of sewerage system in Pagla Catchment Area separately.</p>	
Interim Report-2	<p>This report (no. of packages must be agreed upon with DWASA) consists of:</p> <p>-Conceptual Design Report for different packages of sewerage systems of Pagla Catchment,</p> <p>-PQ Documents for different packages of sewerage systems of Pagla Catchment.</p> <p>-Sewer Pipe Assessment Report</p>	4 months after contract signing
Interim Report-3	<p>This report (no. of packages must be agreed upon with DWASA) consists of:</p> <p>- Bidding Documents (DB) for different packages of sewerage networks in Pagla Catchment.</p> <p>- Bidding Documents (DBO) for Rehabilitation and Expansion of Pagla STP.</p>	5 months after contract signing
Feasibility Study Report of proposed DSIP (Phase-I).	<p>The report consists of -</p> <p>i. Identify and quantify annual financial costs and revenues from the project;</p> <p>ii. Identify, quantify and value annual economic costs of the project, based on life-cycle financial costs;</p> <p>iii. Identify, quantify and value annual economic benefits of the project in monetary terms;</p> <p>v. Determine net benefits; economic net present value (ENPV); economic internal rate of return (EIRR), financial net present value (FNPV); and financial internal rate of return (FIRR) for the project;</p> <p>v. Evaluate the financial sustainability of the project based on the net flow of cash during both the implementation and operating periods; and</p> <p>vi. Conduct sensitivity analysis and test the effects of variations in selected cost and benefit variables on the project's F/EIRR or F/ENPV.</p>	5 months after the contract signing.
Completion Report	Completion report consolidating all above deliverables and providing a narrative of the main achievements and lessons from the consultancy, including training carried out.	15 days prior to the ending of the contract.

***Conceptual Design Report:***

The Consultant shall prepare a Conceptual Design Report that will include, but not be limited to, preliminary designs and recommendations with regard to the sewer system routing, invert levels, construction method, pipeline materials, etc. The report has to define and justify the prevailing design inputs and outputs. This report will form the basis, on which the bidders shall then develop their optimized bids, and subsequent detailed design. It will hence be utilized as an indispensable Annex to the Bidding Documents. After receiving comments by DWASA and from the World Bank on this report, the Consultant shall complete the Final Conceptual Design Report.

***Bidding Documents:***

The Consultant shall prepare Draft Bidding Documents, separately for all contract packages identified and agreed upon. They shall include all specifications as far as is possible at that stage of the assignment and an outline Bill of Quantities. After receiving comments by DWASA and from the World Bank on these documents, the Consultant shall complete Final Bidding Documents, complete with all necessary drawings, Bills of Quantities, survey data, Conceptual Design Report, etc., separately for all contract packages agreed upon. These Final Bidding Documents will be used for the Bidding process.

A Priced Bills of Quantities (Engineer's Estimates) for each package shall be submitted to DWASA in a separate document.

N.B.: All the Final Reports shall be completed, taking into account all of DWASA's and the World Bank's comments, within 1 week after receiving those comments in writing.

**ANNEXES****Annex A. Main interfaces with other infrastructure**

Information may need to be collected from the organizations below mentioned:

- The Dhaka City Corporation- North (DCC North);
- The Dhaka City Corporation- South (DCC South);
- The Department of Environment (DoE)
- The Rajdhani Unnayan Karttripakhya (RAJUK);
- Bangladesh Water Development Board.
- BTCL
- DESCO,

- DPDC,
- TGTDCCL etc.

N.B.: This is a Draft ToR. This may be updated upon the consultation with the World Bank. The updated version of ToR after getting concurrence from the World Bank will be taken as Final ToR.