Government of the People's Republic of Bangladesh

Local Government Division

Department of Public Health Engineering

Terms of Reference

For

Consultancy service for Project preparation (Feasibility Enhancement) and design

for

Bangladesh City Inclusive Sanitation Project
in 25 Towns (GoB-AIIB)

Package No.: CIS-SER-03A

(NCB-MC, QCBS)

June 2023

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for
Consultancy service for Project preparation (Feasibility Enhancement) and design for Bangladesh City Inclusive Sanitation Project in 25 Towns
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1. Background

Bangladesh has a high population density and has experienced rapid urbanization. The percentage of the population living in slums has increased, leading to poor sanitation conditions and a higher risk of water-borne diseases. While access to basic drinking water facilities is relatively good, the quality of drinking water is often poor due to contamination.

Most urban households in Bangladesh have access to toilets, but the functionality of on-site sanitation systems is a concern. Without proper management of fecal sludge, there have been cases of sludge management crises, impacting human and environmental health. Women and children in slums and informal settlements are particularly vulnerable to water-borne diseases caused by unsafe drinking water and poor sanitation and hygiene conditions.

While formally planned urban areas may have access to publicly funded sewerage systems, the poor and those living in slums and informal settlements are left behind with little or no support. In those areas, infrastructure and services for safe containment, emptying, conveyance, treatment and disposal are largely absent. Pits and septic tanks are illegally connected to surface drains or water bodies. The fecal sludge is emptied by informal and unhygienic methods and openly dumped into the environment. This weak link in the sanitation service chain in Bangladesh has been not only contaminating the environment (including drinking water sources) but also posing significant risks to human health (causing recurrent outbreaks of diseases such as diarrhoea, cholera, and typhoid).

To address these challenges, the Government of Bangladesh has prioritized urban sanitation and approved an Institutional and Regulatory Framework (IRF) for Fecal Sludge Management (FSM). A National Action Plan has been developed to implement the IRF and ensure effective FSM by 2030. The establishment of a Citywide Inclusive Sanitation (CWIS)-FSM support Cell aims to facilitate integrated sanitation management.

To tackle these issues at the city level, the Government of Bangladesh conducted a feasibility study project for implementing solid waste and fecal sludge management systems in 53 district-level Pourashavas and 8 city Corporations. The project received technical and financial support from the Bill and Melinda Gates Foundation. The study provided a comprehensive analysis of the existing waste and fecal sludge management situation, including demand, viable technological solutions, and environmental considerations. The findings of the study are available on the open web link www.sanboard.gov.bd and serve as a basis for future development projects and sustainable plans.

2. Bangladesh City Inclusive Sanitation Project (BCISP)

The GoB through its letter dated August 2, 2021, requested AIIB's financing of USD200 million for the underlying Project. The Project was cleared by the Bank's Screening Committee on August 26, 2021, for inclusion in its project pipeline. The Project aims to improve access to inclusive urban sanitation services in selected 25 cities. Specific Objectives include: (i) improving the coverage of safely managed sanitation through the use of safe sustainable sanitation technology; (ii) improving the life and livelihood of the people in the project area through establishing household, community, public toilets, and containment system; (iii) implementing modern and innovative technology of integrated sanitation & bio-waste management system, including enhancement of the capacity of the Municipalities and the overall environment; and (iv) strengthening governance accountability through development of municipal level CWIS framework and guidelines.

3. **Project Preparation Special Fund (PPSF) for BCISP**

To support the preparation of BCISP and ensure the readiness of year-one investments, AIIB provided to the Government of Bangladesh a Project Preparation Special Fund (PPSF) grant. The grant agreement which provides support amounting to USD3.3 million was signed on March 8, 2023, between AIIB and GoB.

The PPSF will be implemented by the Department of Public Health Engineering (DPHE), Ministry of Local Government Rural Development & Co-operatives. DPHE has constituted a Project Management Unit (PMU) to implement the PPSF grand activities and eventually BCISP. The DPHE/PMU will be responsible for various project preparation activities including implementing those to be funded through the proposed PPSF. Activities that will be conducted during the project preparation phase funded by PPSF include the following contracts:

- **i.** Consulting services for Enhanced Feasibility Study and Detailed Design for 25 Towns
- **ii.** Consulting services for Institutional Capacity Building
- **iii.** Consulting service for Awareness Raising
- **iv.** Consulting services for IMIS web platform, Digital Inclusive Financing System, and Service Monitoring.

Preparatory activities include the procurement, implementation, and results monitoring and reporting of the abovementioned activities. Preparatory activities will also include coordination and reporting within the PMU.

4. Rationale Of Hiring Consulting Firm:

To support the implementation of preparatory activities for BCISP, a consulting firm having a team of specialist will be hired to support the DPHE PMU in enhancement of existing feasibility documents of prioritized 5 towns and detailed feasibility study of 20 remaining towns with detailed engineering design (DED), cost estimates, BOQ, tender document preparation considering the ULB's land commitment and existing sanitation value chain. The scope of work for the roles is discussed in the Scope of Works section.

5. A list of Project municipalities (indicative) is presented below.

Sl. no	Division	District	Pourashava	Sl. no	Division	District	Pourashava
1	Barishal	Jhalokathi	Jhalokathi	13	Maymenshing	Netrokona	Netrokona
2	Chattagram	Chandpur	Chandpur	14		Sherpur	Sherpur
3		Feni	Feni	15	Rajshahi	Bogura	Bogura
4		Noakhali	Noakhali	16		Joypurhat	Joypurhat
5	Dhaka	Gopalganj	Gopalganj	17		Naogaon	Naogaon
6	Dhaka	Madaripur	Madaripur	18	Rangpur	Dinajpur	Dinajpur
7		Rajbari	Rajbari	19		Gaibandha	Gaibandha
8		Tangail	Tangail	20		Kurigram	Kurigram
9	Khulna	Chuadanga	Chuadanga	21		Nilphamari	Nilphamari
10		Jhenaidah	Jhenaidah	22		Panchagarh	Panchagarh
11		Meherpur	Meherpur	23		Thakurgaon	Thakurgaon
12		Satkhira	Satkhira	24	Sylhet	Habiganj	Habiganj
	-	-		25		Sunamganj	Sunamganj

5.1 In this context it is proposed to hire a competent, qualified, and experienced consultancy firm to assist DPHE in preparation of feasibility study, carry out environmental and social due diligence, detailed engineering design with cost estimate, and tender document for implementation of integrated sanitation services in the selected 25 towns. The scope of work for the roles is discussed in the Scope of Works section.

6. Components:

Component 1 (Sanitation and Hygiene Improvement) will improve integrated total sanitation infrastructure and services in 25 towns, providing the complete improved sanitation service chain (i.e., containment, emptying, conveyance, treatment and disposal);

Component 2 (Institutional Strengthening and Capacity Building) will support institutional capacity building of ULBs and other stakeholders to enable them to efficiently implement and sustainably operate the sanitation infrastructure and service delivery systems; and

Component 3 (Project Management Support) will provide support for Project implementation, management, and coordination.

7. Objectives of the Consultancy Service.

a. The consultancy will be financed through the PPSF proceeds to conduct preparatory activities to help improve implementation readiness of the proposed Project and finalize sub-components with detailed Engineering designs and ensure Project readiness and compliance with GoB's and AIIB's relevant policy requirements.

b. Are to: (i) Enhance feasibility studies, including technical, economic and financial, legal, social and environmental aspects; (ii) prepare detailed engineering designs and cost estimates for the 20 towns and 5 prioritized towns. (iii) prepare project Delivery strategy, and necessary tender documents following AIIB's procurement policies and procedures; (iv) prepare Project environmental and social safeguards instruments; (v) undertake institutional and financial management capacity assessment for DPHE and Project towns including development of mitigation measures; (vi) assist the DPHE and participating ULBs in the procurement of works through a period of association following the delivery of outputs; and (vii) prepare a consolidated detailed Project report (DPR) and draft Project implementation manual.

c. The sub-projects to be designed and constructed under the Project shall fully comply with the water quality regulations and policies and environment conservation rules 2023 of Bangladesh.

8. Methodology

a. The Project works to which the consultant shall provide professional services are divided into the following project phases:

I. Feasibility Study Phase

- Feasibility Study Part 1: Enhanced Feasibility Studies for 5 Priority Towns
- Feasibility Study Part 2: Feasibility Study for Remaining 20 Towns

II. Detailed Design Phase

- Detailed Engineering Design Part 1: DED for 5 Priority Towns
- Detailed Engineering Design Part 1: DED for Remaining 20 Towns

III. Procurement Phase

- The consultant shall develop the Procurement Strategy, Tender Documents including the Terms of Reference and other attachments
- The consultant shall provide technical support in the procurement of the contractor for the construction, testing and commissioning works necessary for the contract/s for the 5 Priority Towns package/s and Remaining 20 Towns package/s. The consultant shall work with the DPHE-assigned procurement specialist during whole duration of the procurement phase of the Project.
- Procurement documentation and implementation shall comply with the DPHE and AIIB procedures, policies, and regulations.

b. Documents and References. DPHE shall provide the following documents to the consultant for reference purposes only:

I. Report on the "Feasibility for Implementing Solid Waste and Fecal Sludge Management Systems (2020)" prepared by BMGF for DPHE for each of the 25 participating ULBs.
II. Report on the "Bangladesh City Inclusive Sanitation Project in 25 Towns (Jan 2023)" prepared by Citywide Inclusive Sanitation Technical Assistance Hub.

9. Scope of Works

a. Preliminary Works

I. **Kick-off Meeting.** DPHE will conduct a kick-off meeting (KOM) with the Consultants within five (5) days after the issuance of the Notice to Proceed (NTP). The meeting agenda shall include but is not limited to the following:

- introduction of DPHE and Consultant's Project Team and appointment of authorized parties' representatives; discussion of communication protocols;
- discussion of milestones and deliverables schedule;
- discussion on the preparation of the Project Execution Plan; Design Management Plan; Inception Report
- preliminary field surveys

II. **Project Execution Plan.** Within fourteen (14) days after the KOM, Consultant shall submit, for DPHE's review and approval, the Consultant's Project Execution Plan (PEP) and Design Management Plan (DMP). While some preliminary works may proceed prior to the approval of the PEP and the DMP, the execution of these preliminary works shall nevertheless be in accordance with the approved PEP and DMP. The PEP and DMP are live projects documents and shall be updated by the Consultant on a regular basis. As part of the PEP and DMP, the Consultant shall prepare the Project Schedule/Program. The Project program shall have an electronic copy prepared in MS Project or similar software

III. **Inception Report.** Within twenty-eight days (28) after the KOM, Consultant shall submit the Inception Report for DPHE review and approval.

b. Feasibility Study Part 1: Feasibility Study Update for 5 Priority Towns

I. Technical Feasibility

(i) Review the existing project documents including studies and assessments conducted with the support from the BMGF, including sanitation sector analysis, technical and institutional assessments, market analysis etc.
(ii) Review existing documents and update the Feasibility Studies for each of the five (5) Priority Towns. The review and updating shall cover, but is not limited to, the following areas of the Feasibility Study:
(iii) demographic and service demand projections,
(iv) baseline water quality condition of receiving waters and groundwater of project catchment areas,
(v) physical parameters of the influent wastewater/sludge, considering variability from different sources
(vi) Spatial analysis of coverage area including formulation of the implementation plan for achieving SDG 6.2: access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the need of women and girls and those in vulnerable situations by 2030.
(vii) project site-specific market assessment including existing service providers, customer preferences, tariffs and willingness-to-pay, and key stakeholder identification and determination of most appropriate service delivery model
(viii) Project site-specific institutional assessment of participating ULBs, including an assessment of existing systems and procedures, manpower resources, equipment and other physical assets, to determine interventions to operationalize a sustainable sanitation system at the ULB
(ix) Optioneering for different technological options and different service delivery models including the development of CAPEX and OPEX cost estimates,

(x) Optioneering for technical approaches including viability of decentralized sanitation systems (ex. septic tank desludging, communal facilities, etc.) or piped sewer systems (ex. separate systems, combined systems, condominial systems, etc.),

(xi) Analysis of identified risks including flood-risks, seismic risks, cyclonic storms, tidal surge or any remarkable localized risks if any.

(xii) Project site-specific disposal strategy for end-of-the process by products such as biosolid sludge, residual solid wastes,

(xiii) Sustainability strategies including possible water recycling, methane harvesting, use of renewable energy, etc.

(xiv) other recommendations on potential technology interventions required across the sanitation value chain; and

II. Economic and Financial Viability

(i) Carry out economic and financial analysis, to assess economic and financial viability of the Project including the following;

a. determine the Economic Internal Rate of Return and Net Present Value of each subproject;

b. explore feasible and sustainable financing schemes, taking into account current institutional capacity before and after the implementation of capacity strengthening plans, barriers to private sector participation, and a detailed overview of operational sustainability analysis and subsidy requirements by reviewing municipal's financial capacity, current and historic budget allocations in sanitation services; and

c. Estimate annual O&M expenditures for proposed subproject investments (salaries for operation, maintenance, administration and security; electricity and water bills; fuel and oil consumption; equipment and facilities maintenance; supplies; facility depreciation).

(ii) Estimating incremental investments in climate adaptation/mitigation measures; carry out GHG accounting in the baseline and with project scenario.

III. Environmental and Social Due Diligence(ESDD)

(i) Conduct a thorough analysis and review of the existing Environmental and Social Management Planning Framework (ESMPF), including its relevance and applicability to the updated project description;

(ii) Conduct a gap analysis between the current project status and the existing ESMPF and update the ESMPF as per the current project scope;

(iii) Ensure the revised project ESMPF complies with local environmental and social requirements and legislation and also complies with the requirements of AIIB Environmental and Social Standards (ESSs);

(iv) Identify and evaluate potential environmental and social risks associated with the changes in the project description and evaluate how these changes might impact the stakeholders and environment and propose mitigation measures.

(v) Update ESMPF to recommend a systematic, risk-based approach to select appropriate E&S instruments for each subproject, ensuring that they are commensurate with the nature and magnitude of the potential risks and impacts.

(vi) Classify each subproject according to its potential environmental and social risks and impacts to determine the level of assessment and management needed.

(vii) For subprojects with high environmental and social risks (Category A or equivalent), demand comprehensive Environmental and Social Impact Assessments (ESIAs) and detailed Environmental and Social Management Plans (ESMPs) to address the identified impacts.

(viii) For subprojects with moderate risks (Category B or equivalent)utilize a simplified assessment and management tools, ensuring that they are still sufficient to manage and mitigate the identified risks.

(ix) For subprojects with low risks (Category C or equivalent), establish standardized E&S checklists, codes of practice, or standardized ESMPs to manage and monitor potential impacts, ensuring they are in compliance with national legislation and AIIB's requirements.

(x) Prepare Environmental and Social Instruments for 5 priority subproject investments (i.e., Bogura, Gopalganj, Noakhali, Rajbari, Sherpur)in line with the revised ESMPF;

(xi) Prepare Resettlement Action Plans (RPs) for the subproject investments in line with the RPF;

(xii) Conduct a gender and disability analysis of the project in terms of: (i) human resource policy including analysis of staff information disaggregated by male-female, staff gender policies and programs that promote non-discrimination to women during recruitment and promotion, equal work for equal pay, provision and orientation activities on sexual harassment, (ii) project measures that promote welfare and opportunities for women engaged in the company /project, (iii) community activities/programs that promote women welfare and opportunities. The consultant will also explore potential gender measures to further promote women's opportunities and welfare in the Project. The disability analysis along with focusing on human resource policy of the client will assess the current challenges and entry points for improving universal accessibility to the stations under the remit of the project.

(xiii) Prepare a Gender Action Plan (GAP) to mitigate the adverse impacts and promote inclusion/equality for benefit-sharing for the female. In consultation with relevant stakeholders, including Client and community members, measures will be identified to prevent potential negative impacts caused by the influx of migrant workers in the community and the risk of gender-based violence, sexual exploitation and abuse, sexual harassment (GBV/SEA/SH), and included in the management plans;

(xiv) Identify risks to and impacts on vulnerable groups and develop measures for their mitigation; and

(xv) Provide inputs on the tender documents to incorporate E&S requirement and compliance based on the ESMPF

c. Feasibility Study Part 2:Feasibility Study for Remaining 20 Towns

I. Prepare the Feasibility Study for remaining 20 Project towns following the outline of the Updated FS for the 5 Priority Towns presented in Section 4.2.

II. In addition to the scope presented in Section 4.2, Feasibility Study Part 2 shall also include the following Project-wide activities

(i) Based on the CWIS Planning assessment, combined CWIS-inclusive cost for all 25 towns.

(ii) Water source development in small scale at priority basis including for all 25 towns, which includes planning and conducting hydro geological investigations (boring, test tubewell installation, soil sample analysis, standard pumping test and also investigation of existing water source and upgradation plan) in search of potable water and pollutant interaction to aquifer system in areas yet to explore fully in 25 towns.

(iii) Conduct the Economic Analysis for all 25 towns combined

(iv) In coordination with DPHE, develop the Project Results Framework (RF) including baseline and result indicators, and monitoring and reporting arrangements that comply with AIIB requirements

d. Data Gathering and Field Surveys for all 25 Towns

I. GIS survey / GIS data acquisition for spatial analysis of covered area (only for the 20 Towns. And data of prioritized 5 towns have to check and enhance(if needed).

II. Demand Verification

(i) Water quality sampling of influent wastewater quality (septage sludge)

(ii) Survey on Volume septic tanks

III. Baseline establishment

(i) Water quality baseline of major streams in the catchment area of the participating ULBs

(ii) Groundwater survey including water quality

IV. Site-investigation of wastewater treatment plant site:

(i) Parcellary survey / Topographic survey

(ii) Geotechnical survey

V. Environment and Social Due Diligence surveys (which may include resettlement survey depending on site nominated by ULB)

VI. Willingness-to-pay surveys

VII. **Note:** The cost of above activities shall be under the Provisional Sum component of the financial proposal. The implementation program of the field surveys shall be synced with the completion target dates of FS Part 1 (5 Priority towns) and FS Part 2 (Remaining 20 towns).

e. Detailed Engineering Design

I. Conduct Value Engineering Workshop

II. Prepare detailed designs report including technical specifications, and issue for construction (IFC) drawings covering the following:

(i) Production tube well with pipe network for small scale water supply system development.
(ii) fecal sludge treatment plants(can be mechanical or non-mechanical depending on FS results)
(iii) fecal sludge delivery system (can be sewered or non-sewered/truck-based systems depending on FS results)
(iv) public and community toilet as identified for each town
(v) reservoirs (ground), mechanical works, installation of different equipment and electrical works including instrumentation and control system;1 and
(vi) sludge de-watering, co-composting/co-treatment facilities, and wastewater treatment plant, mechanical plant, water and drainage facilities associated for integrated sanitation services and each and every subcomponents;
(vii) Calculation sheets in Excel and/or native modeling software shall be submitted to DPHE along with design report
(viii) Prepare bill of quantities (BOQ),and cost estimates;
ix) Prepare the detailed engineering design in accordance with the ACI & BNBC standards and good engineering based on the project ESMF
(x) Comply with the approved change management procedure in coordination with the DPHE to address any material and design changes or deviation from BNBC Standards and Specifications and ensure that the recommended alternate design, material or solution is equal or better.
(xi) Conduct and facilitate design review workshops with the DPHE (PMU) to expedite review of critical design documents.
(xii) Liaise with all project stakeholders for the smooth review of all design documents.
(xiii) For the purpose of knowledge transfer, the Consultant shall submit and discuss with the DPHE (PMU) editable spreadsheets showing detailed design validation calculations as well as standards and practical guidelines used in reviewing the existing drawings (if any).

f. Engineer's Approval for Process Structure Drawings

(i) All drawings of the process buildings and ancillary items issued by the Consultant will be reviewed by DPHE to ensure that the buildings and ancillary items will meet with their design intent and that the proposed layouts are workable and practical.
(ii) The drawings shall be modified and re-issued as necessary following a HAZOP study, facilitated by third party or in-house HAZOP practitioner.
(iii) DPHE owes no duty to the Consultant to review the design submitted by the letter for errors, omissions or compliance with the Contract. No comments on, reviews or rejection if, or

[1]Consultant shall have to submit the design calculation sheets for all components such as production well design, network analysis, overhead tank, treatment plant, impounding reservoir, drainage works, E&M machinery, etc. in the form of soft and hard copies.

permission to use the design by the Employer will relieve the Consultant from, or alter or affect, the Consultant's liabilities under the contract.

g. Procurement Support

I. The Consultant, in consultation with DPHE, shall prepare the contract packaging strategy to maximize project efficiency and prepare the procurement plan and detailed procurement schedules

II. Prepare tender documents[2] for each contract package, including general specifications and detailed technical specifications for the procurement of all goods and works, and E&S compliance and requirements.

III. The Consultant shall support DPHE in procuring the contracts for the 5 Priority ULBs, which are expected to be bid within the duration of the consultancy. The contractor shall provide the following procurement support services:

(i) Support DPHE during the tender preparation process by joining and inputting to the pre-bid conference, and answering technical and cost-related bid queries

(ii) Support DPHE during the tender evaluation process by providing review of the Technical Proposal

h. Project Management Support

I. Prepare a Project Close out Report that consolidates the key outcomes of the Consultancy;

II. Support DPHE in preparing the draft Project Implementation Manual (PIM) for executing the Project compliant to AIIB requirements

10. Consultancy Period and Implementation Arrangements

a. The Preparation and Design Consultant will be engaged under the Project Management Unit (PMU) for a total period of 15 months up to June 2025. DPHE will provide office space (Partially) to the consultant and it will be located in the DPHE headquarters building in Dhaka.

[2]Tender documents should be prepared in compliance with AIIB's Procurement Policy and Interim Operational Directive on Procurement Instructions for Recipients; Project's ESMPF as well as relevant regulations of GoB.

11. Key Deliverables:

a. The following reports and documents consultants shall submitted ten (10) hard copies to DPHE and in soft copy in both editable native format and digitally signed PDF format. The language of all reports shall be in English. The executive summary of all reports shall have Bengali translation.

b. DPHE shall be the owner of all the software (all format), design, reports, modules, manuals, and other documents prepared and procured under the project. After completion of the project, all documents/results/tools & equipment and all necessary software should be handed over to DPHE before final payment. The consulting firm shall accommodate the latest version of all the computer software/programs and shall provide the latest version while transferring database/tools/ software to DPHE.

Ref	Key Deliverables	Frequency	Timeframe
1	Inception Report (including work plan, deployment of personnel at PMU and Field level, initial safeguards assessment)	One Time	within 30 calendar days after signing of contract
2	Monthly Progress Presentation and Minutes of Meeting *with Timesheet.*	Monthly	within 25th of every month
3	Feasibility Study Part 1: Report for 5 Priority Towns; Social and Environmental Safeguards Package for 5 Priority towns: • ESDD Report including ESIA or appropriate instrument based on updated ESMPF • Environment and Social Action Plan • Stakeholder Engagement Plan	One Time	3th month after signing of the contract
4	Feasibility Study Part 2: Report for Remaining 20 Towns; Social and Environmental Safeguards Package for remaining 20 Towns: • ESDD Report including ESIA or appropriate instrument based on updated ESMPF • Environment and Social Action Plan • Stakeholder Engagement Plan	One Time	7th month after signing of the contract
5	Detailed Design and Procurement Package for 5 Priority Towns • Value engineering workshop • Detailed design report • BOQ and Cost Estimates • Draft Bidding Documents	One Time	• 3th month • 4th month • 5th month • 5th month After contract signing respectively
6	Detailed Design and Procurement Package for 20 Remaining Towns • Value engineering workshop • Detailed design report • BOQ and Cost Estimates • Draft Bidding Documents	One Time	• 9th month • 10th month • 11th month • 12th month After contract signing respectively
7	Conduct and facilitate design review workshops with the DPHE (PMU) to expedite review of critical design documents.	One Time	Within 14th months after signing of contract
8	Technical Evaluation Report for the Tendering of contracts for the 5 Priority Towns	One Time	8th month after signing of contract.

12. Team Composition and Required Key Experts

a. Consultant shall engage and assign the minimum technical and management personnel discussed in the succeeding sections. Consultant shall include, as part of the Project Execution Plan, a roster of these personnel with documentary evidence of their professional qualification (i.e., related project successfully completed, globally recognized professional certifications, etc.).

b. The Consultant may propose other key experts/specialists and supporting staffs required to accomplish the tasks outlined in this document. It is the Consultant's responsibility to select the optimum team and to propose the professionals which he believes best meets the needs of the project.

c. To meet the timelines of an early finish for the DED and Procurement documents for the 5 Priority Towns by 4th and 5th respectively and completing the DED and Procurement documents for the Remaining 20 Towns by 10th and 12th respectively (refer to table in Sec. 6.2 for complete milestones), DPHE envisages the Consultant to field at least three project teams working simultaneously. These two project teams is partially reflected in the Staffing Numbers as reflected in the table in Sec. 7.4.4.

d. Key Experts

I. Key experts are subject for approval of DPHE – physically present during weekly coordination meetings

II. Other Experts - The Consultant is free to propose additional experts to form the team which he believes best meets the objectives of the project. Other experts beyond those presented below shall be subject for approval of DPHE

III. Support Staff - No approval required from DPHE.

IV. Staffing Requirement per Phase

Ref	Position	Nos.	Minimum Experience Requirements
1.	Project Manager (Team Leader)	1	• 20 years total professional experience • 15 years specific experience in managing or leading sanitation or WASH projects • The Project Manager (Team Leader) must demonstrate the following: o Experience in managing or leading at least five (5) sanitation / WASH projects in Bangladesh o International Experience in managing or leading at least 2 WASH/ sanitation project abroad. o Experience in managing or leading MDB-funded projects should be highlighted
2.	Sanitation/WASH/ Fecal Sludge Management Specialist, (Deputy Team Leader during FS Stage)	1	• 15 years general experience • 8 years specific experience in managing or supervising or designing sanitation or WASH projects • Experience in managing or supervising or designing at least three (3) sanitation / WASH projects in Bangladesh. • International Experience in managing or leading at least 1 Fecal Sludge treatment project project abroad.
3.	Solid Waste Management/ Composting Specialist	1	• 15 years general experience • 8 years specific experience in planning, design, and implementation of solid waste management projects. • Experience in supervising or designing at least (3) solid waste management projects in Bangladesh.

Ref	Position	Nos.	Minimum Experience Requirements
			• International Experience in managing or leading at least 1 Solid waste/ composting plants management project abroad. • Application of innovative solid waste technologies should be highlighted
4.	Water Quality Specialist	1	• 10 years of specific experience in planning, design, and implementation of water source or water supply development project in Bangladesh. • Experience in at least five (5) water sources or water supply development project.
5.	GIS Specialist	2	• 10 years specific experience in GIS/ Remote sensing towards planning, development and implementation of urban projects
6.	Pipe Network Designer/ Modeler	2	• 15 years of general experience. • 10 years of specific experience in planning, design, modeling and implementation of piped water supply projects. Must have experience in computer aided pipe network modeling analysis and design in similar projects. • Experience as network designer/hydraulic designer in at least five (5) projects
7.	Environmental Safeguards Specialist	2	• 10 years of general experience. • 5 years specific experience on environmental safeguards assessment, planning and monitoring (ex. conducting IEE, EIA, etc.) • Experience as environmental safeguards specialist in at least three (3) MDB-funded projects (ex. AIIB, World Bank, IFC, ADB, etc.)
8.	Social Safeguards Specialist	1	• 10 years of professional experience. • 5 years specific experience in social safeguards including assessment, planning, implementation and monitoring of social development projects including resettlement and rehabilitation, etc. • Experience as social safeguards specialist in at least three (3) MDB-funded projects (ex. AIIB, World Bank, IFC, ADB, etc.)
9.	Gender Specialist	1	• 10 years of professional experience. • 5 years specific experience in gender including assessment, planning, implementation and monitoring of social development projects including resettlement and rehabilitation, xx • Experience as social safeguards specialist in at least three (3) MDB-funded projects (ex. AIIB, World Bank, IFC, ADB, etc.)
10.	Wastewater Treatment Process Design Specialist and Design Manager (Deputy Team Leader during Detailed Design Phase)	1	• Minimum: Licensed Civil, Chemical or Sanitary Engr. or related field • 15 years general experience • 10 years specific experience a process design engineer in WTP or STP projects • Experience as a process design engineer in at least five (5) WTP/STP projects
11.	Wastewater Treatment Systems Specialist (Low-Cost)	1	• 10 years general experience • 5 years specific experience in designing, and testing and commissioning of low-cost wastewater treatment systems including nature-based systems, constructed wetlands or combinations thereof with other technologies • Experience as a process design engineer in at least five (5) low-cost wastewater system projects.
12.	Structural Engineer	2	• Licensed Structural Engineer • 15 years general experience • 10 years specific experience in designing in computer-aided

Ref	Position	Nos.	Minimum Experience Requirements
			design of hydraulic structures, RCC or steel structures • Experience as structural engineer in a least three (3) projects, such as WTPs and STPs, RCC &steel structures,
13.	Geotechnical Engineer	2	• 15 years general experience • 10 years specific experience in geotechnical/foundation design of facilities • Experience as geotechnical engineer in a least three (3) projects, such as WTPs and STPs, RCC &steel structures,
14.	Electrical Engineer	1	• Licensed Electrical • 15 years of general experience • 10 years specific experience in designing electrical systems of facilities
15.	Mechanical Engineer	1	• Licensed Mechanical Engineer • 15 years of general experience • 10 years specific experience in designing mechanical systems of facilities such as WTPs and STPs
16.	Geodetic Engineer/ Survey Engineer	3	• Licensed Geodetic Engineer • 15 year of general experience • 10-year specific experience in conducting, and/or managing surveys
17.	Quantity Surveyor / Cost Engineer	2	• Licensed Engineer • 10-year experience as QS and Cost Estimator in hydraulic infrastructure projects including STP/WTP, water transmission lines, sewer network system, etc.
18.	Procurement Specialist (Deputy Team Leader during Procurement)	1	• 15 years total professional experience • 10 years specific experience in managing or supervising the procurement of MDB-funded projects
19.	CAD Engineer/Design Documentation Specialist	3	• 5 years' experience in computer-aided design and drafting Experience on design document of hydraulic infrastructure, well design, water supply system design of projects should be highlighted. •
20.	Ground Water Specialist(Hydrologist)/ Drainage designer	1	• 10 years of experience in relevant area spanning hydrological assessment studies, prepare litho-stratigraphy bore hole logging, hydrochemistry, well design, pump/aquifer test design, especially ground water usage for public water supply systems. • 8years' experience in conducting ground water modeling and ground water systems design

e. DPHE envisages professional staff inputs as per the table below, which is indicative. The Consultants shall propose their own staffing plan and inputs depending on the specific capabilities of its team that they deem will best achieve the goals of the assignment as described in the TOR.

	Position	Indicative Input-month
1	Project Manager (Team Leader)	15
2	Sanitation/ WASH/ Fecal Sludge Management Specialist, (Deputy Team Leader during FS Stage)	12
3	Solid Waste Management/ Composting Specialist	12
4	Water Quality Specialist	15
5	GIS Specialist	15
6	Pipe Network Designer/ Modeler	12
7	Environmental Safeguards Specialist	12
8	Social Safeguards Specialist	12
9	Gender Specialist	15
10	Wastewater Treatment Process Design Specialist and Design Manager (Deputy Team Leader during Detailed Design Phase)	15
11	Wastewater Treatment Systems Specialist (Low-Cost)	12

	Position	Indicative Input-month
12	Structural Engineer	15
13	Geotechnical Engineer	12
14	Electrical Engineer	9
15	Mechanical Engineer	9
16	Geodetic Engineer / Survey Engineer	15
17	Quantity Surveyor / Cost Engineer	15
18	Procurement Specialist (Deputy Team Leader during Procurement)	9
19	CAD Engineer/Design Documentation Specialist	12
20	Ground Water Specialist(Hydrogeologist)/ Drainage Designer	15

f. The consultant shall ensure that there is sufficient non-key staff such as Junior Engineers, CAD Operators, survey specialists, administrative and secretarial provision to enable experts to concentrate on their primary responsibilities.

g. The consulting firm shall submit a detailed work plan in MS Project Format as part of the technical proposal.

h. The Consultant shall also submit as part of the financial proposal the Consultancy manpower histogram and the corresponding man-hours for each key expert for each project phase.

i. The Consultant shall, at its own cost, immediately remove and replace any of their key experts whom DPHE, in its sole discretion, considers:
   I. To be incompetent and/or insubordinate and/or
   II. To have acted in a manner prejudicial to DPHE's best interests and/or
   III. To have failed to comply with DPHE's safety, health, security or other rules or regulations and/or
   IV. To have produced or performed sub-standard work and/or
   V. To have demonstrated unexplained or unacceptable absence from project activities

j. The Consultant will not be entitled to any additional fee for delays incurred which are attributed to the Consultant failure to properly manage the project or project team, including delays caused by removal or replacement of key experts.

13. Logistics

a. The consultant shall ensure that all members of the CONSULTANT's team are equipped with adequate computing, all the necessary IT hardware and ancillary equipment such as printers, document processing, electronic mail facilities, communication devices, and other equipment as needed (ex. photo or video documentation devices). DPHE (PMU) intends to partially house the consultant team at PMU.
b. All equipment and/or furniture purchased by the Consultant for the Assignment shall be transferred in good condition to DPHE at the end of the Consultancy Services.

14. Schedule of payment

a. Payment shall be made to the Consultant following the provision hereto:
   I. All payments shall be made from the office of the Project Director, DPHE.
   II. No payment for disproportionate progress/achievement of the target.
   III. A proportionate penalty shall be imposed for delay of service delivery as per special conditions of contract and arbitration rules of PPR, 2008.
   IV. Taxes shall be deducted at source from the payment as per the rules of the Government of Bangladesh.
   V. Percentages are fractions of the total contract amount excluding provisional sums
   VI. Payment shall be output-based in case of (like design etc.) as follows:

Ref.	Key Deliverables	Percentage
1	Inception Report (including work plan, deployment of personnel at PMU and Field level)	5%
2	Feasibility Study Part 1: 5 Priority towns and Social and Environmental Safeguards Package for 5 Priority towns:	10%
3	Feasibility Study Part 2: Remaining 20 towns and Social and Environmental Safeguards Package for remaining 20 Towns:	30%
4	Detailed Design and Procurement Package for 5 Priority Towns	10%
5	Detailed Design and Procurement Package for Remaining 20 Towns	40%
6	Technical Evaluation Report for Procurement of 5 Priority Towns	5%

Provisional Sum:

b. The following cost items shall be reimbursed based on actual expenses. The Consultant shall include costs in the Provisional Sum component of their Financial Proposal;

Ref	**Other Items**
1	Support Staff (Draftsman, clerk, work clerk, office attendant)
2	Air fare and travel expenses
3	Per diem (international)
4	Per diem Domestic
5	Vehicle Rental
6	Computer, laptop, printer and, other equipment
7	Office operations

Ref	Other Items
8	Photocopier, Scanner, telephone, internet modem, other necessary office equipment and accessories
9	Projects report, town wise report, GIS mapping, modeling, training modules
10	Office stationeries
11	Office setup including furniture setup, recurring cost, maintenance
12	Surveys: **See Section 18**
13	Miscellaneous

15. Counterpart Staff and Facilities

a. DPHE will make available adequate counterpart staff. DPHE will also make available to the consultants all relevant reports, documents and data/info on an 'at cost basis'. The consultants shall clearly indicate in their financial proposal the number and person-month requirement of additional counterpart personnel needed as well as the detailed requirement of logistics, equipment and supplies. The consultants should have separate office in Dhaka but have to report to PMU every day. During work in the field, they will be attached to the district offices according to a schedule and arrangements to be decided at the time of consultancy contract negotiations.

16. **Requirements on Confidentiality and Conflicts of Interest**

a. Confidentiality. Information relevant to proposal evaluation and recommendations concerning awards shall not be disclosed to the Consultant who submitted the proposals or to other persons not officially affiliated with the process, until the winning firm has been notified. Likewise, all information disclosed to the bidders during the conduct of the bidding process shall not be used for any other purpose other than what is covered by the Terms of Reference.

b. Conflict of Interest. The Consultant and its affiliates, as well as any sub- Consultant, shall be disqualified in providing works or services (other than the work that are considered a continuation hereof) for any project that are closely related to the work covered by this document.

17. Attachments

a. Annex 1: Design Reference
b. Annex 2… Roles and Responsibilities
c. Annex 3: EOI Sample Forms

Annex 1
Design Reference

1. Design Reference

1.1 The CONSULTANT shall carry out the detailed design and engineering works observing the best engineering practices and ensuring that the design shall cater to the specified Project requirements, constructability, and least life cycle cost.

1.2 All design shall be in accordance with the best modern practice and shall facilitate safe access for inspection, cleaning, lubrication, repair and replacement to ensure satisfactory operation under all service conditions. It shall also take into account constructability, potential disturbance to and interfacing with operation of existing facilities, neighboring community and industries, and general operation and maintenance requirements.

1.3 Develop and submit for DPHE review and acceptance of the complete set of plans, calculations, specifications, scope of works, bill of quantities, and cost estimates, detailed specifications with preference/nominated suppliers, as well as baseline construction procedures/methodology, geo-hazard study/analysis and construction schedule as part of the design report, as necessary, and other documents as required for the actual implementation

1.4 The CONSULTANT should use the following reference codes and standards

1.4.1 If the CONSULTANT opts to utilize codes or references other than those listed below, one (1)full authorized English copy of such alternative codes and references adopted for the works shall be submitted to Employer with the final report.

1.4.2 Unless specified otherwise, all submittals and drawings shall be in S.I units.

1.4.3 The following codes and standards shall apply, as a minimum but not limited to:

i. Bangladesh National Building Code (BNBC)
ii. Environmental Conservation Rules 2023
iii. DPHE Standard Engineering Specifications (DPHE SES)
iv. American Society for Testing and Materials (ASTM)
v. American Concrete Institute Manual of Concrete Practice (ACI)
vi. American Society of Civil Engineers Manual 7 – 95 (ASCE)
vii. Uniform Building Code 1997
viii. American Institute of Steel Construction, Allowable Stress Design (AISC-ASD)
xii. American Water Works Association (AWWA)
xiii. International Organization for Standardization (ISO) Standards
xvii. AS 1281 Cement Mortar Lining of Steel Pipes and Fittings
xxii. Alternatively, other Standards may be employed, subject to approval by DPHE or standard established in DPHE (DPHE FSM lab). Where dispute arises in the interpretation of the standards, the more rigorous shall prevail.

1.5 Water Quality Baseline Survey:

1.5.1 The Water Quality Baseline Survey will cover each of the 25 municipalities the following parameters:

i. pH
ii. BOD_5
iii. COD
iv. TSS
v. Oil & Grease
vi. Nitrate
vii. Phosphate
viii. Total Coliform
ix. Hg (for drinking water sampling points)
x. As (for drinking water sampling points)

1.5.2 The activity will be conducted as follows:

i. Collection of sample from at least 3 (three) sites with GPS location/position (inlet at TP, Outlet from TP, (water body/ground water source) at disposal point, every 10 days interval under strict supervision and presence of PMU/PIU.
ii. Sample should be signed and sealed by PIU (EE), ULB's, consultant's representative and having informed to PMU before delivered for testing.
iii. Samples should be tested from DPHE FSM lab or any public university lab with certificate of authentication.
iv. Test report has to be submitted to PMU in completion of every cycle. (Each month).

1.6 **Groundwater Source Development**. The activity will be conducted as follows:

1.6.1 Desktop study - general data gathering of information to get an idea of the geology of the area, any groundwater information, existing wells (DPHE or any source available publicly), etc. The desktop study shall determine the survey activities to be done including location and depth of test wells, depth of screening.

1.6.2 Geophysical survey (normally via electrical resistivity/VES) and hydro census. The hydro census shall identifying existing wells (industrial, commercial, or residential), their location, and usage, yield, etc.

1.6.3 Drilling and installation of test wells - Can be one or two, or more depending on result of the survey per ULB. Well design shall be based on the survey results and the actual soil and rocks encountered during the drilling (geophysical surveys are indirect while drilling is direct information). Driller installs the test wells at this stage.

1.6.4 Conduct Falling head tests and pumping tests are required to determine yield and how fast the aquifer recharges. The tests will determine optimal extraction rate, hence also the pump size recommendations.

1.7 Geotechnical Survey

1.7.1 Geotechnical Investigation for proposed wastewater treatment facilities at the 25 participating ULBs shall be performed by a local Geotechnical Exploration Firm. Such firm shall have under its employ a locally licensed Engineer-of-Record with core competencies and experience relevant to the investigation.

1.7.2 A copy of the CV of the locally licensed Engineer-of-Record that will take professional liability for the contents of the geotechnical report, detailing qualifications and experiences relevant to the project, shall be included in the bid proposal of the Respondents.

1.7.3 The proposed works must conform to the following standards:

a) The National Building Code of the Bangladesh (BNBC)

b) The National Structural Code of the Bangladesh

c) ASTM Standards

1.7.4 Alternatively, other standards may be employed, subject to approval by DPHE. If any difference exists in the requirements of the standards and codes mentioned above, the more applicable and rigorous shall prevail.

1.7.5 Soil classification and other geotechnical parameters required shall be based on field and laboratory tests of materials disclosed by borings or excavations made in appropriate locations. All information and data obtained from the exploration (complete record of field and laboratory findings) shall be included in the report. Such GI data shall be made comprehensive as possible for independent interpretation

1.7.6 Calculations, spreadsheets or printed software input-output used to develop results shall be submitted along with the Final GI Report as part of appendices.

1.7.7 Operations and methods of drilling shall be planned for maximum core recovery

1.7.8 The CONSULTANT shall undertake geotechnical investigations required to ascertain the ground conditions and design parameters for designing and constructing the Works.

1.7.9 The cost of acquiring geotechnical information shall be included in the bid amount.

1.7.10 This geotechnical report shall include an analysis for the soil, showing relative amounts of any components that would adversely affect the durability of the concrete.

1.7.11 The geotechnical report shall likewise define all required seismic coefficients required for structural design in accordance to the Uniform Building Code of 1997.

1.7.12 The CONSULTANT'S geotechnical consultant shall be available during any or all coordination meetings if and when DPHE requires their attendance.

1.8 Wastewater Treatment Design

1.8.1 The facility shall be designed to comply with the relevant laws and policies of Bangladesh regarding wastewater treatment namely, Environmental Conservation Rules 1997 and Environmental Conservation Rules 2023.

1.8.2 The treated effluent limits shall be as follows:

Standards for Sewage water in Bangladesh

S/N	Parameter	Unit	Standard Limit(Environment Conservation Guideline update 2023, Schedule-3
1.	Temperature	°C	30
2.	pH	-	6-9
3.	BoD_5 at 20°C	mg/l	30
4.	COD	mg/l	125
5.	Suspended Solid	mg/l	100
6.	Oil & Grease	mg/l	10
7.	Nitrate (NO3)	mg/l	50
8.	Phosphate (PO4)	mg/l	15
9.	Total Coliform	CFU/100 ml	1000

Source: Environmental Conservation 2023 (Schedule 3 respectively)

N.B: Consultant team has to keep in mind the above parameters in designing the treatment plants that the interventions would be able to meet the standards.

1.8.3 To satisfy the main objectives of this project, the standards of different sub-components should be compared with innovative modern and waste to resource recovery & mechanical treatment technology.

1.9 Seismic Analysis

1.9.1 Inertia forces developed by the structure and its contents during seismic excitation shall be determined based on the recommended procedures of ACI 350.3-06.

1.9.2 Unless allowed otherwise by DPHE, parameters used in the seismic analysis shall be site specific.

1.9.3 An importance factor of Z=0.20g (g=gravitational acceleration) (minimum) shall be used in the analysis. A higher value may be used as recommended by CONSULTANT.

1.9.4 Effects of vertical acceleration to the structure and its contents shall be considered in the seismic analysis

1.9.5 Where it can be shown by calculation that developing dynamic earth pressures can be neglected, the designer can dispense with a seismic analysis that includes dynamic earth pressures. Otherwise, dynamic earth pressures shall be calculated based on the Mononobe-Okabe Method.

1.9.6 Where there is liquefaction potential, reduction in soils strength shall be presented and must be validated through acceptable references.

1.9.7 For all buried tanks and chambers global stability check shall be provided against floatation/uplift with a factor of safety of 1.50 or consultant may suggest for safety and cost effectiveness of the structure.

1.9.8 Environmental durability factor (Sd) according to 9.2.6 of ACI350.6 shall be incorporated in load combinations requiring it.

1.10 Structural Design

1.10.1 The Works shall be designed to withstand pressures and seismic loading in accordance with the BNBC and National Structural Code of the Bangladesh.

1.10.2 For structural concrete, the 28-day compressive strength shall not be less than 24 MPa for general structure and 28 MPa for water retaining structures.

1.10.3 All structural designs for foundations, super-structures, slope protection and related support structures shall be subject to certification by the Structural Consultant whose Engineer-on-Record must either be a member in good standing of the Association of Structural Engineers of Bangladesh.

1.10.4 A 3D structural model of the structure (foundation, super-structure and others) is required for the static and dynamic analysis. It is preferred that 3D modelling be done in STAAD.Pro. V8i Build 1005. Should the Structural Consultant opt to use other structural applications, or newer versions of STAAD.Pro for the mathematical modelling, the bid shall include the provision of providing DPHE an authorized stand-alone copy of the said program, including training in the use of the said program for four (4) DPHE's representatives

1.10.5 Analysis Considerations

a) Sizing of the foundation system(s) shall be done with service level forces.

b) Design for concrete sections shall be performed at Ultimate Strength level.

c) Design of the steel superstructure shall be by Allowable Stress Design. Material strength increase is not allowed. The effect of vertical acceleration shall be considered.

1.10.6 Seismic design of liquid-containing structures shall be in accordance to ACI350.3-06 and to comply with provisions as stated in Alternative Method of Analysis using UBC 97 Procedure. Importance factor shall be taken at least 1.50.

1.10.7 Structural Design Calculation Package

d) A Soft Copy of structural design calculations (input and output) for all structures and foundations in its original electronic file format, along with a hard copy signed and sealed by the Engineer-of-Record, shall comprise the structural calculation package, and shall be submitted to Employer's for approval.

e) The calculation package shall at least contain the following:
   i. Technical Narrative
   ii. References
   iii. Design Criteria
   iv. Load Derivations
   v. Structural Modeling and Load Application
   vi. Analysis Results and Interpretation
   vii. Component Design
   viii. Plans and Spot Details in A3

ix. Site Investigation Reports
x. Copy of Geotechnical Report
xi. Site Photos
xii. Photocopy of License of Structural Design Software
xiii. Photocopy of Professional License
xiv. Photocopy of ASEP ID

1.11 Mechanical Design

1.11.1 General

i. All Mechanical design and equipment to be use shall conform with DPHE SES and standard drawing.
ii. All Facilities shall have fire protection plans, in accordance with the Fire Code of the Bangladesh.
iii. Facilities should be designed with an adequate Air – conditioning and Ventilation system

1.11.2 Piping System

i. All design and materials for piping system inside the pumping station should conform to DPHE SES and Standard drawing.
ii. Piping. Total dynamic head greater than 35m– ISO7005-1/2, PN 16 or higher, Pipe type-Steel pipe, Inside Coating-406 microns epoxy lining(pumping), 8mm thickness cement lining for below 600mm dia.(network only),Outside coating-coal tar enamel coating(buried) per AWWA 203 & rubber alkyd paint coating(exposed) per AWWA218 and coating with PE sheets. Analyze for transient condition (surge): Bentley Water Hammer Surge Analysis.
iii. Use SAV. Discharge Piping velocity of the system for pumping station shall be for a maximum of 3meters per sec. Suction piping system shall be greater size than discharge piping system. Valves shall be with dismantling joint suitable to the system. Bands and Arrows color shall be as base as per DPHE SES. Suction branch butterfly valve shall be manual operation per set. Suction header butterfly valve shall be manual operation Discharge branch butterfly valve shall be manual and with provision for motorized operation (future) per set. Discharge header butterfly valve shall be manual and with provision for motorized operation (future). Analyze for transient condition (surge): Bentley Water Hammer Surge Analysis. Use SAV
iv. Valves. Butterfly valves: below 150 mm dia.–wafer type; 150 mm dia and above–flanged, PS suction and discharge line.
v. Gate Valve-Drain and blow off valve, Drain/blow off valves on all low points of piping, reservoir and PS. Flange Type.
vi. Check valve–non-slam type with air cushion, lever arm with counter weight.
vii. Double acting Air release valves on pumping suction and discharge branch and header and all high points of piping with isolation valve.
viii. Pressure gauge-pumping suction and discharge branch and header with isolation valve and manual drain.
ix. Surge anticipation valves,1on duty, 1on standby, with isolation valves, sized for 5m/s discharge maximum velocity of pumping system
x. Wye strainers must be readily maintainable while still installed along the pipeline.

1.11.3 Noise

i. The operational site shall not cause excessive noise disruption to the surrounding community. All facilities shall be designed to operate free from any noise louder than 85dB (A) one (1) meter from the site boundary.
ii. The Contractor shall perform a noise survey prior to commencing construction to determine the current noise level at the site, and demonstrate that the completed treatment plant at its full operation shall not increase the current noise levels above 3dB. The location of the monitoring points shall take into consideration position of the sensitive receiver and be agreed with Owner prior to survey commencement.

1.12 Electrical Design

1.12.1 General. The functional specifications stated herein shall be interpreted within the context of the Bid, TOR, DPHE SES, and all supporting reference drawings.

1.12.2 **Power Supply**

i. Power is derived from the secondary pole-type transformer provided by the utility company, in the area. All power source shall be taken from the low-voltage (secondary) connection, 460V, 60Hz, 3-phase, to the dedicated pole mounted distribution transformer to be provided by Utility Company.
ii. All Mains and feeders LV cable shall be installed as per DPHE SES or any applicable code.
iii. LV power cable feeders to submersible pumps shall use multi-core cable suitable for deep well.

Motor Drive (if needed)

i. For any Pump Station, pump motors shall be provided with VFD (variable frequency drives).
ii. All VFD and VSD shall be as per DPHE SES.

1.12.3 **Process Controller (if needed)**

i. The entire plant installation shall be controlled using PLC-based controller with Profit bus process communication protocol, following DPHE preferred process plant control scheme.
ii. A single master PLC type Controller located in the Pump Station control room shall be provided to remotely control all Pump Station pumps.
iii. The controllers shall be equipped with Profibus process bus, connecting all VFD's, level sensors, pressure sensors, flow sensors, etc.
iv. The controllers shall be provided with dedicated plant alarm inputs through dry contacts and digital inputs, such as reservoir alarms, motor alarms, etc.
v. The controllers shall be provided with communication facilities for remote operation, compatible with DPHE water supply SCADA system.
vi. Provide an industrial-grade touch screen HMI LCD display for the master control PLC. The HMI shall be located at the main control cabinet. The HMI GUI shall be reflected as well on the station computer.

1.12.4 **Utilities**

i. Contractor to secure the following utility connections in favor of DPHE: electric power and internet connection.
ii. Provide owner-side electric energy meter/instruments for each mains feeder for energy balance.

1.12.5 **Secured Power**

i. Provide UPS (uninterrupted power supply), with 4-hour back up time, to supply power to PLC, Process IT, CCTV, Sensors/Transmitters.
ii. Provide UPS output panel with rail mounted CB to distribute power accordingly. Use CB with GFCI for UPS power distribution to field sensors/instruments/transmitters.

1.12.6 **Pump Station Bldg**

i. The Pump Station (PS) Bldg shall house the following equipment: water pumps, chlorinator, low voltage switchgear (LVSG), VSDs, Control Cabinet, CCTV Controller and IT Computer.
ii. The PS Bldg shall be partitioned to pump room and control room . The pump room will house the water pumps and chlorinator. The control room will house the LVSG, Control Cabinet, IT Computer and CCTV Controller.
iii. The control room will be equipped with redundant air conditioning.

iv. Provide industrial type exhaust fan in the pump room, with automatic controller.
v. Provide industrial grade lighting and power outlets as per DPHE ESA requirements.

1.12.7 **Standby Power**

i. The pump station shall be provided with standby power using diesel generating sets.
ii. The Contractor will calculate the load and nominate the appropriate rating of the genset in accordance to DPHE SES or applicable code.
iii. Provide Automatic Transfer Switch (ATS). The ATS shall be fitted inside the control cabinet for deep wells, and inside the LVSG for the pump station.
iv. Install genset above the 100-year flood level elevation.

1.12.8 **Others**

v. Provide standard MEP requirements for a Toilet facility or room near or within the Pump Station Building.

Annex-2:-I. Project Manager (Team Leader) (1X15=15person-months)(International) As a team leader in this project, the individual is responsible for providing leadership, coordinating project activities, overseeing design, supervising the project team, and ensuring accurate reporting. His/her role is crucial in ensuring the design meets the project objectives and is able to deliver quality sanitation infrastructure to improve the urban environment. Here's a brief overview of their responsibilities but not confined to:

Design:

- The team leader provides leadership and guidance to the project team during the design phase.
- They collaborate with technical experts, engineers, and consultants to develop design plans and strategies for sanitation infrastructure.

The team leader ensures that design activities are aligned with project objectives, regulatory requirements, best practices and are sustainable.

Reporting:

- The team leader plays a key role in reporting project preparation progress, enhancement of feasibility and outcomes to PMU, stakeholders and management.
- They compile and analyze data from monitoring and evaluation activities, preparing reports that highlight project preparation stage achievements, challenges, and recommendations.
- The team leader ensures timely and accurate reporting to meet the requirements of PMU, funding agencies, regulatory bodies, and project partners.

They present project updates and reports to stakeholders, facilitating transparency and accountability.

II. Sanitation/ WASH/ Fecal Sludge Management Specialist, (Deputy Team Leader during FS Stage) (1X12=12 person-monthsA faecal sludge management Specialist is responsible for designing appropriate faecal sludge management systems, monitoring the implementation, providing supervision and guidance, and contributing to reporting efforts. Their expertise ensures the safe and sustainable management of human waste in urban sanitation projects, protecting public health and the environment. A faecal sludge management (FSM) expert plays a critical role in urban sanitation projects, specifically in terms of design, monitoring, supervision, and reporting. Here's a brief overview of his/her responsibilities but not confined to:

Design:

- FSM experts contribute to the design of faecal sludge management systems, which involve containment improvement, the safe collection, transportation, treatment, and disposal of human waste.
- They analyze the local context, including population density, infrastructure availability, and regulatory requirements, to develop appropriate FSM strategies.
- FSM experts design collection systems, such as vacuum trucks o emptying methods in hard to reach areas, and treatment facilities like anaerobic digesters, septic tanks, or wastewater treatment plants.
- They ensure that the design considers factors like public health, environmental impact, resource recovery, and long-term sustainability.
- Developing comprehensive sanitation plans and strategies tailored to the specific needs of urban areas.
- Designing sanitation infrastructure, including sewage treatment plants, solid waste management facilities, public toilets, and drainage systems.
- Creating waste management systems, including collection, recycling, and disposal strategies, considering factors such as population density, waste generation rates, and environmental impacts.
- Ensuring the designs adhere to regulatory requirements, sustainability principles, and public health standards.

Reporting:

- FSM experts contribute to the preparation of technical reports and documentation throughout the project.
- They document faecal sludge characterization, treatment processes, disposal methods, and compliance records.
- They collaborate with the project team to provide updates on FSM aspects, report any compliance issues or challenges, and recommend improvements.
- Communicating the results and recommendations to relevant stakeholders, including government authorities, funding agencies, and community members.
- Ensuring that reporting complies with established guidelines and requirements.

III. Solid Waste Management/Composting Specialist (1X12= 12person-months) (International)

The Solid waste management/Composting specialist will play important roles in urban sanitation projects, particularly in terms of design, monitoring, supervision, and reporting. Here's a brief overview of their responsibilities but not confined to:

Design:

- Solid waste management specialists contribute to the design of waste management systems, including collection, transportation, disposal, and recycling facilities.
- They analyze the waste composition, generation rates, and characteristics of the urban area to develop efficient and sustainable waste management strategies.
- Solid waste management specialists design waste sorting and separation systems, composting facilities, and recycling centers to optimize waste diversion and minimize environmental impact.
- They incorporate technologies and practices for co-composting, anaerobic digestion, and other waste treatment methods into the design plans.

Reporting:

- Solid waste management specialists contribute to the preparation of technical reports and documentation throughout the project.
- They document waste composition studies, waste characterization data, and waste management strategies employed.
- Solid waste management specialists generate reports on waste management performance, recycling rates, compost quality, and landfill utilization.
- They collaborate with the project team to provide updates on waste management aspects, report any compliance issues or challenges, and recommend improvements.

IV. Water Quality Specialist (2x15=30 person months)

The Water Quality Specialist's responsibilities in assessing water quality, identifying contamination sources, ensuring compliance, implementing pollution control measures, analyzing data, raising awareness, and contributing to research in urban sanitation and waste management projects but not confined to .

Following are the major roles -

- Water quality assessment: Assess the quality of water in urban areas by collecting samples, analyzing parameters, and identifying potential contaminants.
- Contamination source identification: Investigate and determine the sources of water contamination, recommending measures to mitigate further pollution.
- Compliance with regulations: Ensure compliance with water quality and sanitation regulations, monitor wastewater treatment systems, and develop strategies for regulatory compliance.
- Water pollution control: Contribute to the design and optimization of wastewater treatment systems, storm water management, and pollution prevention programs.
- Data analysis and reporting: Analyze water quality data, identify trends, and generate reports with recommendations for improving water quality.
- Public education and awareness: Raise public awareness about water quality issues, promote sustainable sanitation practices, and provide education and training.
- Research and innovation: Stay updated on the latest research and advancements in water quality monitoring and management, and contribute to research projects and innovation initiatives.

V. Pipe Network Designe/Modeller(3x12=36 person months)

The roles of a pipe network designer in an urban sanitation project, specifically related to sewer systems and water supply networks, include but not confined to

Design:

- The pipe network designer analyzes project requirements, topographical data, and hydraulic calculations to develop efficient and reliable pipe network designs.
- They determine the optimal pipe sizes, materials, and layouts based on factors such as population density, anticipated flow rates, and future expansion plans.
- The designer ensures that the network design complies with relevant standards, regulations, and engineering best practices.
- They collaborate with other design disciplines to integrate the pipe network with other infrastructure components.

Reporting:

- The pipe network designer contributes to the preparation of technical reports and documentation throughout the project.
- They document the pipe network design, including drawings, calculations, and specifications.
- The designer may generate reports on the performance of the pipe network, such as flow rates, pressure profiles, and connectivity.
- They collaborate with the project team to provide updates on the pipe network design, report any design or operational issues, and recommend improvements.

VI. Ground Water Specialist (Hydrogeologist)/ Drainage Designer (3x15=45 Person months)

The roles of a drainage network designer in an urban sanitation project, particularly related to storm water management, include but not confined to:

Design:

- The drainage network designer analyzes project requirements, rainfall data, topographical information, and hydraulic calculations to develop effective drainage network designs.
- They determine the optimal layout and sizing of drains, culverts, channels, and retention/detention structures to manage storm water runoff efficiently.
- The designer considers factors such as catchment area, flow rates, and local regulations to design appropriate drainage systems.
- They collaborate with other design disciplines to ensure integration with the overall urban infrastructure.

Reporting:

- The drainage network designer contributes to the preparation of technical reports and documentation throughout the project.
- They document the drainage network design, including drawings, calculations, and specifications.
- The designer may generate reports on the performance of the drainage system, such as flow rates, hydraulic profiles, and drainage efficiency.
- They collaborate with the project team to provide updates on the drainage network design, report any design or operational issues, and recommend improvements.

Overall, pipe network designers and drainage network designers play essential roles in the urban sanitation project. They are responsible for designing efficient and reliable pipe and drainage networks, monitoring their performance, providing technical supervision during construction, and contributing to reporting efforts to ensure the effective management of wastewater, water supply, and storm water in urban areas.

VII. Environmental Safeguards Specialist [National] (3x12=36person-months)

Should have carried out IEE and EIA-related works of urban development. Candidates having adequate in environmental quality modelling and analysis to support environmental assessment would be an added advantage. Experience in the environmental and social assessment and management with multilateral development banks (MDBs) is required. Experiences in development of environmental and social management framework are an asset. The Environmental Consultant are responsible for assessing and managing the environmental impact of urban sanitation projects. They play critical roles in the design phase by incorporating

environmentally friendly practices, monitor project activities for compliance with environmental regulations, provide supervision and guidance, and contribute to reporting efforts on environmental performance. Their expertise ensures that urban sanitation projects are implemented in an environmentally sustainable manner.
Environmental Consultants play crucial roles in urban sanitation projects, particularly in terms of design, monitoring, supervision, and reporting. Here's a brief overview of their responsibilities but not confined to:

Design:

- Assess the environmental impact of the sanitation project and ensure compliance with environmental regulations and standards.
- Conduct environmental studies and assessments to identify potential environmental risks, such as water pollution, air emissions, and waste management issues.
- Coordinate closely with engineers and designers to incorporate environmentally friendly practices and technologies into the project design.
- Develop environmental management plans that outline strategies for minimizing negative impacts and promoting sustainable practices.

Reporting:

- Environmental Consultants contribute to the preparation of environmental reports and documentation throughout the project lifecycle.
- They document environmental impact assessments, monitoring data, and compliance records.
- Environmental specialists generate reports on the project's environmental performance, including progress towards environmental objectives, mitigation measures implemented, and compliance with environmental regulations.
- They collaborate with the project team to provide updates on environmental aspects, report any environmental incidents or non-compliance issues, and recommend improvements.

VIII. Social Development Specialist (3x12=36person months)

This position will require Masters in social science or equivalent. Higher degree is preferable. At least 10 years of professional experience as well as at least 5 years of which shall be specifically in social development or assessment, resettlemement, land acquisition plan, community standard improvement and in project administration. Experience in the environmental and social assessment and management with multilateral development banks (MDBs) is required. Experiences in development of environmental and social management framework are an asset.

The Social Development Consultant's responsibilities in designing interventions that promote social equity, monitoring social impacts, supervising implementation activities, and reporting progress and recommendations in the projects. Following are the major roles of a Social specialist but not confined to -

1. Design:

- Work closely with the Environmental Consultant to prepare the E&S documents for the project and incorporate social considerations and community needs into the project design
- Conduct consultation meetings or focal group discussion and social impact assessments to identify potential implications on communities and develop strategies to promote social equity.
- Facilitate stakeholder engagement and participation in decision-making processes, particularly the Grievance Redress Mechanism for the project

4. Reporting:

- Compile and prepare reports on the social aspects of the project, documenting progress, achievements, and challenges.
- Analyze and interpret data to provide insights and recommendations for improving social outcomes.
- Ensure that reporting adheres to established guidelines and requirements, and communicate findings to stakeholders, including government authorities, funding agencies, and community members.

IX. Structural Engineer (3X15=45 person-months)

Structural engineers are responsible for designing robust and sustainable sanitation infrastructure, monitoring construction activities, providing technical supervision, and contributing to reporting efforts. Their expertise ensures the structural integrity and safety of the sanitation infrastructure in urban projects. Civil/Structural engineers play vital roles in urban sanitation projects, particularly in terms of design, monitoring, supervision, and reporting. Here's a brief overview of their responsibilities but not confined to:

Design:

- Civil/Structural engineers contribute to the design of sanitation infrastructure, such as sewage treatment plants, pumping stations, storage tanks, and waste management facilities.
- They analyze project requirements, site conditions, and regulatory guidelines to develop robust and sustainable designs.
- Civil/Structural engineers design structural elements, foundations, and support systems to ensure the stability, strength, and integrity of the infrastructure.
- They consider factors such as load-bearing capacity, earthquake resistance, and environmental impact in their designs.

Reporting:

- Civil/Structural engineers contribute to the preparation of technical reports and documentation throughout the project lifecycle.
- They document design calculations, structural analysis, and construction methodologies.
- Civil/Structural engineers generate reports on structural integrity, stability, and performance of the sanitation infrastructure.
- They collaborate with the project team to provide updates on structural aspects, report any design or construction issues, and recommend improvements.

X. Electrical Engineer (1X09= 09 person-months)

Electrical engineers are responsible for designing electrical systems, monitoring their performance, providing technical supervision, and contributing to reporting efforts in urban sanitation projects. Their expertise ensures the safe, reliable, and efficient operation of electrical components within the sanitation infrastructure. Electrical engineers play significant roles in urban sanitation projects, particularly in terms of design, monitoring, supervision, and reporting. Here's a brief overview of their responsibilities but not confined to:

Design:

- Electrical engineers contribute to the design of electrical systems in sanitation infrastructure, such as fecal sludge treatment plants, , and waste management facilities.
- They analyze project requirements, technical specifications, and relevant codes and standards to develop electrical designs that meet safety, reliability, and efficiency criteria.
- Electrical engineers select and specify electrical equipment, such as switchgear, transformers, motors, control panels, and instrumentation systems.
- They design electrical power distribution networks, lighting systems, control systems, and backup power systems, ensuring proper integration with mechanical and civil components.

Reporting:

- Electrical engineers contribute to the preparation of technical reports and documentation throughout the project.
- They document electrical designs, calculations, equipment selections, and system configurations.
- Electrical engineers generate reports on electrical system performance, energy consumption, and reliability.

- They collaborate with the project team to provide updates on electrical aspects, report any design or operational issues, and recommend improvements.

XI. Mechanical Engineer (1X09= 09person-months)

Mechanical engineers are responsible for designing mechanical systems, monitoring equipment performance, providing technical supervision, and contributing to reporting efforts in urban sanitation projects. Their expertise ensures the effective and efficient operation of mechanical components, contributing to the overall success of the sanitation infrastructure. Mechanical engineers play important roles in the project particularly in terms of design, monitoring, supervision, and reporting. Here's a brief overview of their responsibilities but not confined to:

Design:

- Mechanical engineers contribute to the design of sanitation infrastructure, such as fecal sludge treatment plants, pumping stations, and solid waste management systems.
- They analyze project requirements, technical specifications, and regulatory guidelines to develop efficient and effective designs.
- Mechanical engineers select and size equipment, such as pumps, blowers, valves, and filtration systems, ensuring they meet the project's needs and comply with relevant standards.
- They integrate mechanical systems with other disciplines, such as electrical and civil engineering, to create comprehensive and coordinated designs.

Reporting:

- Mechanical engineers contribute to the preparation of technical reports and documentation throughout the project lifecycle.
- They document design calculations, equipment selections, and system configurations.
- Mechanical engineers generate reports on equipment performance, energy consumption, and maintenance requirements.
- They collaborate with the project team to provide updates on mechanical aspects, highlight any design or operational issues, and recommend improvements.

XII. GIS Specialist (3X15= 45person-months)

GIS experts will play a vital role in urban sanitation projects by leveraging geospatial data and technologies. They support the design process, monitor project performance, provide supervision and guidance, and contribute to reporting efforts. Their expertise in spatial analysis and data management ensures the effective utilization of geospatial information for informed decision-making and improved urban sanitation planning and management.
GIS (Geographic Information System) experts play a crucial role in urban sanitation projects, particularly in terms of design, monitoring, supervision, and reporting. Here's a brief overview of their responsibilities but not confined to:Design:

- GIS experts utilize geospatial data and technologies to support the design of urban sanitation infrastructure.
- They analyze and integrate various geospatial datasets, including topographic, demographic, land use, and infrastructure data, to inform the design process.
- GIS experts create spatial models and simulations to identify suitable locations for sanitation facilities, such as fecal sludge treatment plants, , or solid waste management sites.
- They assist in the spatial planning of fecal sludge collection , optimizing route selection and connectivity.

Reporting

GIS experts contribute to the preparation of technical reports and documentation throughout the project lifecycle.

- They create maps, visualizations, and spatial analyses to support reporting efforts.
- GIS experts generate reports on the spatial distribution of sanitation infrastructure, environmental impact assessments, or hotspot identification for targeted interventions.
- They collaborate with the project team to provide updates on GIS-related activities, report any data-related issues or challenges, and recommend improvements.

XIII. Hydrologist/Drainage Designer (2x12=24 person months)

The hydrologist's involvement in understanding groundwater resources, designing sustainable extraction systems, assessing water quality and contamination risks, monitoring project performance, and collaborating with stakeholders for successful completion of the project. Following are the majors but not confined to -

- Assess groundwater resources: Evaluate the availability and suitability of groundwater for sanitation purposes through surveys, drilling, and water sample analysis.
- Conduct hydrological investigations: Study the geological and hydrological characteristics of the project site to understand groundwater flow patterns, aquifer properties, and recharge mechanisms.
- Design groundwater extraction systems: Develop designs for sustainable water supply, considering water demand, well construction techniques, aquifer vulnerability, and potential impacts on surrounding water resources.
- Assess water quality and contamination risks: identify pollutants, assess contamination sources, and recommend mitigation measures.
- Environmental impact assessment: Identify potential impacts on groundwater and surrounding ecosystems, assess aquifer vulnerability, and suggest measures to minimize adverse effects.
- Monitor and analyze data: of existing drainage conditions, quantity of flow generation, , analyze data to track changes, and assess project performance.
- Collaboration and communication: Work with multidisciplinary teams, communicate findings and recommendations to stakeholders, and ensure integration of hydrological considerations into project design.
- Regulatory compliance: Stay updated on relevant laws, regulations, and standards related to Drainage water, groundwater and sanitation, ensuring project compliance.

XIV. Geodetic Engineer/ Survey Engineer (6x15=90person months)

Surveyors play a pivotal role in conducting site assessments, gathering accurate data, establishing boundaries, mapping utilities, processing data, collaborating with other professionals, and documenting survey findings. Their work forms the foundation for informed decision-making and effective design of urban sanitation infrastructure. Following are the majors but not confined to -

1. Site assessment and data collection: Surveyors visit the project site to assess the existing conditions and collect relevant data. They use specialized surveying equipment such as total stations, GPS receivers, and laser scanners to measure and map various features including terrain, buildings, utilities, and existing infrastructure.
2. Topographic surveys: Surveyors conduct topographic surveys to capture detailed information about the elevation, contours, and physical characteristics of the project site. This data helps in understanding the terrain and designing the sanitation infrastructure in a way that optimizes functionality and minimizes environmental impact.
3. Boundary surveying: Surveyors establish accurate boundaries of the project site, ensuring that the proposed sanitation facilities are constructed within the designated area. They conduct boundary surveys to determine property lines, easements, and other legal considerations.
4. Utility mapping: Surveyors identify and map existing utilities such as water supply lines, sewer lines, storm water drains, and electrical infrastructure. This information is crucial for planning the routing of new sanitation infrastructure and avoiding conflicts or disruptions to existing utilities.

5. Geodetic control network: Surveyors establish geodetic control points within the project area. These reference points serve as a basis for accurate measurements and spatial referencing throughout the project, ensuring consistency and precision in data collection and subsequent design work.
6. Data processing and analysis: Surveyors process the collected field data using specialized software and tools. They analyze the data to extract relevant information, create maps, and generate accurate measurements that can be used for designing the sanitation infrastructure.
7. Collaboration with other professionals: Surveyors collaborate closely with other professionals involved in the project, such as engineers, architects, and designers. They provide crucial spatial data and expertise to support the design process, ensuring that the sanitation infrastructure aligns with the project requirements and regulatory standards.
8. Documentation and reporting: Surveyors document their findings, measurements, and survey methodologies in detailed reports. These reports serve as valuable references for the project team and stakeholders, providing a comprehensive understanding of the site conditions and informing subsequent design and construction activities.

XV. CAD Engineer (3x12= 36 Person months)

CAD (Computer-Aided Design) operators play crucial roles in urban sanitation-related projects, specifically in terms of design, monitoring, supervision, and reporting. Here's a brief overview of their responsibilities but not limited to:

Design:

- CAD operators use specialized software to create detailed technical drawings and plans for sanitation infrastructure, such as sewage treatment plants, pipelines, pumping stations, and waste management facilities.
- They convert survey data into digital models, accurately representing project components, dimensions, and specifications.
- CAD operators develop 2D and 3D models of the proposed infrastructure to visualize and evaluate the design, identify clashes or conflicts, and optimize the layout for efficient construction.

They collaborate with engineers, architects, and other professionals to integrate design inputs, review and incorporate changes, and ensure that the final design aligns with project requirements.

Reporting:

- CAD operators contribute to the preparation of design-related reports and documentation, including technical drawings, sections, elevations, and details.
- They ensure that design documentation accurately represents the approved design plans and meets established standards.
- CAD operators may also provide technical input and collaborate with the project team to generate reports and presentations on design progress, challenges, and recommendations. Overall, CAD operators are responsible for creating detailed design drawings, developing digital models, assisting with monitoring activities, and providing design support during supervision, and contributing to the preparation of design-related reports and documentation in the project.

XVI. Gender Specialist: 1x15=15person-month

He/she will report to the Team Leader and will be responsible for implementing the following principle tasks but not confined to: Design:

Organize Gender awareness training for local implementing partners

(i) Conduct interviews with the executive leaders of the local implementing partners to identify the needs of local partners in terms of gender programming
(ii) Develop and deliver a customized gender awareness training programme to introduce a gender perspective in the project
(iii) Assess and identify potential gender-differentiated impacts of the project components.

Identify most effective trainings and resources to support staff's gender literacy.

XVII: Wastewater Treatment Process Design Specialist and Design Manager (Deputy Team Leader during Detailed Design Phase): (1x15=15 Man-month)

Design:

- Deputy Team leader have to provide support and guidance to the project team during this Process Design phase.
- They collaborate with technical experts, engineers, and consultants to develop design plans and strategies for waste water treatment infrastructure.

Wastewater Treatment Process Design Specialist ensures that design activities are aligned with project objectives, regulatory requirements, and best practices and are sustainable.

Reporting:

- He/She plays a key role in reporting project preparation progress, ensures quick delivery of designs and outcomes to PMU, stakeholders and management.
- They compile and analyze data, preparing reports that highlight existing wastewater management condition, impacts, challenges, and recommendations

Ensures timely and accurate reporting to meet the requirements of PMU.

XVII. Quantity Surveyor / Cost Engineer: As Quantity Surveyor, individuals support the urban sanitation project by assisting quantity check with design tasks, participating in monitoring activities, providing supervision and coordination, and contributing to reporting efforts. Their involvement is essential in ensuring quantifying the smooth implementation with transparency and accountibility of the project and the successful delivery of sanitation infrastructure in urban areas. Quantity Surveyor in an urban sanitation project play important roles in various aspects of reporting. Here's a brief overview of their responsibilities but not limited to:

Design:

- Quantity Surveyor assist senior engineers and technical experts in the design phase of the project.
- They contribute to the development of estimate aligned with design plans and specifications for sanitation infrastructure, such as fecal sludge treatment plants, water supply networks, or solid waste management facilities.
- They support the preparation of technical drawings, calculations, and documentation required for the design process.
- They conduct research and data collection to assist in design decisions and ensure compliance with relevant standards and regulations.

Reporting:

- Quantity Surveyor contributes to the preparation of billing documentation throughout the project.
- They may contribute to the preparation of drawings, charts, or visual representations to support reporting efforts.

They collaborate with the project team to provide updates on project activities, report any issues or challenges encountered, and propose recommendations for improvement.

XVIII. Geotechnical Engineer:

Design: He/She should support structural design activities in selection of foundation but not limited to this only.

XIX. **Procurement Specialist (1X9=9 Man month)** He/she will report to the Team Leader and will be responsible for implementing the following principle tasks but not confined to:

Design:

1. Provide inputs at both (pre-) feasibility and detailed design stages to develop procurement documentations for sub project components following AIIB and GoB

guidelines.

2. Assist PMU in contract management;
3. Assist PMU procurement team to Organize/assist opening and evaluation of tenders, contract awards AIIB's Procurement/Consultant's Guidelines and arrange for transmission of documentation to AIIB for approval (if necessary);
4. Assist the project in carrying out all activities related to contracting including contract signing, and handling of documents that may be required for receiving, distributing and delivering goods;
5. Supervise the implementation of contracts including transportation, delivery, acceptance and storage.

Assist in any other task assigned by the supervising consultant in relevance to effective project implementation.

XX. Ground Water Specialist (Hydrogeologist): Responsibilities are here but not confined to.

1.1.1 **Design**: He/She should collect groundwater information, existing wells (DPHE or any source available publicly), to determine the survey activities to be done including location and depth of test wells, depth of screening.

1.1.2 Collect and analyze Geophysical survey (normally via electrical resistivity/VES) and hydro census.

1.1.3 Conduct Falling head tests and pumping tests are required to determine yield and how fast the aquifer recharges. The tests will determine optimal extraction rate, hence also the pump size recommendations.

N.B: Here stated some tentative responsibilities but not limited to, and the firm has freedom to deploy experts and staffs as per table 7.4.4 to bring out with the assignment within the time.

Annex-3. EOI Sample Form

{The Consultant shall prepare their EOI using the EOI Sample Form with necessary additions and revisions. It should be noted that domestic Consultant shall seal the document as required in the EOI Sample Form while foreign firms may not.}

EOI shall contain at least the following information:

FORM-1 Firm/Consultant's Information Sheet
FORM-2 Firm/Consultant's Commitment Letter of Eligibility
FORM-3 Introduction of Consultant /Firm
FORM-4 Firm/Consultant's Financial Situation
FORM-5 Summary of Firm/Consultant's Experiences

Form-1 Firm/Consultant's Information Sheet

Consultant's/Firm Name	
Firm/Consultant's Registration Country	
Registration Address	
Business License No. （Institution Legal Person Certificate No.）	
Date of Establishment	
Registered Capital	
Business Scope	
Information of Legal Representative (Name, Telephone No. and E-mail address)	
Information of Authorized Representative (Name, Telephone No., Fax and E-mail Address)	
Remarks	

Firm/Consultant's Name: ----------(Seal of Consultant)
Authorized Representative: ----------(Signature)

Notes: Following documents shall be attached:
1. Color scans or copies of certification of independent legal personality;
2. Power of Attorney of authorized representative (Self-made Format)

Form-2 Commitment Letter

I/We promise that we meet the qualification criteria of the assignment and the following requirements of eligibility:
1. do not listed in the AIIB's Debarment List;
2. do not involve in the situations as per paragraph 4.4, 4.4.2 and 13.4 of the Interim Operational Directive on Procurement Instructions (AIIB-2016) for Recipients.

I/We belong to State-owned Enterprise, and we
1. are carrying-out or are established for a business purpose, and are operating on a commercial basis;
2. are financially and managerially autonomous;
3. are not controlled by the government on day-to-day management; and
4. are not under the supervision of the Client or its procuring agency.
OR [We do not belong to State-owned Enterprise.]

The items we committed above are real and effective, we would be disqualified in the assignment and be sanctioned by supervision department and the AIIB in case of providing misrepresentative, misleading or false information.

Consultant's Name: ----------(Seal of Consultant) Authorized Representative: ----------(Signature)

Notes:
1. State-owned Enterprises shall provide Articles of Association and other documentations which could support the above-mentioned matter

2. For joint venture, attached with a letter of intent or a copy of an existing agreement (self-made format), which at least reflects the following items: (i) Name of the lead member and other members; (ii) Scope of the works undertaken by each member; (iii) Authorization of each member to lead member.

3. State-owned Enterprises shall provide Articles of Association and other documentations which could support the committed matters mentioned above.

FORM-3 Introduction of the Firm/Consultant (Self-made Format)

At least contains the following contents: the overall introduction, the introduction of core business, years in business, technical and managerial capability. If any, provide relevant documents on the mentioned issues

FORM-4 Financial Situation

Firm/Consultant's Name----------

1. Current Assets	2021	2022	2023
2. Current Liabilities			
3. Working Capital [=1-2]			
4. Profit after Taxes (PAT)			

Firm/Consultant's Name: ----------(Seal of Consultant) Authorized Representative: ----------(Signature)

Notes: Following documentation shall be attached:

1. Financial Reports for the last three (3) years (2021-2023) certified by a Chartered Accountant/Auditor, including copies of Balance Sheets, Cash Flow Statements, Income Statements and Description of Financial Situation

FORM-5(A) Summary of Similar Experiences in Recent Years

Firm/Consultant's Name:----------

No.	Name of the Project	Date of Contract Signing	Completion Date （if completed）	Contract Value

Irm/Consultant's Name:---------- (Seal of Consultant) Authorized Representative:---------- (Signature)

Notes:

1. Only the Similar Experiences in the past FIVE (5) years are considered, the Date of Contract Signing prevails;
2. Detailed information of each experience shall follow the FORM-5(B), with the relevant documentation attached.

FORM-5(B) Specific Experience

No.	-----of ----------(total number)
Project Name	
Project Location	
Date of Contract Signing	
Completion Date	
Contact Value	
Role of the Consultant	□ Independent Consultant □ Joint Venture Leader □ Joint Venture Member □ Sub-consultant
Client's Name	
Client's Address	
Client's telephone No.	
Whether it is a new-built (or reconstructed or expanded)	□ Yes □ No
Scope of the Service	Include the following services : □ digital development service which contains BIM technology service or similar service □ information management system service which contains smart construction site function or similar function
Assignment Description	

Firm/ Consultant's Name:---------- (Seal of Consultant)Authorized Representative: ----------(Signature)

Notes:
1. Each table is for one assignment, and mark with serial numbers;
2. The Contract and Certification issued by the Client (if any) shall be attached;
3. Additional documentations would be necessary to confirm the succession of the experience in the situations such as Consultant's legal alteration or reconstruction and renaming of the Consultant.