ውሃና ኢነርጂ ሚኒስቴር
MINISTRY OF WATER AND ENERGY
የኢትዮጵያ ፌዴራላዊ ዲሞክራሲያዊ ሪፐብሊክ | Federal Democratic Republic of Ethiopia

URBAN WATER SUPPLY STUDY, DESIGN AND CONSTRUCTION SUPERVISION DESK

Terms of Reference for Selection of Consultant for Study and Design Review of Alem Ketema Town and Abay Ber Village Water Supply and Sanitation Project

December 2025

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1. BACKGROUND

1.1. Introduction

The provision of adequate water supply and sanitation services is essential for improving living standards and ensuring better health, educational opportunities, gender equality, social inclusion, and environmental sustainability. Access to safe water not only enhances public health through improved hygiene, water quality, and sanitation but also has indirect benefits—particularly in advancing education and empowering women. Research indicates that school enrolment rates, especially among girls, increase significantly when communities gain access to nearby safe water sources. This access reduces the time women and girls spend fetching water, which, in rural Africa, accounts for nearly one-quarter of household time.

Improved water supply also contributes to higher household incomes through reduced health care costs and increased productivity. Productivity gains arise from the time saved in collecting water, the use of water as an input in various productive sectors, and a reduction in water- and sanitation-related diseases. However, water sustainability continues to face serious challenges, both in quality and quantity, due to pollution and competing demands from agriculture, energy, manufacturing, and other sectors.

Safe drinking water, sanitation, and hygiene are fundamental to human health, survival, growth, and development. Yet, these essential services remain beyond the reach of many of the world's poorest populations. Globally, more than 1.1 billion people lack access to improved drinking water sources, while about 2.6 billion do not have basic sanitation facilities. In response to this crisis, the United Nations established the Millennium Development Goals (MDGs), which aim to reduce poverty and promote sustainable development. Specifically, Goal 7, Target 10, sought to halve, by 2015, the proportion of people without sustainable access to safe water and basic sanitation.

Ethiopia, like many developing countries, faces a persistent shortage of adequate water supply, which has significantly affected its national development strategy. Expanding access to safe and potable water, particularly in rural areas, not only improves living conditions but also helps reduce population pressure on urban centers. The Amhara and Benishangul Gumuz Regional State in particular, continues to experience water supply and sanitation shortages. To address this, the Ministry of Water and Energy (MoWE), in collaboration with regional bureaus and development partners, has been undertaking continuous efforts to increase water supply coverage.

As part of these efforts, the Amhara and Benishangul Gumuz Regional State, together with various NGOs, has been conducting feasibility studies and engineering designs for water supply projects across the region. In alignment with this initiative, and to ensure the provision of safe and adequate water for the urban population, the Ministry has prepared Terms of Reference (TOR) to hire competent consultants for the review study, detailed design, of the spring development for the Alem Ketema Town Water Supply Project and surrounding villages and Well Development for Abay Ber Village.

1.2. Location and Accessibility

The Project area is situated at a road distance of 575 km from the regional capital Bahir Dar through (Bahir Dar-Mukaturi-Alem Ketema), 175 Km from the Zonal town Debrebirhan. The topography of the town can be characterized as rugged surface and plateau with raised ridges and ridge foot shoulders showing variable slopes (from 2-20%) and average elevation of about 2300 a.m.s.l. The main part of the town is located on the undulating hill plateau surrounded by gorges of the surrounding mountains West direction and the plateau land in the South East direction, The other project area are Pawe Woreda and its located in the Benishangul-Gumuz Regional State, in Metekel Zone. It is located some 550 km northwest of Assosa town. The project area covers only one villagization center in which it is consisting of about 465 household in 2014, among which 45.30% of the share belongs to females.

The residing community camped at first near Almu-Felegeselam, which is the woreda capital of Pawe, then after, in late 2013 this community was transferred to a newly established villagization center called Abay-Ber village. The respective regional, zonal, and woreda governor reasoned out that the former location is possessed for Sugar Industry expansion and development purposes.

Thus, the newly established village is bounded in the north and south direction by Assosa and Pawe woreda respectively. From the eastern and western quarters, Abay- Ber is bounded by Manbuk woreda and Assosa Town of Benishangul-Gumuz Peoples National Regional States.

In general, the village is geographically located between a UTM of 198886E, 1244555N, and an average altitude of 1176 masl. The village is accessible with all-weather road but detours 3km from the main road. Here thus, Abay-Ber village is accessible in all aspects and distant in 18km from the zonal capital Gilgel-Beles. But yet, it is 794km distant from Addis Ababa on the way to Assosa.

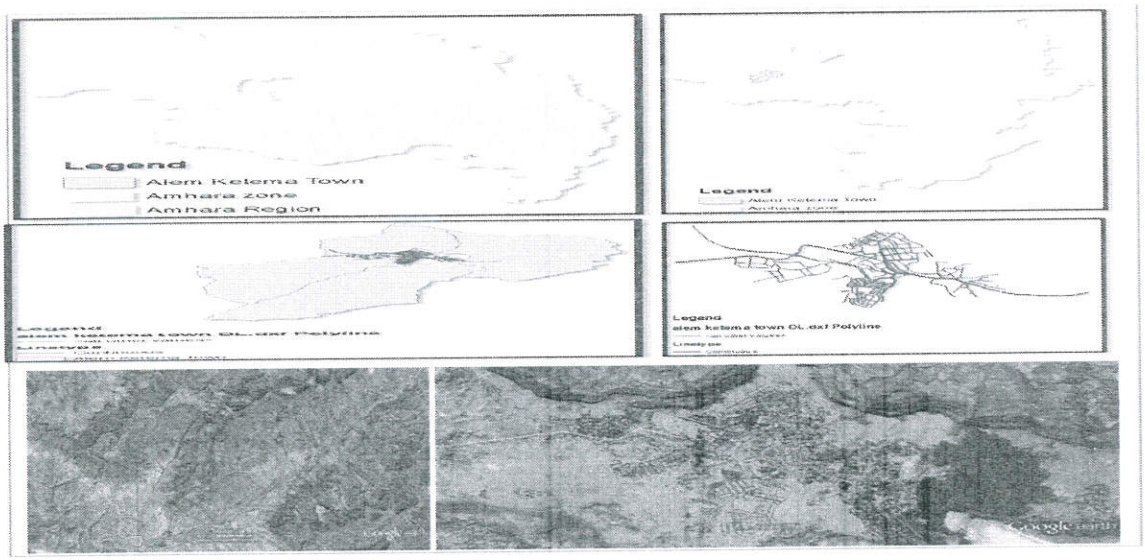

Figure 1 Alem Ketema project area satellite image

2. Objectives

2.1. General Objective

The general objective of this assignment is to address the existing shortage of potable water and sanitation challenges in **Alem Ketema Town** and **Abay Ber Village** This will be achieved through the preparation of a **Detailed Engineering Design and Study Document review and update**, of the water supply and sanitation project for Alem Ketema and Abay Ber Villages , The ultimate goal is to ensure that residents have access to an adequate, reliable, and sustainable water supply within reasonable distances and in accordance with current and future demand. The study in general proposes the future expansion projects to fully provide efficient and quality services to the current residents of the town plus the projected population 20 years for Alem Ketama and 10 year for Abay Ber Villages starting from 2026.

2.2. Specific Objective:

The consultant's main responsibility is to **Detailed Engineering Design and Study Document review and, updates** all aspects of the **Abay Ber Village** and **Alem Ketema** Water Supply and Sanitation Project, ensuring quality, compliance, and coordination with all stakeholders (Regional, Zonal, Woreda Water Offices, and local communities).

The specific objectives of the project to achieve the above general objective are the following;

- Assess the existing water supply and sanitation situation, the review the design of the previous design report and identify gaps.

- Detail Engineering Design and study Review and update: Review and update the Detailed Engineering Design and study. Conduct a feasibility appraisal of alternative water sources.
- Prepare BOQs, Design drawings, Specifications for each component, bidding documents as appropriate as it can be process for procurement contractors and suppliers.
- Project Prioritization and Capacity Building: Prioritize project clusters based on water source adequacy, cost-effectiveness, and socio-environmental factors. Assess existing water, sanitation, and hygiene (WASH) conditions and prepare baseline and capacity-building reports. Promote skills development, lesson sharing, and knowledge exchange among project stakeholders to strengthen the regional water sector. On-the-job training and knowledge transfer to client personnel will be facilitated throughout the project.

2. SCOPE OF THE ASSIGNMENT

The Consultant shall carry out comprehensive **Detail Engineering Design and study Review and update,** of the **Alem Ketama** and **Abay Ber Village** Water Supply and Sanitation Project.

The Consultant shall work in close collaboration with all relevant stakeholders, including Regional, Zonal, and Woreda Water Offices, as well as local project communities.

The specific objectives of the assignment include, but are not limited to, the following:

1. **Design and Study Review and Update**
   - Prepare an appraisal and feasibility study for the Alem Ketama and Abay Ber Village Water Supply System, considering various potential source alternatives (if available).
   - Conduct initial and further consultation with the local stakeholders related to the objectives of the study, and the roles of each stakeholder looking at changes undergone from study output.
   - To study the existing water supply, sanitation and hygiene, and managerial situations at town level and preparation of detail baseline, and capacity building need assessment reports related to the service.
   - Preparation of a review report for appraisal of feasibility study report for water supply system, sanitation & hygiene facilities for community and institutions in the town by conducting socio-economic study, based on the existing situation, determination of water demand, conducting geophysical and/or study for sufficient water sources, conducting financial and economic study for different alternative schemes to select (if any) the most feasible system related satisfying the demand at affordable level of the users.

- Conduct a comprehensive review and audit of the hydrogeological conditions in the project area, including:
  - ✓ Evaluation of recharge and discharge conditions;
  - ✓ Delineation of aquifer distribution;
  - ✓ Determination of hydraulic parameters;
  - ✓ Analysis of groundwater quality;
  - ✓ Assessment of potential impacts of future groundwater abstraction.
- Review and verify the final borehole design, including:
  - ✓ Depth intervals to be screened;
  - ✓ Screen slot sizes;
  - ✓ Gravel pack intervals and materials;
  - ✓ Installation EM and test pumping activities, ensuring conformity with the Bill of Quantities (BoQ) and technical specifications.
- Review and update all activities necessary for full project implementation and prepare a detailed implementation plan covering installation, testing, commissioning, and all associated civil works (wells, transmission mains, transfer mains, and distribution networks).
- Review and update the detailed engineering design of wellfield electromechanical components, including borehole equipment, pipes, fittings, accessories, and power supply alternatives.
- Prepare revised working drawings for the wellfield electromechanical, mechanical, electrical, and civil components, based on the approved design review report.
- Present design review findings, identified deficiencies, and proposed technical and administrative solutions during client appraisal sessions.
- Prepare a comprehensive detailed design report covering water sources, transmission and distribution pipelines, fittings, electromechanical equipment sizing, and power supply options.
- Provide recommendations and justifications based on economic, technical, and environmental considerations.
- Perform hydraulic simulations of the transmission and distribution systems using Water CAD or equivalent modeling software to ensure appropriate pipe and fitting selection.
- Prepare a revised Bill of Quantities (BoQ) and detailed technical specifications for all works and goods associated with the reviewed design.

3. Main Tasks

Task-I: Draft and Detail Design Review of the Water Supply and Sanitation System

- ✓ **Data Collection and Analysis:** The Consultant's proposals shall be required to improve the list as required to complete the assignment and to provide a clear indication of all necessary personnel, mapping and resources required. The assignment shall address and include
  - ❖ **Review Existing Reports / secondary data analysis/:** A comprehensive review of relevant reports regarding hydrology, geotechnical, environmental flows estimation, environmental and social impacts in the project area etc.
  - ❖ **Mapping of the Project Area:** The Consultant shall conduct topographic and aerial mapping of the project area with suitable scales as indicated below. The main tasks shall include but not limited to the following;
- ✓ **Establishment of control points:** The Consultant shall review the previous reports and liaise with relevant Authorities to locate National grid points or secondary permanent and reliable established points to act as a start point. Using GPS the Consultant shall use previous established permanent control network within the project area for further referencing of future surveys. The WGS-84 coordinates must be transformed to the national grid system and control points map produced at 1:1000 scales. At least three permanent control points must be referenced to Mean Sea Level.
- ✓ **Topographic Mapping of Upstream Area (Reservoir Area):** This area includes; A Reservoir area of provisional capacity of not less than 340 MCM storage volumes, expected sediments delta and a 500 m buffer zone. The topographical control points will be 500 m intervals and should be visible from adjacent points. Grid system of 100 m intervals will be used depending on the terrain. Map scale of 1:10000 and contour interval of 2 meters.
- ✓ **Topographic Intake Site Mapping:** The Consultant shall survey and prepare a spring site map with and without spring layout with a grid system of 50 meters interval at scale of 1:1000 and contour interval of 0.5 meters.
- ✓ **Topographic Mapping of the Potential Construction Areas:** Topographical Maps shall be prepared of potential access roads, site camp, and permanent housing area and construction facilities with a scale of 1:2000 and contour interval of 1 meter.
- ✓ Determine location of associated infrastructures, access road, telecommunication, electricity,
- ✓ Determine communities' settlement areas (if any)
- ✓ **Hydrological Analysis:** Assess historical records of rainfall and runoff flow regime of the spring and weather stations to check the present and future water availability and prepare a rainfall-runoff model.
  - ❖ Propose and conduct any supplementary hydrological monitoring (rainfall, flow volume, sediment loads, etc.)
  - ❖ Review and Conduct flood analysis including frequency analysis and calculation of PMF (Probable Maximum Flood) to determine the dam design flood and spillway capacity.
  - ❖ Review sediment load; propose scour and flushing arrangements if required.
  - ❖ Assess possible impacts of climate change on the hydrological characteristics using some scenarios (without climate change, low climate change and high climate change) drawing from existing literature.

✓ **Geological, Geotechnical and seismological Investigation:** The Consultant shall conduct geological/geotechnical investigation. This could be sub-contracted to a specialized firm(s) under the Consultant's supervision. The cost of these site investigations shall be covered by a provisional sum, as per the Data Sheet. This will cover the following items but not limited to:-

- ❖ Assessment of the geological condition of the spring manhole.
- ❖ Drill sufficient number of boreholes required for the feasibility study to identify if there are any liquefiable materials and leaking structures, conduct borehole logging and prepare lithological profile. The consultant shall propose the optimum number of core drilling on upstream, spring axis, downstream, according updated revised versions of international spring design guidelines and standards (refer the spacing, number, depth and well sites).The number and depth of the well to be drilled must later be approved by the client. The consultant shall submit the **Geotechnical** drilling schedule for timely completion of the assignment.
- ❖ Conduct a series of geological investigations/tests, such as seismic refractions, bore-holing/logging, trial pits, in-situ and laboratory tests for measuring soil/rock type classification, shear stress, permeability, grouting procedures, etc.
- ❖ Conduct seismology assessment of the intake site and surrounding areas for determining seismic loads for spring design
- ❖ Feasibility level analyses of Electro-mechanical, Structural, Hydraulic, and intake also be conducted and reported.

✓ **Socio-Economical and financial analysis:** The consultant shall conduct the socio- economic and financial analysis covering the following aspects:

- ❖ Assess outstanding social, cultural, resettlement and traditional impacts of the spring, rising main, reservoir/tank (before, during and after construction) and shall consider it in the design and final site selection.
- ❖ Conduct cost benefit analysis of the final scheme in the economic and financial terms. Presented indicators will include NPV (Net Present Value), B/C (benefit cost analysis), and economic/financial IRR (Internal Rate of Return if required).
- ❖ While cost estimates are tabulated with unit costs and estimated quantities for project components as well as physical and financial contingencies, benefits should cover direct ones from drinking water and other water supply uses. Non quantifiable benefits are to be explained separately.
- ❖ Prepare project cost budget tables on an annual basis covering local and foreign components. The duration of the analysis should cover the construction phase and operational phase.
- ❖ The costs of the environmental management/mitigation measures and resettlement costs should be included as a cost to the project. The cost of additional adaptation measures to Climate Change (altered intake design and operations and other measures) should be defined.

✓ **The Environmental Assessment:** After completion of the analysis of spring alternatives and on selection of the final design, the consultant shall complete and finalize EA based on the final choice of dams design.

a) Fully describe and illustrate using schematic engineering layouts the entire project design on relevant and well referenced maps ensuring all intake and treatment structures are clearly

illustrated in their correct location, including identified areas for temporary construction sites/use, access roads and power lines. Then present a corresponding description of all the parts of the project infrastructure making references to the maps, include the relevant features and parameters of the various components of the dam infrastructure such as the intake and treatment plant, outlet for riparian release, and all other components of the project.

b) Show the entire project area and project impacted areas. Ensure full capture of the environmental issues, with the entire project area divided into project impact zones. Update and complete surveys and all other relevant data using detailed and clearly referenced maps with acceptable scales and charts and tables as appropriate

c) Describe and present the applicability of relevant national, regional and international policy (including World Bank safeguard policies), Legal and Administrative Framework governing the Water and Environment Sector in Ethiopia.

d) Discuss and present a detailed summary of Analysis of Alternatives section already fully presented in the preliminary study report including the rationale for arriving at the selected intake design.

Task-II: Staff capacity building and transfer of knowledge

a) The utility wishes to promote skills development, lesson learning and knowledge sharing across the consulting and contracting community. As such, it is considered that Transfer of Knowledge to be about supporting utility. To improve and increase the knowledge base and performance.

b) The utility shall require the Consultant to submit a training plan to be embedded in the proposal and clearly articulating how nominated trainees from the utility shall be trained by the Consultant. The training should cover technical and management and follow up procedures,

Task-III:-Reporting & Documentation

✓ Prepare and submit the following reports:

- Inception Report.
- Socioeconomic Report
- Draft and Final Feasibility Study.
- Water Source Investigation and Study Report
- Draft and Final Detailed Engineering Design Reports.
- Environmental and Social Impact Assessment Study Report
- Town Water Supply and Sanitation Institutional Setup Study Report
- Town Water Supply and Sanitation Business Plan
- Tender Documents.

4. Expected deliverables

S/N	Report/Document	Time in weeks	No. Copy (soft and hard)	Ending Activity Month
1	Final Review report	**Draft**	5HC + 2SC	4
		Appraisal	5 HC + 2SC	0.5
		Final	5 HC + 2SC	0.5
Total month				**5**

The consulting firm expected to prepare and submit separate report for the project under the assignment at each milestone.

Payment modalities

Payment Modalities with respect to deliverables

The contract for the consultant should be lump-sum and the Payment is effected as per the following modality:

SN	Payment Phases	Deliverable	Payment modality
1	First payment	Inception Report and presentation	20% of total agreed cost
		Reconnaissance level Source identification report	
		Topographic Survey Report of the feasibility study	
		Detailed Geological and geotechnical Report of the feasibility	
		1st Quarter report	
2	Second payment	Feasibility studies and design on alternative source systems	20% of total agreed cost
		Preliminary Outline Design Report	
		2nd Quarter report	
		Three monthly reports	
3	Third payment	Feasibility studies and design on selected source system	30% of total agreed cost
		Three monthly report	
		3rd Quarter report	
		Draft Completion Report and Presentation	
4	Forth payment	Final Report after comment	30% of total agreed cost

4. Consulting Firms Team Expert Composition

The Consulting firm shall be legally established firm and committed to put together a team of the required qualification with direct experience and excellent understanding of technical, economic, financial and environmental and social issues related to water Supply, Sanitation and hygiene.

Resumes of the qualifications and experience of the key members of the team will be the key criteria used to evaluate proposals.

Composition of the consultant's staff Table Consulting Firms Team Expert Composition.

Table 1 Consulting Firms Team Expert Composition

S/No.	Position	No of person	Qualification and Experience	Office	Field	Person Month
1	Project manager	1	✓ MSc or above in Hydraulic, Water Resource, Civil and Environmental Engineering or related field of study ✓ MSc 13 years or PHD and 11 years and above/ minimum years' experience in the water supply sub-sector. ✓ Experience as design team leader for more than one a high credit to experiences in study & design and construction supervision of water supply projects. ✓ Projects Skill on AutoCAD and Water CAD is also a credit. ✓ Renewed Professional License	3	2	5

S/No.	Position	No of person	Qualification and Experience	Office	Field	Person Month
2	Water supply Engineer II	2	✓ MSc/BSc or above in hydraulic, water supply and environmental engineering. ✓ Experience 8 and 10 (and above) years respectively in the water supply sub-sector ✓ High credit to experiences in study & design and construction supervision of water supply projects. ✓ Skill on CAD and · Water CAD is also a credit. ✓ Renewed Professional License	1	3	4
3	Water Treatment expert	1	✓ MSc or above in Hydraulic, Water Resource, Civil and Environmental Engineering or related field of study with MSc and 10 years or PHD and 8 years and above/ minimum years' experience in the water supply sub-sector ✓ High credit to experiences in study & design and construction supervision of water supply projects. ✓ Experience as design water treatments planet for town more than one projects ✓ Skill on AutoCAD and Water CAD is also a credit. ✓ Renewed Professional License	2	1	3
4	Structural/Civil Engineer	1	✓ M.Sc. / BSc. degree in structural or Civil related fields and ✓ Experience 8 and 10 (and above) respectively, in Civil and structural design Buildings and Water of water supply projects with similar scope and complexity.	1	1	2

S/No.	Position	No of person	Qualification and Experience	Office	Field	Person Month
			✓ Proven capacity to work with structural design soft wares (SAP, ETABS and etc.) ✓ Renewed Professional License			
5	Geotechnical Engineer	1	✓ BSc and 11 years, MSc and 9 years or PHD and 7 years/ respectively, in Civil and structural design Buildings and Water of water supply projects with similar scope and complexity. ✓ Renewed Professional License	0.5	1.5	2
6	Hydro geologist	1	✓ M.Sc. / BSc. degree in Hydrogeology/ Geology or related fields and a ✓ Experience 8 and 10 (and above), respectively, in reconnaissance and feasibility study of subsurface water Supply project management with similar scope and complexity.	1	1	2
7	Hydrologist/Water Resources Engineer/	2	✓ MSc/ BSc in hydrology/ hydraulic engineering/civil engineering/ Irrigation Engineering/ Water resources engineering/water resources management field and · ✓ Experience minimum of 8 and 10 years' respectively, on water resources, assessment, analysis & management, geotechnical investigations for the water supply system in similar scope and complexity. ✓ Proficiency in hydrological modeling software (e.g. HEC-HMS, SWAT, MODFLOW and etc.) ✓ GIS and remote sensing expertise for spatial analysis	1	2	3

S/No.	Position	No of person	Qualification and Experience	Office	Field	Person Month
			and mapping. ✓ Date analysis and statistical skill using statistical tools ✓ Renewed Professional License			
8	Electro-Mechanical	2	✓ MSC/BSC degree in Electrical/ mechanical/electro mechanical engineering filed and ✓ Experience minimum of 8 and 10 years 'respectively, in study & design of electromechanical equipment (pumps, generators or other renewable energy sources) for water supply system	1.5	1.5	3
9	Socio-economist	1	✓ MSc or above in sociology and/or economics ✓ Experience minimum of 6 years' experience in socioeconomic assessment ✓ study of infrastructure projects with accredit for water supply projects	1	2	3
10	Environmentalist	1	✓ MSc or above in environmental science or related fields with · Experience of minimum of 6 years' in Environmental impact assessment studies of infrastructure projects with a high credit to water supply and sanitation sub-sector. ✓ Renewed Professional License.	2	1	3
11	Surveyor	1	✓ Minimum diploma in surveying technology ✓ Experience of minimum 8 years in water supply system. ✓ Skill in AutoCAD · Skill on use profile and layout	1	2	3

S/No.	Position	No of person	Qualification and Experience	Office	Field	Person Month
			preparation · ✓ Renewed Professional License.			
12	Water Quality Expert	1	· MSc or above in Applied chemistry or related fields with · Experience of minimum of 10 years' in Experience minimum of 8 years' experience in water quality	2	1	3

Table2. Consultant's Non Key Expert

S/No	Expertise name	No of person	Qualification and Experience	Office	Field	Per Month
1	AutoCAD(draftsman)	1	✓ A certificate or diploma in drafting ✓ Experience of minimum 4(four) years in infrastructure projects. ✓ Proven skill in AutoCAD	1	1	2
2	GIS Expert	1	✓ A certificate or diploma in GIS training ✓ Minimum of 2(two) years of experience (compile and integrate new water supply system data, draw maps using design software, and manage the data that is entered into the GIS database.)	1	1	2

5. Firms Responsibility

- Provide all necessary logistics, equipment, and qualified professional personnel required for the assignment.
- Carry out all relevant assessments, surveys, and stakeholder consultations in accordance with the approved methodology.
- Submit all reports and deliverables in line with the agreed schedule and quality standards.
- Ensure effective coordination and communication with the Ministry of Water and Energy (MoWE), Regional Water Bureaus, Town Water Utility (TWU), and other key stakeholders throughout the assignment.

6. Client's Support and Responsibilities

- The Ministry of Water and Energy (MoWE) will provide all available background documents, previous studies, and design reports relevant to the assignment. MoWE will also facilitate access to necessary data, ensure coordination among stakeholders, and provide technical guidance during the review process.
- The Regional Water Bureau and Town Water Utility (TWU) will support the consultant in organizing field visits, data collection, and community consultations. They will also assist in facilitating meetings with local authorities and beneficiaries.
- The Client will review and provide timely feedback on reports and deliverables submitted by the consultant.