Subject: The Lebanese Red Cross is seeking expressions of interest from qualified and experienced contractors for the implementation of a water network project in Al Fekha village, Baalbeck-Hermel Governorate.

Project Overview

In response to the urgent need for improved water access in underserved areas, the Bekaa Water Establishment formally referred the matter to the Lebanese Red Cross (LRC), requesting the implementation of a dedicated water supply project.

The project aims to upgrade the existing potable water system in Al Fekha, specifically targeting the neighborhoods of Hay Al Bayada, Hay Al Jami' Jdeideh, and Tarik Ra's Baalbek Al Dakhili. The goal is to meet the diverse water supply needs of these communities through the following key activities:

- **Collecting all necessary data** including but not limited to topographic Survey, **sewage line, telecommunication**
- **Site Preparation**, including the removal of debris, wreckage, and excess materials
- **Civil Works**, including asphalt cutting, trench excavation, sand bedding and surrounds, and road reinstatement
- **Installation of hydraulic gate valves and associated** manholes, fittings, and necessary supports
- **Installation of 1,830 meters of HDPE piping**, ranging from 2 to 4 inches in diameter
- **Testing and commissioning** of the upgraded potable water system

Project Location

Al Fekha Village, Baalbeck-Hermel Governorate, Lebanon. Exact coordinates will be shared upon contract award.

Project Duration

The project shall be completed and delivered in maximum November 15th , 2025.

Site visit

A mandatory site visit will be conducted. Bidders who fail to attend will be disqualified from the tender process. The date of the site visit will be communicated at a later stage.

Submission Requirements:

Interested contractors must submit a complete offer including all of the following:

- A priced, signed and stamped Bill of Quantities in soft (PDF & Excel) and hard copy:

- A method of statement/application methodology detailing the procedure and materials the tenderer intends to use, as specified in the special conditions. It must describe every task and its correlation with any other relevant job, including:

    a) Quality Control: Provide a document detailing how quality of the Works will be assured;

b) Health, Safety, Security and the Environment Document: Provide a document detailing how health, safety, security and the environment at the site will be assured.

- List of Equipment for Works Document: Detail the equipment that will be used by the Contractor on the Works and specify if this equipment will be rented or if the equipment is owned by the Contractor (Including but not limited to: bobcat, excavator, truck, asphalt milling machine, asphalt saw, etc…) Supporting documents such as ownership registration (e.g., "daftar") or rental agreements must be attached. Subcontractor documents (if any) shall be submitted for approval by ICRC & LRC Engineers.

- Previous Experience Document: For at least Five Works performed and handed-over in the last three years of similar nature and complexity to the Work included in the Request for Tender detail the name of Clients, name of Contracts, value of Contracts (at least $70,000 of similar works per project), brief description of Works and address of the Works;

- Proposed Contract Personnel Document: Detail the name, position, professional license, experience and qualifications of the Contractor Project Manager / Representative for the Works and detail the name, position, experience and qualifications of the Contractor's key staff for the Works including but not limited to: -
    - **Project Manager** (Licensed Engineer with a minimum of 5 years of relevant experience)
    - **Site Engineer** (Licensed Engineer with at least 5 years of field experience)
    - **Foreman** (Minimum of 5 years of relevant supervisory experience)
    - **Safety Officer**
    - **Quality Control Engineer**
    - **Surveyor**

- Details of Make / Brands of materials Document: Detail the make/ Brand of key materials to be supplied as part of the Works if not specified in the Bill of Quantities, Drawings and Specifications of this Request for Tender; **A Sample of Materials to be used in the project (for review and approval by LRC & the Water Establishment). List of equipment to be submitted: pipes, bends, tees, reducers, flanges, gate valve, surface box, etc…).** The bidder is also requested to add the specifications and characteristics of backfilling and asphalt material.

- Specifications of the Works Document: Provide specifications of the Works where these are not provided by the Client in this Tender;

- Time Schedule: Provide a plan of works to show the duration and planned sequence of the Works including all of the activities that will be required to carry out the Works including materials delivery and equipment mobilization and manpower requirements. The time schedule should take in consideration the location and nature of the site with specific security measures and necessary access permits.

Permits:

The contractor shall be solely responsible for obtaining all necessary permits required for the execution of the works.

Selection and Awarding Criteria:

The evaluation team shall review and evaluate the Financial and Technical Bids on the basis of their responsiveness to the requirements and technical specifications and the other documentation required/provided:

CRITERIAS	Award criteria's	Score up to	Max. Score	% of overall
Capability / competence of tenderer to perform the service required	Experience in the field concerned (water and energy sector), and with Water Establishment	10	**30**	**30%**
	Experience with other international or national NGOs	2.5		
	Previous experience with LRC.	2.5		
	Qualifications, skills, languages or experience of key personnel engaged in the project, including sub-contractors (Site engineer, Project Manager, Safety Officer, Quality Control Engineer)	10		
	Available machinery and equipment	5		
Quality / Understanding of requirements	Proposed Methodology & Quality of proposed materials	30	**40**	**40%**
	Ability to meet delivery dates & Reliability of plan proposed (November 15th , 2025)	10		
Prices for /services	Price proposal of Services in accordance with the request (best value for money)	30	**30**	**30%**
TOTAL MAXIMUM GENERAL SCORING			**60**	**100%**

Appendixes

Appendix A: Bill of Quantities

Appendix B: Technical Specifications

Annex C: Google earth layout

Appendix A: Bill of Quantities

ITEM #	DESCRIPTION	UNIT	QUANTITY	UNIT RATE USD	TOTAL AMOUNT USD
1	**General**				
1.1	Data collection including but not limited to site Topographic Survey	LS	1		
1.2	Mobilization/demobilization	LS	1		
1.3	All required documents, design, drawings, BoQ, O&M, trainings, etc… as mentioned in the specs.	LS	1		
2	**Pipeworks**				
2.1	**Pipes**				
2.1	Supply of PE100- PN10 HDPE pipes including all necessary fittings (bends, tees, reducers, flanges, etc...)				
2.1.1	Supply of 63 mm OD Pipes	Lm	980		
2.1.2	Install 63 mm OD Pipes	Lm	980		
2.1.3	Supply of 110 mm OD Pipes	Lm	850		
2.1.4	Install 110 mm OD Pipes	Lm	850		
2.2	**Asphalt Cutting**				
2.2.1	Asphalt-cutting and removal of existing asphalt along the pipe alignment, including disposal of debris and surplus material				
2.2.1.1	Asphalt Cutting for 63 mm OD Pipes	Lm	980		
2.2.1.2	Asphalt Cutting for 110 mm OD Pipes	Lm	850		
2.3	**Trench Excavation**				
2.3.1	Excavation of trench to required depth and width for pipe laying, including disposal of excess material				
2.3.1.1	Trench for 63 mm OD Pipes	Lm	980		
2.3.1.2	Trench for 110 mm OD Pipes	Lm	850		
2.4	**Sand bedding and surrounds**				
2.4.1	Supply and placement of approved fine sand bedding below the pipe to the specified thickness, properly leveled and compacted to provide uniform support. Surrounding the pipe with selected fine sand material up to 30 cm above the crown, ensuring full coverage				
2.4.1.1	Sand bedding and surrounds for 63 mm OD Pipes	Lm	980		
2.4.1.2	Sand bedding and surrounds for 110 mm OD Pipes	Lm	850		
2.5	**Laying of HDPE Pipe**				

ITEM #	DESCRIPTION	UNIT	QUANTITY	UNIT RATE USD	TOTAL AMOUNT USD
2.5.1	Laying and jointing of HDPE pipes including alignment, cutting, and welding or mechanical jointing as required by the manufacturer's guidelines and project specifications. Works include connection to existing main pipelines handling, positioning, and securing of pipes in the prepared trench, ensuring proper support and protection throughout the pipeline route.				
2.5.1.1	Laying of 63 mm OD Pipes	Lm	980		
2.5.1.2	Laying of 110 mm OD Pipes	Lm	850		
2.6	**Backfilling of Trenches Including Compaction and Testing**				
2.6.1	Backfilling of trenches using approved sand material in layers, placed above the pipe surround up to the required level, including watering and mechanical compaction to achieve specified density. Works include all necessary compaction tests, equipment, and procedures to ensure compliance with project and geotechnical specifications.				
2.6.1.1	Backfilling of trenches for 63 mm OD Pipes	Lm	980		
2.6.1.2	Backfilling of trenches for 110 mm OD Pipes	Lm	850		
3	**Road Reinstatement**				
3.1	Supply and placement of asphalt to reinstate the road surface over trench areas, matching the existing pavement thickness, grade, and type. Works include surface preparation, priming, laying of base and wearing courses, mechanical compaction, and finishing to restore road conditions to original or as specified by the local authority.	m2	1100		
4	**Valves and Valve Chamber**				
4.1	**Hay Al Bayada:**				
4.1.1	Connection of OD 110 Pipe to Exisiting Valve Chamber - Works shall include all necessary civil, mechanical, and hydraulic provisions to connect a new OD 100 HDPE pipeline to an existing underground valve chamber. The works involve careful excavation around the existing chamber to expose the connection point without damaging the existing structure or pipework. The contractor shall core drill into the existing valve chamber wall as required, ensuring alignment and sealing between the new pipe and the chamber.	nb	1		

ITEM #	DESCRIPTION	UNIT	QUANTITY	UNIT RATE USD	TOTAL AMOUNT USD
4.1.2	Supply and install DN100 PN16 ductile iron gate valve epoxy-coated inside existing valve chamber, including connection to the existing main pipeline, with all necessary fittings, supports, sealing gaskets, and chamber adjustments. Works include alignment, anchoring, pressure testing, and reinstatement.	nb	1		
4.2	**Hay al Jami3 Jdeideh:**				
4.2.1	Supply and install of 2 inch gate valve wirh surface box including connection to the existing main pipeline, with all necessary fittings, supports, sealing gaskets, and chamber adjustments. Works include alignment, anchoring, pressure testing, and reinstatement.	nb	1		
4.3	**Tarik ra2s baabalk l de5le**				
4.3.1	Supply and install of 2 inch gate valve with surface box including connection to the existing main pipeline, with all necessary fittings, supports, sealing gaskets, and chamber adjustments. Works include alignment, anchoring, pressure testing, and reinstatement.	nb	1		
5	**Testing and commissioning of potable water pipes, before and after embedding**				
5.1	Perform hydrostatic pressure and leakage testing of the installed water pipeline.Works include supply of all equipment, water, fittings, temporary thrust supports, and manpower required to pressurize the pipeline, monitor pressure loss, identify leaks, and document results for consultant/authority approval.				
5.1.1	Testing and commissioning of 63 mm OD Pipes	Lm	980		
5.1.1.2	Testing and commissioning of 110 mm OD Pipes	Lm	850		
	Sub-Total				
	V.A.T 11%				
	Total				

LEBANESE RED CROSS

Fekha Potable Water Network Extension

Technical Specifications

June 2025

GENERAL

SUFFICIENCY OF RATES

The Bill of Quantities is not and does not support to be either exhaustive or explanatory of all the obligations and duties of the Contractor who shall be deemed to have satisfied himself as to the correctness and sufficiency of the rates and prices entered by him in the Bill of Quantities all of which shall cover all his obligations under the Contract (including those in respect of the supply of goods, materials, services, and contingencies) and all matters and things necessary for the proper execution and completion of the Works and the remedying of any defects therein and which may reasonably be inferred to be necessary for the works as described in the Contract whether expressly mentioned therein or not.

ITEMS DESCRIPTION

The items descriptions provided in the Bill of Quantities may not fully detail the scope, conditions, or methods of execution. The Contractor is required to refer to this specification document, the drawings, and all other contract documents for the complete definition of the works to be executed. Each item in the Bill of Quantities shall be read in conjunction with the full set of Contract Documents. The absence of a detailed description in the BOQ shall not relieve the Contractor from the obligation to perform all works necessary for the proper and complete execution of the Contract in accordance with the specified requirements in the contract.

SCOPE OF WORK

In response to the urgent need for improved water access in underserved areas, the Bekaa Water Establishment formally referred the matter to the Lebanese Red Cross (LRC), requesting the implementation of a dedicated water supply project.

The project aims to upgrade the existing potable water system in Al Fekha, specifically targeting the neighborhoods of Hay Al Bayada, Hay Al Jami' Jdeideh, and Tarik Ra’s Baalbek Al Dakhili. The goal is to meet the diverse water supply needs of these communities through the following key activities:

- **Topographic Survey** of the project site
- **Site Preparation**, including the removal of debris, wreckage, and excess materials
- **Installation of 1,830 meters of HDPE piping**, ranging from 2 to 4 inches in diameter
- **Civil Works**, including asphalt cutting, trench excavation, sand bedding and surrounds, and road reinstatement

- **Installation of hydraulic gate valves and associated** manholes, fittings, and necessary supports
- **Testing and commissioning** of the upgraded potable water system

PROJECT LOCATION

The project is located in Al Fekha, a village situated in the Baalbeck-Hermel region, Lebanon. The exact coordinates will be provided to the Contractor upon contract award.

DEFINITIONS OF BILL OF QUANTITY CATEGORIES

The Bill of Quantities is divided into the following:

Bill 1: Fekha Potable Water Network Upgrade

RATES AND PRICES

The Contractor shall be deemed to have inserted against each item in the Bills such rates and prices as he may deem necessary to cover the requirements of the Contract. Where neither price nor rate is entered against an item or if the term "included" or any such similar term is used it shall be deemed to have been included in the other priced items in the BOQ and measured accordingly. All rates and prices entered against any item in the BOQ shall be deemed to include all the detailed requirements of the specifications and contract.

Rates and prices shall be inserted in the unit rate column of the Bill of Quantities. Each part of the Bill of Quantities shall be totaled, and the totals carried to the Summary and Grand Summary.

PRE- AND POST-INSTALLATION DOCUMENT

The Contractor shall prepare and submit all relevant documentation to support the proper planning, execution, monitoring, and handover of the works. Documentation shall include, but is not limited to, the following:

- Method statements covering all major construction and installation activities.
- Project-specific Health & Safety Plan.
- QCP detailing material inspections and testing procedures
- Topographical survey for site planning.
- Shop drawings shall be prepared and submitted for all works including general layout plan, piping profiles, manholes, surface boxes, and connection details

- Detailed calculation notes shall be provided for the relevant works in the contract as required or instructed by the ICRC & LRC Engineers.
- Technical data sheets for all equipment and materials shall be submitted for review and approval.
- Time schedule outlining all major activities and milestones, including the critical path, shall be submitted prior to the commencement of works.
- As-built drawings reflecting the actual execution on site shall be submitted upon completion of the works.
- As-Built BOQ shall be prepared based on final executed quantities.
- Operation & Maintenance (O&M) Manual shall be submitted covering all installed equipment and systems.
- Testing reports documenting all required on-site and factory tests shall be submitted.
- Acceptance certificates and manufacturer compliance certificates shall be included in the documentation package.
- Warranty certificates for all equipment and materials, clearly stating the terms, start dates, and end dates, shall be provided.

RECORDS AND "AS-BUILT" DRAWINGS

After the work has been completed, the Contractor shall submit "as-built" drawings and BOQ prepared whilst surveying during construction, showing the Works as constructed together with all other information that may either be required or be useful for the operation and maintenance of the Works in the future, such as dimensions and location of structures, size of existing pipelines and cables encountered during excavation.

The cost of preparing the shop drawings, "as-built" Drawings and Records shall be deemed to be included by the Contractor in his unit rates for the various items in the Bill of Quantities and shall not be paid for separately. The As-built Drawings shall be submitted, if required by the Engineer, as digital copy and hard copy.

CONSIDERATIONS AND REMARKS

The Contractor shall be responsible for submitting detailed method statements, shop drawings, calculation notes, and technical data sheets for all works and equipment to be installed, all of which must be reviewed and approved by the ICRC & LRC Engineers. General requirements such as testing, commissioning, training, preparation of as-built drawings, insurance, and warranty obligations shall not be compensated separately; their costs must be deemed included within the contract and BOQ total price. Any damage to existing utilities caused during the execution of the works shall be repaired by the Contractor at their sole cost and responsibility, with no entitlement to additional payment or time extension. Furthermore, the cutting of existing trees is strictly prohibited under this contract.

HEALTH AND SAFETY MEASURES

The contractor shall be required to strictly adhere to comprehensive health and safety measures throughout the project, in accordance with applicable local and international regulations and industry best practices. These measures include but are not limited to the implementation of good hygiene practices, providing appropriate Personal Protective Equipment (PPEs) to workers and visitors, establishing a robust health monitoring system, conducting regular safety monitoring activities, conduct safety training, and foster a safety-conscious environment on-site. The contractor is responsible for the effective implementation of these requirements to ensure the well-being of all personnel involved in the project.

COORDINATION WITH LOCAL AUTHORITIES

The contractor is responsible for establishing effective communication and coordination channels with relevant local authorities throughout the execution of works under ICRC & LRC supervision. The contractor shall obtain all necessary permits, licenses, and approvals from local authorities prior to commencing the project. This may permits required by local regulations. The contractor shall ensure compliance with all applicable laws and regulations and provide evidence of such compliance as requested by the local authorities, at no additional cost.

PRIVATE LANDS

The Contractor shall not enter upon or occupy with men, tools, or materials of any nature, any lands other than the working areas specified, except after consent shall have been received by him from the proper parties and a certified copy of such consent shall have been furnished to ICRC & LRC Engineers. Any rentals or damages paid for occupying private lands shall be at the Contractor's expense.

EXISTING SERVICES

In the course of works, the Contractor may encounter within the limits of the working areas and in the vicinity, miscellaneous above ground, and underground services such as drains, pipes, cables, telephone and electric poles and lines, water supply and similar existing services which might be damaged during works. It is the contractor's responsibility to repair, move or re-route any existing service, or to ensure getting it back to its original condition, if intersecting with works to be executed, after receiving legal approval from the concerned authority, with no additional cost on the project.

GOVERNMENT REGULATIONS

The Contractor shall comply with all provisions of the rules, regulations and orders of Government and Municipal agencies, such as the Water Establishment, Ministry of Energy and Water, Public Works Department, Electricity of Lebanon, and Telecommunications Authority. The Contractor shall co-operate with the Employer in promptly furnishing any information that may be required by such governmental agencies. It shall be the obligation of the Contractor to keep himself

informed of these governmental rules, regulations, and orders and the Contractor shall make the requirements of this article a part of any sub-contract he may enter.

FACILITIES FOR THE ENGINEER'S REPRESENTATIVE

The Contractor shall provide all necessary personal protective equipment (PPE) and safety gear for the use of authorized site visitors, including the Employer, the Engineer, their respective staff, and representatives of any relevant authorities. This provision shall ensure safe access and compliance with site safety regulations for all official visitors throughout the duration of the works.

ACCESS TO WORK

The Engineer and his duly appointed representatives and the Employer or his representatives or agents may at any time and for any purpose whatsoever enter and upon the work and the premises used by the Contractor. The Contractor shall provide free, proper, and safe facilities, therefore.

SURVEY AND SETTING OUT

All levels used for construction shall be referenced to the National Height Datum. The Contractor shall be responsible for obtaining the location and elevation values of existing permanent benchmarks. In the absence of such benchmarks, a site-specific datum shall be established and agreed upon with the Engineer. Prior to the commencement of any works, the Contractor shall conduct a detailed topographic survey of the site to capture all relevant physical and elevation features. All plans showing benchmarks, plot limits, and auxiliary baselines shall be submitted for review and approval by the Engineer. Under the supervision of the Engineer, the Contractor shall set out the works on-site and install permanent markers where instructed. Additionally, the Contractor shall provide the Engineer with a duly signed map indicating centerlines, baselines, reference points, and boundaries of parcels or blocks, ensuring the re-establishment of markers if they are displaced or destroyed during the works.

PRECAUTIONS AGAINST CONTAMINATION OF THE WORK

The Contractor shall always take every possible precaution against contamination of the works. The site and all permanent and temporary works shall be kept in a clean, tidy and sanitary condition. The Contractor shall always take measures to avoid contamination of the existing water courses and drains by petrol, oil or other harmful materials. Additionally, the contractor is responsible for the housekeeping of the site.

SITE UTILITIES

The Contractor shall be solely responsible for providing all necessary site utilities, including water, drainage, and power supply, at their own expense. These services shall be made available throughout the duration of the works execution, testing, and commissioning to ensure uninterrupted construction activities.

ACCESS TO PROPERTIES

The Contractor shall not disrupt any private or public access way without first providing alternative arrangements. It is the contractor's responsibility to coordinate with the local operator concerning shutting down the water supply and turning off any facilities during work execution. Moreover, it is the contractor's responsibility to ensure receiving necessary permits from all concerned authorities to guarantee safe and legal access to necessary properties.

WARRANTY

The Contractor shall provide a comprehensive warranty for the completed works, materials, and installed equipment for a period of one (1) year from the date of project completion, unless a longer warranty period is specifically required for certain equipment. During this warranty period, the Contractor shall, at no additional cost to the Employer, promptly repair or replace any defects, failures, or malfunctions resulting from defective workmanship, materials, or equipment. The warranty shall cover all aspects of the project as defined in the Contract and shall extend to both visible and latent defects.

The Contractor shall be responsible for addressing any warranty-related issues reported in writing by the Employer within a reasonable time frame, and shall bear all associated costs, including labor, materials, equipment, and transportation. The Employer shall provide access to the site for inspection and rectification works as needed.

TESTING AND COMMISSIONING

The Contractor shall be responsible for the testing and commissioning of the installed water network and all associated works within the scope of the project to ensure full compliance with project specifications and performance requirements. This includes conducting all necessary tests on equipment and materials to verify their quality, functionality, and suitability prior to and after installation. A pressure test shall be performed on the discharge piping system up till the connection to the existing pumping main to verify system integrity, ensure there are no leaks, and confirm that the piping can withstand the required operating pressure. Testing shall be conducted in two phases: once prior to pipe embedding and again after the embedding is completed. All tests shall be carried out in the presence of the ICRC & LRC Engineers. A detailed commissioning plan—outlining test procedures, methodologies, and acceptance criteria—shall be submitted for review and approval prior to execution. Any defects, deficiencies, or malfunctions identified during testing and commissioning shall be rectified by the Contractor at their own expense. Upon completion, the Contractor shall submit a final commissioning report that includes test results, observations, corrective actions taken (if any), and certification of successful operation of the water network.

INSURANCE

The cost of all required insurance policies shall be deemed to be included within the contract price. This includes, but is not limited to, the insurance of the Contractor's personnel and staff,

equipment, and any liabilities related to the Employer and their representatives, in accordance with the conditions of contract and applicable laws and regulations. The insurance shall also explicitly cover risks related to war, armed conflict, civil unrest, and acts of terrorism. No separate payment shall be made under this item. The Lebanese Red Cross (LRC) shall not be held liable for any loss, damage, injury, or claim arising from inadequate, insufficient, or missing insurance coverage on the part of the Contractor. It is the sole responsibility of the Contractor to obtain and maintain all necessary insurance for the entire duration of the contract. All relevant insurance documents and certificates shall be submitted to the LRC & ICRC for review and approval prior to the commencement of works.

TRAINING

The Contractor shall provide at no extra cost, a technical training for the BWE personnel on the use, operation, and maintenance of all installed systems and equipment. The training shall cover key procedures outlined in the Operation and Maintenance (O&M) Manual, including routine checks, troubleshooting, and safety precautions. Training shall be conducted by qualified technical staff prior to project handover and documented with an attendance sheet and a summary of topics covered.

BILL 1 – Fekha Potable Water Network Upgrade

Site Topographic Survey

The Contractor shall conduct a topographic and site survey covering the entire project area. The scope shall include all necessary data collection, measurement, and processing to establish accurate site conditions and elevation profiles. The Contractor shall establish and mark permanent benchmarks and reference points and carry out all surveying works using calibrated and project-approved equipment. Deliverables shall include the preparation and submission of contour maps, spot elevation data, and digital survey files in CAD format, all clearly referenced and aligned with project coordinates. All survey data and outputs shall be submitted for review and approval by the Engineer prior to commencing any construction works and shall be used to develop the shop drawings for all related works of the project.

The topographic survey shall be carried out along the proposed route of the underground water pipeline. It shall capture all relevant features directly along and adjacent to the alignment, as instructed by the Engineer. The survey shall include road layouts, property boundaries, and any existing water infrastructure such as pipelines, valves, hydrants, and manholes that may impact or interact with the proposed works. It shall also document natural features such as terrain elevations, contours, drainage paths, and significant vegetation, as well as any visible or indicated underground utilities such as sewer, electricity, or telecommunications. The data collected shall support the refinement of the design and aid in construction planning and risk mitigation.

PIPE WORKS

Pipes

All pipes used for the potable water distribution system shall be high-density polyethylene (HDPE) pipes conforming to PE 100, pressure rating PN16 (SDR11), and manufactured in accordance with internationally recognized standards. Pipes shall be suitable for continuous use in buried water supply systems operating at pressures up to 16 bar. The dimensions of HDPE PE 100 pipes shall comply with DIN 8074 and EN 12201 standards. The specified pressure class (PN16) is valid at a reference temperature of 20°C. Derating factors shall be applied for higher operating temperatures, as per the manufacturer's recommendations and applicable standards. Pipes shall be manufactured from virgin PE 100 resin, certified for use with potable water, UV-stabilized, and resistant to corrosion, chemical attack, and biological fouling. Recycled material shall not be permitted. The material shall meet relevant potable water approval standards such as WRAS or equivalent. Pipes shall be handled with care to avoid damage or deformation and stored on level ground away from sharp objects. If stored outdoors for extended periods, pipes shall be protected from direct sunlight. During installation, the interior shall be kept clean and free from debris.

Asphalt Cutting

Prior to the excavation of trenches for the installation of potable water pipelines, the existing asphalt pavement shall be carefully and precisely cut to the required width and alignment. The purpose of asphalt cutting is to define clean trench boundaries and minimize surface damage beyond the excavation area. The Contractor shall carry out asphalt cutting along the proposed pipeline route in accordance with the approved shop drawings and site instructions. Cuts shall be made in straight lines using suitable mechanical saws or cutting equipment to ensure clean, uniform edges. Irregular or jagged cuts shall not be accepted. Only approved cutting machines capable of producing clean, continuous cuts through the full thickness of the asphalt shall be used. Manual breaking of asphalt or use of unsuitable tools that damage adjacent pavement is not permitted. The Contractor shall implement appropriate safety measures and traffic control plans during asphalt cutting, especially in public or trafficked areas. Signage, barriers, and flagmen shall be provided as needed to ensure pedestrian and vehicular safety.All asphalt waste generated from cutting operations shall be promptly removed from the site and disposed of in accordance with local regulations to an approved dump site. The work area shall be always kept clean and free of debris. Asphalt cutting shall be coordinated with the excavation and pipe laying schedule to avoid prolonged exposure of open cuts. Where delays occur, the Contractor shall take appropriate measures to secure and protect the site.

Trench Excavation

The Contractor shall perform trench excavation works necessary for the installation of potable water pipelines in accordance with the approved shop drawings and actual site conditions. All excavation activities shall be carried out safely and in a manner that minimizes disruption to surrounding infrastructure and utilities. Trenching shall follow the alignment and levels indicated in the approved shop drawings. Excavation shall be to the required depth and width to

accommodate the pipe, bedding material, and provide sufficient working space, subject to the Engineer's approval. Trench depth shall ensure the required minimum cover above the pipe, as shown in the approved shop drawings and as per applicable standards, considering protection against traffic loads, frost, and mechanical damage. Based on typical site conditions, the depth of existing networks is generally not expected to exceed **1.10 meters**. Trench width shall be sufficient for proper pipe installation, jointing, and compaction of bedding and backfill materials. The Contractor shall base calculations on the **outer diameters (OD)** of the pipes to be installed, which are **63 mm and 110 mm**. In accordance with applicable standards and good engineering practice, a minimum lateral clearance of **150 mm** on each side of the pipe shall be maintained. Depending on the excavation and compaction method used, the total trench width may range up to **PIPE OD + 300 mm**. Vertical trench walls shall be maintained where soil conditions allow. Where stability is in question, appropriate shoring or protective systems shall be used. Before commencing excavation, all existing underground utilities shall be located and clearly marked. Excavation near utilities shall be done manually to prevent damage. Any damage caused shall be reported immediately and rectified at the Contractor's expense. Suitable excavated material may be reused as backfill if approved by the Engineer and lab test. Unsuitable or excess material shall be removed from the site and disposed of in compliance with local regulations. All trenching activities shall comply with applicable health, safety, and environmental regulations. Trenches shall be properly barricaded and marked with warning signs to ensure public safety. Measures shall be taken to prevent water accumulation in open trenches. Trenching shall be coordinated with pipe laying activities to minimize the duration that trenches are left open. The Contractor shall notify the Engineer for inspection and verification of trench depth and alignment prior to pipe installation. Following trench excavation and prior to pipe laying, the Contractor shall place and compact sand bedding material to provide a stable and uniform support for the potable water pipeline. After pipe installation, sand surround shall be placed and compacted to protect the pipe from external loads and prevent point loading or movement.

Sand Bedding and Surrounds

Bedding and surround material shall consist of clean, well-graded, non-cohesive natural sand free from organic matter, clay, silt, gravel, and sharp particles. The sand bedding shall be placed uniformly along the trench bottom to a minimum thickness of 10 cm (or as shown in the approved shop drawings). The bedding shall be carefully leveled and compacted to form a continuous and stable cradle along the entire length of the pipe. Additional hand shaping may be required at pipe joints and fittings to ensure continuous support under the pipe barrel. After the pipe is laid and inspected, sand shall be carefully placed around the sides and over the crown of the pipe up to at least 30 cm above the pipe or as specified in the drawings. The material shall be placed in layers not exceeding 15 cm and compacted lightly to avoid displacement or damage to the pipe. Special care shall be taken during placement to avoid dropping the material directly onto the pipe. Bedding and surround material shall be compacted by hand tamping and/or mechanical means as appropriate, ensuring uniform support and no voids under or around the pipe. The Engineer shall inspect the completed bedding and surround works prior to backfilling with general fill. Any areas found to be insufficient or non-conforming shall be corrected by the Contractor at no additional cost. Warning tape shall be installed above the water pipeline to indicate its presence and prevent accidental damage during future excavations.

Laying of HDPE Pipe

The Contractor shall carry out the laying of HDPE pipes in accordance with the approved shop drawings, manufacturer's recommendations, and relevant international standards such as ISO 4427 and EN 12201. All works shall ensure alignment, grade, and pipe integrity suitable for potable water distribution. Pipes shall be handled with care to prevent damage, deformation, or contamination. Pipes shall be stored on level ground, away from sharp objects, and protected from prolonged exposure to direct sunlight if stored for extended periods. End caps shall be kept in place until immediately before installation. Before laying, the trench bottom shall be inspected to confirm that it is clean, level, and free of sharp or protruding materials. Sand bedding shall be in place and compacted as specified. The pipe shall be checked for roundness, cleanliness, and any visible defects before installation. Pipes shall be laid in straight alignment along the trench, with uniform support along the entire barrel. Laying shall proceed in the direction indicated in the approved shop drawings. Proper care shall be taken to maintain the correct invert level and pipe slope, where applicable. Pipes shall not be dragged along the trench bottom; instead, they shall be lifted and placed carefully using slings or approved methods. Bends shall be made using approved fittings or by cold bending within the pipe's allowable curvature radius, as per manufacturer's guidelines. All jointing shall be performed in accordance with the manufacturer's instructions and the approved method (e.g., butt fusion, electrofusion, or mechanical fittings). Jointing surfaces shall be clean, dry, and free from contaminants. Only trained personnel using calibrated equipment shall carry out fusion jointing. Joints shall be allowed to cool adequately before any movement or stress is applied. Pipes shall be aligned correctly both horizontally and vertically. Temporary supports may be used during laying and jointing to prevent deflection or misalignment. Valves, fittings, and accessories shall be installed in accordance with manufacturer specifications and securely supported. The installed pipe section shall be inspected by the Engineer and tested prior to placing the pipe surround. Any damaged or defective pipe shall be removed and replaced at the Contractor's expense. Pipe alignment, invert levels, and joints shall be verified and recorded before continuing with surround and backfill. During laying, the interior of the pipe shall be kept clean and free from debris. Temporary caps or covers shall be placed at the end of each day or work stoppage to prevent ingress of dirt, water, or animals

Backfilling of Trenches Including Compaction and Testing

Backfilling shall be carried out after the pipe has been laid, inspected, and surrounded with the required sand material up to a minimum of 300 mm above the pipe crown. The process shall be executed in a manner that ensures protection of the pipe, restores the trench, and maintains ground stability in accordance with the approved specifications and site conditions. The backfill material shall be free from large stones, boulders, organic matter, debris, or any sharp or corrosive materials that may damage the pipe. Excavated material may be reused if deemed suitable by the Engineer and applicable visual and lab testing. Otherwise, imported fill material conforming to project requirements shall be used. Any unsuitable material shall be disposed of off-site in compliance with local regulations and to approved dump site. Backfill shall commence only after testing of the pipes and approval of the pipe bedding and surround by the Engineer. Backfilling shall be done

in layers not exceeding 300 mm in loose thickness. The initial layer above the sand surround shall be placed carefully to avoid displacing or damaging the pipe. Each backfill layer shall be compacted to the required density, typically 95% of Modified Proctor Density unless otherwise specified. Compaction shall be achieved using suitable mechanical equipment, avoiding direct contact or vibration over the pipe until sufficient cover is in place. Where compaction is not feasible due to space constraints (e.g., near walls or structures), alternative methods or materials may be proposed subject to Engineer approval. Field compaction tests shall be conducted at intervals and locations agreed upon with the Engineer. The Contractor shall record and submit test results as part of the quality control documentation. Any failed tests shall require re-compaction and retesting at the Contractor's expense. Upon completion of backfilling, the surface shall be restored to its original condition or as specified in the shop drawings Reinstatement shall match existing ground levels and gradients, ensuring no depressions or settlement. Open trenches left overnight shall be properly marked and secured. Protective measures shall be taken in public or trafficked areas to prevent hazards during backfilling and reinstatement.

Road Reinstatement

Upon completion of backfilling and successful inspection and compaction tests, all affected road surfaces shall be reinstated to their original condition or better, in accordance with the approved drawings, standards, and the requirements of the relevant authority or municipality. The Contractor shall be responsible for all preparatory works, materials, compaction, and asphalt works to ensure a durable, uniform, and traffic-safe surface. The reinstatement shall include surface preparation, reconstruction of base layers, application of tack coat, and placement of asphalt layers. The work shall cover removal of temporary surfaces (if any), preparation and compaction of sub-base and base layers, application of tack coat, and laying of asphalt concrete layers matching the existing pavement in thickness and type. All works shall ensure continuity with the surrounding road and long-term durability. Before reinstatement, the trench shall be properly trimmed, and any temporary or loose material removed. The edges of the existing pavement shall be neatly saw-cut in straight lines to ensure clean joints with the new asphalt. The trench surface shall be cleaned and lightly moistened if required. Hot-mix asphalt shall be placed in layers consistent with the original pavement structure. Asphalt shall be laid using approved equipment and compacted using steel-wheeled rollers to achieve the required density and surface finish. The surface shall be flush with adjacent pavement and free from depressions, cracks, or visible defects. Longitudinal and transverse joints between the new and existing pavement shall be tightly bonded . The finished surface shall be uniform in texture and level, and shall not present any tripping or driving hazards. Joints shall be inspected to ensure proper bonding and compaction.The road shall only be reopened to traffic once the asphalt has cooled and compacted sufficiently to bear vehicular loads. Proper traffic control measures, signage, and barriers shall be maintained until the road is deemed safe for use. After completion of all works, the site shall be cleared of all debris, surplus material, and equipment. Any damage to surrounding surfaces caused during reinstatement shall be repaired at the Contractor's expense.

Connection to existing to valve chamber

The Contractor shall carry out all necessary civil, mechanical, and hydraulic works required to connect a new OD 110 HDPE pipeline to an existing underground valve chamber. The works shall

be executed with precision and care to avoid any disturbance to the existing structure, pipework, or operational components. The scope of work includes surveying and confirming the position and condition of the existing valve chamber and pipelines, followed by controlled excavation around the chamber to expose the designated connection point. Excavation shall be performed manually or using light machinery to prevent structural damage, and trench shoring or support shall be provided as needed. The Contractor shall core drill into the valve chamber wall at the approved location and elevation using suitable equipment for reinforced concrete. The opening shall be carefully aligned with the proposed pipeline to allow proper insertion of the HDPE pipe. After drilling, the pipe shall be inserted through the opening to the required depth, ensuring proper alignment with the connecting pipeline. The annular space between the pipe and chamber wall shall be sealed using a non-shrink grout, a flexible rubber gasket system, or another approved watertight sealing method. Where necessary, anchorage or thrust supports shall be installed to prevent movement and absorb hydraulic forces during operation. Should the connection require mechanical fittings, flange adapters, or valves, these shall be installed in accordance with the approved shop drawings and the manufacturer's recommendations. All mechanical joints shall be tightened and tested to ensure leak-free performance prior to backfilling. Upon completion of the connection, the Engineer shall inspect the works, and a localized pressure test may be conducted to verify the joint's integrity. Any identified leaks or deficiencies shall be corrected by the Contractor at no additional cost. Following approval, the site shall be backfilled in compacted layers using suitable material. The surface shall be reinstated to match the existing conditions or as otherwise specified. All debris and excess materials shall be removed, and the work area shall be cleaned and restored to its original condition.

Gate Valve

The gate valve shall be of the elastic-seated type, designed for bidirectional flow and full port opening to minimize head losses. The valve body shall be constructed from ductile iron or equivalent, with both internal and external surfaces coated with epoxy for corrosion suitable for potable water applications. The wedge shall be fully coated with EPDM rubber, ensuring tight sealing. The valve shall feature a non-rising stem, made of corrosion-resistant material, and shall be designed for clockwise closing. It shall operate with reduced torque, facilitating manual control. The valve shall be suitable for potable water applications and capable of installation in either flow direction, in accordance with manufacturer recommendations and relevant standards.

Construction of Valve Chamber

The Contractor shall construct a reinforced concrete valve chamber of Type C3 in accordance with the approved shop drawings and structural requirements. The internal clear dimensions of the chamber shall be 1.5 meters by 1.5 meters, with an internal depth of 1 meter or as required based on exisiting pipe profile. The chamber may be constructed as a cast-in-situ structure using C30 grade concrete or provided as a precast concrete manhole of equivalent or suitable internal dimensions and structural performance, subject to prior approval by the Engineer. For cast-in-situ construction, the chamber base and walls shall be poured using C30 concrete in a single continuous operation. Double-layer steel reinforcement shall be provided in all vertical and horizontal elements, with adequate concrete cover as per structural design. Reinforcement shall be properly

tied, positioned, and supported to maintain alignment during pouring. The base slab shall rest on a well-compacted subgrade, and all formwork shall be rigid, aligned, and treated with an approved release agent. Alternatively, the Contractor may supply a precast valve chamber with internal dimensions suitable for the application, with wall thickness of 20 cm and reinforcement adequate to withstand soil and traffic loads. The precast unit shall be delivered to site fully cured and undamaged, with lifting points and pipe openings either pre-formed or core-drilled on site as per alignment. All pipe penetrations shall be sealed with non-shrink grout or flexible pipe sleeves to ensure watertightness. In both construction methods, the internal surface shall be smooth and free from defects such as honeycombing or segregation. A reinforced concrete cover slab shall be placed over the chamber, designed to accommodate the road loading class subject to heavy vehicular traffic. The cover slab shall include an access opening fitted with a D400-rated heavy-duty ductile iron manhole cover and frame compliant with EN 124 or equivalent standards, suitable for installation in roads subject to heavy vehicular traffic. The cover shall be non-rocking, seated on mortar or rubber gasket, and finished flush with the road surface. Following completion, the chamber shall be cleaned, and the surrounding trench shall be backfilled in compacted layers with suitable material. The surface shall be reinstated to match existing conditions or as directed by the Engineer.

Surface box for valve operation

The Contractor shall supply and install a ductile iron surface box to provide durable and accessible access to the buried gate valve. The surface box shall be heavy-duty and suitable for installation in both paved and unpaved areas, capable of withstanding vehicular loads where required. It shall consist of a ductile iron frame and cover, factory coated with a bituminous or epoxy protective layer, and clearly marked with “WATER” or an equivalent label as approved by the Engineer. The cover shall seat securely within the frame, flush with the surrounding surface, and shall not rock or rattle under traffic or movement.

The surface box shall be aligned vertically above the valve spindle or extension and installed in a way that ensures smooth and unobstructed access for valve operation. It shall be independently supported on a concrete or masonry bed to prevent any surface loads from being transmitted directly to the valve or pipe. The surrounding area shall be carefully backfilled and compacted to avoid settlement or displacement. Where the surface box is installed in asphalt or concrete pavement, the surrounding surface shall be neatly reinstated to match the existing condition. All components shall conform to applicable standards for potable water systems and be approved by the supervising Engineer prior to installation.

Testing and commissioning of potable water pipes

The Contractor shall perform hydrostatic pressure and leakage testing on the completed sections of the water distribution network to verify the structural integrity and water-tightness of the installed pipeline. All testing shall be conducted in accordance with the applicable project specifications, approved standards, and under the supervision of the Engineer.

The scope of work includes the supply of all necessary equipment, fittings, water, temporary thrust blocks or anchoring systems, pressure gauges, flow meters, and skilled manpower required to carry out the test safely and effectively. The Contractor shall also be responsible for identifying and repairing any leaks or defects, retesting if necessary, and documenting all results for submission and approval by the Engineer and relevant authorities.

Prior to testing, the section of the pipeline to be tested shall be flushed and filled completely with clean water, free from debris or entrapped air. All valves, joints, and connections shall be inspected to confirm readiness. Temporary end caps, fittings, and air release points shall be installed as needed. The pipeline shall be subjected to a hydrostatic pressure not less than 1.5 times the design operating pressure or as specified by the Engineer, for a duration of not less than 3 hours.

During the test period, pressure shall be maintained within the allowable tolerance, and any pressure drop shall be recorded and analyzed. The pipeline shall be deemed to have passed the pressure test if the observed pressure loss and allowable leakage are within the limits set by the relevant standards (e.g., AWWA, ISO, or EN standards for HDPE pipes). Any visible leaks or pressure losses exceeding allowable values shall be investigated and repaired, and the section shall be retested until satisfactory results are achieved.

The Contractor shall maintain detailed records of all test procedures, pressure readings, leakage measurements, repair actions, and final results. A formal test report, including date, location, pipe section, applied pressure, duration, and observations, shall be submitted to the Engineer for review and approval. No pipeline section shall be backfilled or put into service until it has successfully passed hydrostatic pressure and leakage testing and received formal acceptance from the supervising authority.

BILL C – GENERAL WORKS

GENERAL SITE WORKS

The works shall include all activities necessary for the proper commencement, support, and conclusion of the project. This includes the mobilization and demobilization of all required personnel, equipment, and materials. The Contractor shall establish adequate site facilities, including staff accommodation, project offices, storage areas, and utility connections required to support continuous site operations.

Comprehensive health and safety measures shall be implemented in line with applicable regulations and the approved HSE plan. This includes the provision of appropriate personal protective equipment (PPE) for all site personnel, fire extinguishers, and first aid kits. The Contractor shall ensure that all safety equipment is accessible, functional, and regularly inspected throughout the duration of the works.

The scope also includes general site clearance and preparation of the working area, accurate setting out of works under the supervision of the LRC & ICRC, and the establishment of safe access routes

and circulation paths. Temporary fencing, warning signage, and project identification boards shall be installed to ensure site security, public safety, and visibility of ongoing works.

Additionally, the Contractor shall be responsible for arranging temporary utility connections such as water, electricity, and lighting to support site operations. All works shall be performed in strict compliance with the project specifications, relevant standards, and the Engineer's instructions. The Contractor shall bear full responsibility for executing these preliminary activities in a safe, orderly, and professional manner.

TECHNICAL DOCUMENTATION AND SUBMITTALS

The Contractor shall prepare and submit all required technical documentation in accordance with the project specifications, timelines, and the Engineer's instructions. This shall include, but not be limited to, the following: detailed shop drawings, as-built drawings, calculation notes, method statements, equipment datasheets, POW, and operation and maintenance (O&M) manuals.

All documents shall be submitted in both hard copy and editable digital formats, as required, and shall be subject to the LRC & ICRC review and approval prior to implementation. The Contractor shall ensure that all submittals are accurate, coordinated, and delivered in a timely manner to avoid any delay to the progress of the works.

Appendix C: Google earth plan

Link to google earth document:
https://drive.google.com/drive/folders/1wJ026LNZJ2ab99ai_euvTO_XPRgri2Id?usp=drive_link