



United Nations Children's Fund

WASH Programme

Terms of Reference

Digital Transformation for Smart Water Management in Al-Hamadanya district, Ninawa Governorate

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Project Summary	Project Title: Digital Transformation for Smart Water Management in Al-Hamadanya district Geographical Locations: Al-Hamadanya District, Ninawa Governorate Targeted Population: 250000 (122000 Female, 127500 Male, 56350 Girls, 58650 Boys) Alignment with Office Priorities: Climate Change- Data and Modelling Implementation Modality: Contract with Private contractor
Background and Project description	Ninawa Governorate, located in northern Iraq bordering Syria, is the country’s third largest and second-most populated governorate, with approximately 3.1 million residents across an area of 37,323 square kilometers. Administratively, it comprises seven districts: Mosul (the capital), Telafar, Al-Hamadaniya, Tilkaif, Al-Hatre, Sinjar, and Al-Ba’aj. The governorate faces substantial climate-related challenges, reflected in its Climate Vulnerability Index score of 0.44 out of 1, indicating high sensitivity coupled with very limited adaptive capacity. This vulnerability is primarily due to high population density, significant reliance on agriculture and livestock farming as primary economic activities, and an elevated poverty rate (Ministry of Environment, 2025). Recent low annual precipitation and prolonged drought conditions have exacerbated water scarcity. Deep wells, particularly in Sinjar and Al-Ba’aj, have either dried out completely or shown increased contamination, including elevated salinity levels, due to reduced groundwater recharge and declining surface water availability. Challenges are not limited to resource availability but extend critically to the management of water distribution and supply infrastructure. Non-Revenue Water (NRW)—both physical leakages and apparent losses due to unauthorized use or metering inaccuracies—currently reaches approximately 50% across Iraq, with Ninawa being no exception. Additionally, the daily per capita water consumption in Ninawa is significantly higher compared to neighboring countries with similar contexts, and the existing tariff structure recovers only up to 30% of operational expenses. These factors highlight an inefficient water supply system and mismanagement of both demand and supply sides, compounding the water crisis and underscoring the urgent need for strategic action. Hamadanya district is supported with water through the Al Salamyia water project, water is conveyed to the population in Hamadanya (250000 individuals) across Hamadanya town, Bartella, and the surrounding villages through main transmission lines with a total length of about 30 km. The significant water losses on those lines are affecting the water supply system in Hamadanaya causing a shortage in access to water for the population. The local authorities do not have an effective monitoring and analysis system that may contribute to informing the decision-makers on how to prioritize the available resources to take action to

improve the quality of the service towards efficiency. Recognizing this critical situation, climate adaptation through improved water management has become a moral, economic, and social imperative. The Ministry of Environment, in collaboration with development partners and local communities, has developed a comprehensive Local Adaptation Strategy for Ninawa, placing digital transformation of municipal water supply, distribution systems, and NRW management at its core. Furthermore, the International Committee of the Red Cross (ICRC) has supported the Ninawa Directorate of Water (NDW) to develop a comprehensive water master plan, addressing NRW challenges through innovative interventions, including digitalization, implementation of District Metered Area (DMA) zoning, and real-time monitoring via Supervisory Control and Data Acquisition (SCADA) systems.

Strategic Intervention

To enhance water efficiency and resilience in Ninawa, UNICEF will implement a model for smart water monitoring system along the Al-Hamadanya-Salamya-Bartella water transmission line, integrating advanced digital technologies to reduce water losses, improve system reliability, and optimize water distribution. The intervention aims to:

1. Digitalization of Al-Hamadanya-Salamya-Bartella Water Transmission Line

- Deployment of IoT-based sensors and smart flow meters to monitor real-time water flow, pressure levels, and potential leakage points along the transmission line.
- Integration with Ninawa's central SCADA system at NDW to allow automated data collection, remote monitoring, and predictive maintenance.
- Automated alerts for leakage detection and system anomalies, enabling quick response and preventive maintenance.

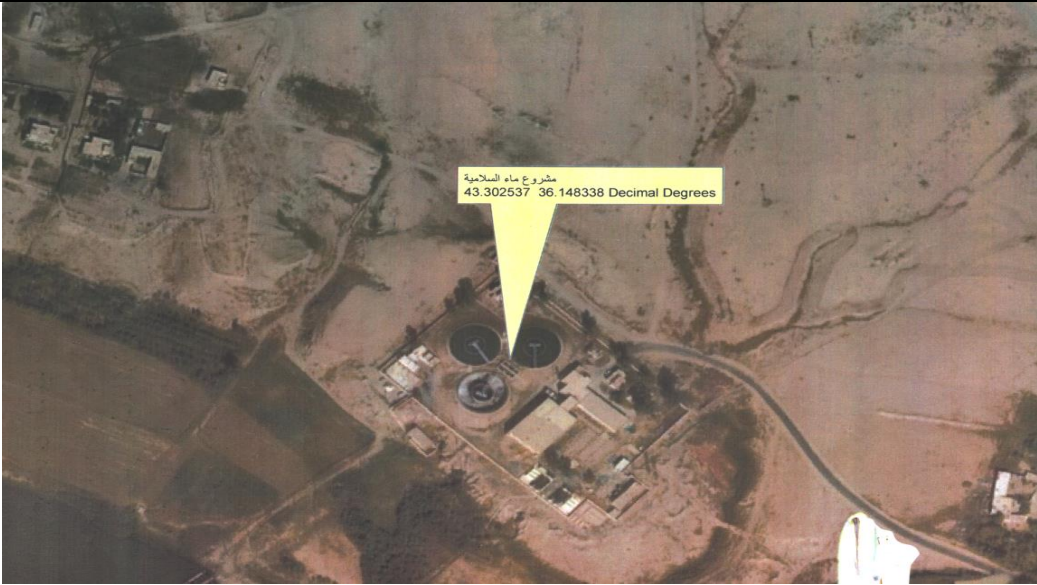
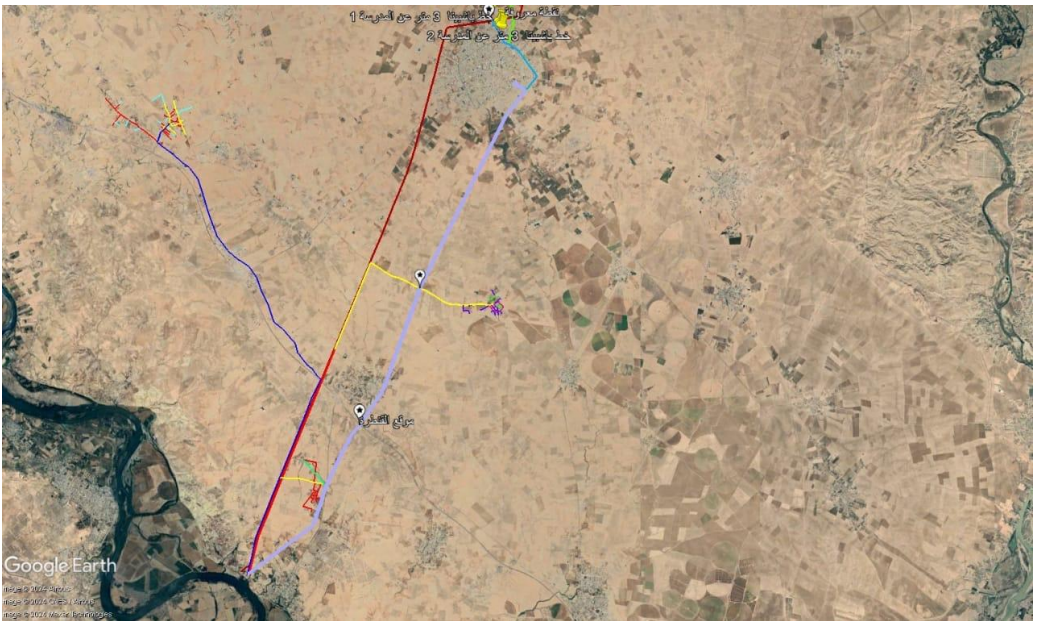
2. Strengthening SCADA and Data Management

- The central SCADA system to accommodate real-time data from Al-Hamadanya-Salamya-Bartella main water transmission line and ensure seamless communication between water infrastructure assets and control centers.
- Enhancing NDW's capacity to analyze water distribution patterns, identify inefficiencies, and make evidence-based decisions using digital dashboards and analytics platforms.
- Improving interconnectivity between monitoring stations and existing SCADA unit, ensuring integrated network management for optimal water allocation.

3. Institutional Capacity Building for NDW

	• Training NDW engineers and technicians on IoT-based monitoring tools, to improve water system performance. • Developing operational guidelines to ensure sustainable adoption and maintenance of smart water monitoring systems. 4. Strengthening Data-Driven Decision Making • Establishing a structured data management process, allowing NDW to monitor trends, forecast demand, and improve long-term planning. • Utilizing real-time SCADA analytics to support policy and investment planning for infrastructure upgrades and NRW reduction. • Generating insights to guide future water sector modernization efforts based on evidence collected from the pilot project. Expected Impact By leveraging digital monitoring and SCADA integration, this initiative will benefit 250000 individuals in Hamadanya district including the villages, through: • Reduce Non-Revenue Water (NRW) and improve operational efficiency by detecting and addressing water losses in real time. • Enhance water conservation and climate resilience by ensuring sustainable use of limited water resources in a drought-prone region. • Improve service reliability and equitable water distribution, particularly benefiting vulnerable communities in Al-Hamadanya and surrounding areas in Salama and Bartella. • Strengthen NDW's technical capacity, enabling the directorate to manage water systems more effectively and expand digital solutions across Ninawa. • Provide a scalable, evidence-based model for future water sector digitalization and climate adaptation strategies in Iraq. By implementing smart water monitoring along Al-Hamadanya-Salama-Bartella 's transmission lines, this project directly supports Ninawa's Local Adaptation Strategy, enhances institutional efficiency, and strengthens climate-resilient water governance in the region
Objectives and expected results	Objectives A. Ninawa (Al-Hamadanya Water Transmission Lines) • Enhance Water System Efficiency: Deploy IoT-based smart sensors and digital monitoring technologies to optimize water distribution and reduce Non-Revenue Water (NRW).

	• Strengthen Digital Water Governance: Integrate real-time monitoring data into Ninawa Directorate of Water's (NDW) central SCADA system to enable evidence-based decision-making. • Increase Climate Resilience: Improve operational control and sustainability of water resources by minimizing losses and ensuring adaptive water management strategies. Expected Results A. Ninawa (Al-Hamadanya): • Smart water monitoring system operational along the Al-Hamadanya water transmission line, enhancing water loss detection and control. • Seamless integration with NDW's central SCADA system, enabling real-time analysis and proactive infrastructure management. • Improved NRW management, leading to enhanced water conservation and sustainable resource utilization.
Locations.	Ninawa: Governorate: ➤ The Hamadanya-Salamya-Bartella transmission lines GPS: 36.148338, 43.302537 The targeted locations experience significant water losses due to initial design limitations, outdated system configurations, illegal connections, and aging infrastructure Al Hamadanya site:

	 
Scope of work and Description of the assignment.	Component A: Equipping Al-Hamadanya Water Transmission Line with Smart Water Monitoring Systems (Ninawa) Objective To enhance water supply efficiency and Non-Revenue Water (NRW) management in Al-Hamadanya by deploying digital monitoring technologies and integrating them into the existing SCADA system at the Ninawa Directorate of Water (NDW). Scope of Work Procurement and Installation of Smart Monitoring Technologies

	○ Initiate the procurement process for IoT-based smart sensors, flow meters, and telemetry devices ○ Verify certifications and compliance standards of the supplied equipment, submit to UNICEF for validation and approval before proceeding with installation. ○ Ensure compatibility of installed sensors with NDW's existing SCADA system. ○ Coordinate with NDW for equipment storage and pre-installation inspections. ○ Install and configure smart monitoring devices at designated points along the Al-Hamadanya water transmission line. ○ Ensure real-time connectivity and data transmission to NDW's SCADA system. ○ Conduct live testing and calibration of all installed devices. ○ Provide one year connectivity subscription ○ NDW and UNICEF to verify functionality before finalizing installation. 2. Integration with NDW SCADA System ○ Establish data transmission links between installed sensors and NDW's central SCADA system. ○ Configure real-time monitoring dashboards for operational teams at NDW. ○ Develop an alert system for early leak detection and response planning. 3. Testing, Commissioning, and Optimization ○ Conduct functional and performance tests to verify system reliability and data accuracy. ○ Optimize sensor placement and data calibration to ensure accurate NRW tracking. ○ Provide necessary adjustments and enhancements to maximize system efficiency. ○ Present performance validation report for UNICEF approval. 4. Capacity Development for NDW Staff ○ Develop a training curriculum for NDW engineers and technicians. ○ Conduct on-site training sessions on: ○ - System operation and troubleshooting. ○ - Data analysis and dashboard usage. ○ Provide training manuals and technical guides for future reference. 5. Final Handover and Documentation ○ Submit a comprehensive implementation report, including: ▪ Technical specifications and installation records. ▪ Sensor calibration and performance validation. ▪ User manuals and operational guidelines. ○ Conduct a final evaluation meeting with NDW for project handover and sustainability planning.
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	6. Coordination and endorsement: Closely coordinate with UNICEF and the local authorities, specifically the supervision committees from Ninawa Directorate of Water (NDW) to thoroughly discuss proposed solutions, finalize selection, and obtain official endorsement for the design and the materials before applying them on ground. 7. Risk Analysis and Mitigation, and implementation Plan • Identify potential risks related to the recommended interventions (financial, technical, and operational). • Develop a comprehensive risk mitigation plan, including appropriate contingency measures. • Prepare a detailed and practical implementation plan clearly outlining timelines, roles, responsibilities, and key milestones for successful project delivery 8. Reporting • Provide regular weekly progress updates to UNICEF and the local authorities in Ninawa NDW summarizing both the works, process, and quantities implemented within the reporting periods. • Submit a comprehensive final report, including: ➤ The detailed technical documents (maps, data sheets, manuals, etc.) and actual certified quantities applied in the project. ➤ The comprehensive quality control process, detailing all conducted tests and results, etc. ➤ The capacity development process and report include training activities, materials, and participant documentation. ➤ The detailed implementation process summarizing activities, milestones achieved, and lessons learned.
Deliverables.	The contractor is expected to produce the following outputs, following a sequential and structured approach: Equipping Al-Hamadanya Water Transmission Line with Smart Water Monitoring Systems (Ninawa): Supply, delivery, installation, integration into the existing central SCADA system at NDW in Mosul, commissioning, and testing of smart monitoring devices for the Al- Hamadanya Water Project and its associated main transmission lines, in accordance with the technical specifications outlined in the attached Bill of Quantities and maps. The contractor should provide a one-year connectivity subscription, the contractor will provide training for the technical staff of the Ninawa Water Directorate on the operation and maintenance of the installed devices devices.

Reporting requirement.	Report Title	Submission Timeline
	Weekly Progress Reports for the implementation phases	Weekly, on an agreed-upon day.
	Samples of the devices, materials, and tools for approval	Once the contract is signed
	Training Plan, materials, user manuals, final training report	The training materials should be submitted when the implementation progress reaches 50%. The training report should be submitted once the training is completed.
	Final Report	At the conclusion of the assignment upon handover.
Duration	The assignment shall be completed within 120 calendar days from the commencement date. The contractor is expected to undertake work simultaneously across all targeted sites. The timeline for key activities is as follows:	
	Activity	Timeline (Calendar weeks)
	Site handover	Within 1 week of contract signing
	Submission samples of the devices and materials)	Weeks 2
	Supply, installation, commission, and testing of the digital tools	Weeks 4-14
	Training	Week 15
	Handover and Final Report	Week 16
Project Execution and Oversight	Note: 1. The contractor must commence the work within a maximum period of 7 calendar days from the contract signature date.	
	Quality Assurance and Compliance Material Standards and Workmanship: The Contractor is required to submit materials and equipment samples, along with Certificates of Origin, for the Supervision Committee and UNICEF approval. This step ensures all project materials comply with technical specifications and adhere to reliable International and Iraqi standards. - The supervising committee reserves the right to reject any materials not meeting the required specifications. In such instances, the contractor must replace the non-compliant materials at no additional cost. Additionally, the site engineer may request tests to verify the quality of materials and workmanship. Only materials and workmanship that have received approval will be used in the project. Site Management	

	• Site Cleanliness and Waste Management: Maintain cleanliness across the project site and ensure responsible debris disposal. Obtain necessary approvals for all concealed works before moving forward, aligning with environmental and safety standards. Health, Safety, and Environmental Management • Safety Practices and Environmental Compliance: Develop and implement Health & Safety and Accident Prevention Plans in alignment with UNICEF's zero tolerance policy towards corruption, fraud, and child labor. These plans must ensure the safety of all employees and visitors on-site and incorporate environmental protection practices. Warranty Responsibilities • After preliminary handover, the contractor enters a 6-month warranty period, undertaking maintenance and support to rectify any operational issues and guaranteeing long-term system functionality. This commitment is crucial for maintaining project integrity and performance standards.
Variation Order Management	Managing variations in the project scope, quality, or quantities is crucial to meeting objectives while accommodating necessary adjustments. This process is governed by the following steps: 1. Variation Requests: Contractors must submit formal requests for any scope, quality, or quantity variations, including BoQ changes. These requests should outline the variation's nature, rationale, and expected impact on project execution and outcomes. 2. UNICEF Review and Approval: • UNICEF's Authority: UNICEF reserves the right to make necessary variations to work scope, quality, or quantity, including changes in the BoQ. • Review Process: Upon receiving a variation request, UNICEF will review the necessity and feasibility of proposed changes, assessing their impact on project goals, budget, and timeline. • Decision Making: Decisions on variation requests will be made solely by UNICEF, with formal notifications issued to the contractor. This ensures clear documentation and mutual understanding. 3. Implementation of Approved Variations: • Contractor's Role: Upon UNICEF's approval, variations must be documented and executed according to UNICEF's directives, ensuring alignment with agreed standards. • Adjustments in BoQs: Approved variations may lead to adjustments in BoQs, which require endorsement by all stakeholders, including the Supervision committee, and UNICEF. 4. Valuation of Work: • Using BoQ Rates: For comparable work, existing BoQ rates will be applied.

	• Determining Rates for Unlisted Work: If no comparable rates are available, UNICEF will determine fair and reasonable rates, considering market value, work intricacy, location, and current value of similar work. • No Variation in Contract Price: There will be no variation in the contract price due to changes in material costs, labor wages, or the introduction/operation of laws affecting the project. 5. Written Orders Requirement: No variation by the contractor is to be made without a written order from UNICEF, ensuring all additional or omitted work is appropriately authorized and valued.		
Evaluation process and methods	1. Initial Technical Evaluation Pass/Fail approach:		
	MANDATORY REQUIREMENTS	SUPPORTING DOCUMENTS	SCORE
	Bidder is a legal entity regulated and licensed in Iraq	For Local companies, a copy of the certificate of incorporation (i.e. company legal registration) or equivalent document verifying legal status/capacity in Iraq. For international companies. a copy of the certificate of incorporation (i.e. company legal registration) or equivalent document verifying legal status/capacity in Iraq. UNICEF accept submission by either one bidder, or as Joint Venture	Pass / Fail
	The bidder shall submit evidence of implementing similar projects	Minimum two implemented contracts for SCADA and/ or Smart monitoring system or relevant project. At least one contract with total value not less than \$200,000.	Pass / Fail
	TAX Clearance	Bidder to provide tax clearance for 2023 and 2024	Pass / Fail
	Bidder keeps updated and compliant financial records	The bidder must submit Audited Financial Statements for 2023 and 2024. Turnover shall be not less than \$750,000 for any of those two years. In case of Joint Venture submission, the accumulative turnover shall be not less than \$750,000 for any of those two years.	Pass / Fail

	Evidence of site visit	A certificate of site visit issued by the respective of the NWD and UNICEF focal point, site visit date and timing shall be determined by UNICEF later.	Pass / Fail
	Full compliance with the specified technical requirements	Submission of the technical offer, documents of full and detailed specifications (datasheets, catalogues, etc.) showing full compliance with the required specifications.	Pass/Fail
payment schedule	The awarded contractor shall receive two payments First payment will be 50% of the contract total value processed upon successful completion of 75% of the work upon acceptance and certification by UNICEF and NDW. The payment will be made according to the actual quantities implemented and approved. The Second payment will be 50% of the contract total value processed upon successful completion of 100% of the contracted works upon initial handover approved and certified by UNICEF and NDW, and according to the actual quantities implemented and certified. Note: the contractor must submit a bank guarantee letter equal to 10% of total contract value when the contract is signed, this is to cover the project warranty period of 6 months after initial handover. UNICEF will release the bank warranty letter to the contractor after the end of the 6-month warranty period and final handover letter issued by the handover committee and acceptance from UNICEF		
Project management	Project Management and Coordination • UNICEF Supervision: UNICEF provides overarching supervision to ensure the project aligns with specific goals and quality standards. • Local Oversight: Representatives and/or official committees from the government partner (NDW), offer day-to-day oversight, ensuring quality and adherence to project objectives. • Project Manager Role: The contractor appoints a project manager responsible for: • Daily management of project implementation. • Liaising between UNICEF, the government partner, and the project team. • Ensuring all project activities comply with specifications and contractual terms. Coordination, Approval, and Accountability: • The project manager coordinates closely with all involved parties. • Seeks and obtains necessary approvals for project milestones and deliverables from UNICEF.		

	All activities shall be conducted according to the terms and conditions embedded in the contract with due considerations to UNICEF rules and regulations. UNICEF shall obtain endorsement from the NDW of all submittals.
Other information and considerations	➤ Should the Contractor fail to fulfill any of his obligations under the contract, the relevant remedies will be applied in line with UNICEF contractual provisions for construction works as provided in the attached RFP and the resulting. ➤ There will be no variation in the contract price as a result of any variation in the costs of materials for permanent or temporary works or of consumable stores fuel or power or in the rates of wages or allowances payable to or respect of labor or as a result of any changes in the labor employment conditions or as a result of the introduction or operation of any law statute or order. ➤ The contractor should familiarize him/herself with the characteristics of the project and the location where the contractor will have to deliver the assignment in the actual conditions of the project location as it is, BOQs and drawings will not be modified for convenience purposes ➤ If the contractor fails to complete the works within the time prescribed within the Terms of Reference, hereof or extended time (approved by UNICEF), UNICEF shall have the right to deduct from any payment due to the Contractor the amount of one-tenth of a percent (0.1 %) of the Contract Price per day of delay up to a maximum of ten percent (10%) of the Contract Price. These liquidated damages shall not relieve the contractor of his obligations and/ or responsibilities that he may have under the contract. ➤ UNICEF shall make any variation in the form of quality or quantity of the works that may in its opinion be necessary and for that purpose or if for any other reason, it shall have the power to order the contractor to do and the contractor shall do any of the following: ○ Increase or decrease the quantity of any works included in the contract. ○ Omit any work included in the contract. ○ Change the character or quality or kind of any work included in the contract. ➤ Where there are rates for comparable work in the bills of quantities such rates are to be used. Where no such comparable rates are available from the bills of quantities UNICEF in negotiation with the contractor shall determine such rates as it considers fair and reasonable after a reasonable and documented market assessment, the due allowance shall be made for the market value of articles purchased, the intricacy and the location of the work involved and the current value of similar work in other contracts. ➤ The variation must be agreed by both parties and the contract must be amended before execution of the work. ➤ Execute additional work (communicated in writing) of any kind necessary for the completion of the works. And no such variation shall in any way violate or invalidate the contract but the value (if any) of all such variations shall be considered in ascertaining the amount of the contract price. No such variation

	shall be made by the contractor without an order in writing by UNICEF who shall determine the amount (if any) to be added to or deducted from the sum named in the tender in respect of any extra or additional work done or work omitted by its order. ➤ There will be no variation in the contract price as a result of any variation in the costs of materials for permanent or temporary works or of consumable stores fuel or power or in the rates of wages or allowances payable to or in respect of labor or as a result of any changes in the labor employment conditions or as a result of the introduction or operation of any law statute or order ➤ any change in quality and quantity should be communicated with UNICEF in written and approved in written prior to implementation ➤ The total cost of each item includes testing costs for all works and materials as they need to be the contractor's responsibility. the contractor should conduct tests for the work and materials as per the Iraqi standards and instruction of the supervision committee to be conducted in official and governmental laboratories and as approved by the local authority, the Directorate of water. The work should only progress upon submission of satisfactory results. the contractor should also submit data/fact sheets, certificates of origin, and sample of all materials to be used in the site prior to their application on ground upon obtaining official approval from the supervision committee. ➤ UNICEF has zero tolerance to child labors ➤ All the works should be executed according to the instruction of the supervision committee (UNICEF and Directorate of water) ➤ the contractor is responsible for bringing back to normal situation of any damages occur to the existing infrastructures during the implementation ➤ The contractor should ensure all the requirements of site safety, environmental safeguarding, and accessibility for labors, supervision committee, and community. ➤ Site is to be cleaned and cleared from any debris by the contractor prior to handover, debris is to be disposed to an authorized location. ➤ All the hidden works need to be approved first by the supervision committee before covering, for example, the trenches need to be handed over to the supervision committee prior to laying the pipes, and the pipes laying and connection need to be approved by the supervision committee prior to filling/backfilling, the filling/backfilling work need to be approved for each layer by the supervision committee prior to proceeding to lay the next layer, etc. if the contractor contradicts this then and as requested by the supervision committee, the contractor will have to undo/remove the implemented work that covers the unapproved one. ➤ The contractor is responsible for proper transportation, storage, and guarding of the construction materials during the project period, the cost is included in the relevant item lines. ➤ The Contractor shall be responsible for the preparation and actualization of detailed Health & Safety and Accident Prevention Plans, Detailed Time
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	Schedules and Cash Flow Estimates, site Protection, and ensuring people and traffic mobility. ➤ The Contractor shall execute the activities listed in the BOQs in accordance with the TOR. ➤ The Contractor shall transport and at his expense all demolished rubbles and exceeded building materials to locations a minimum distance of 10 km or as specified by the municipality and shall be responsible for cleaning out the site and it is surrounding areas at the end of usage. ➤ The latest issue of “UNICEF’s GTCs and Contractual Provisions for Construction” shall be applicable to this contract, especially clauses concerning the Settlement of Disputes, Arbitration, etc. ➤ Upon satisfactory completion of the works, the contractor should submit a completion certificate certified, signed, and stamped by the nominated handover committee with a cover letter by the relevant water directorate in order to request payment process. Note: the total project cost and time must consider the above points