FSECTION 5: SCHEDULE OF REQUIREMENTS

6.3.1. Construction of two (2) rainwater harvesting systems and training of the communities in charge of their management in the neighborhoods of Busanza and Mpazi, in Kigali, Rwanda

1. BACKGROUND AND CONTEXT

1.1. The UN SDG (United Nations Sustainable Development Goals) Action Campaign is working closely with cities and local governments to showcase how they are actively contributing to implement Agenda 2030, accelerating transformative action to achieve the Sustainable Development Goals for all, and everywhere.

1.2. The UN SDG Action Campaign, together with the office of UNDP in Rwanda are supporting the City of Kigali to implement the **Rainwater harvesting systems project in the settlements of Mpazi and Busanza that have recently been upgraded**, one of the winners of the 2021 Global Mayors Challenge.

1.3. The project encompasses construction activities, culminating in the training of residents in the respective neighborhoods on the utilization and upkeep of rainwater harvesting system infrastructure.

1.4. It's by this context that UNDP is seeking to hire a contractor to execute the construction works of two (2) rainwater harvesting systems, one per settlement of Mpazi and Busanza, located in different sites in Kigali.

1.5. The project initiative aims at providing an affordable alternative source of water to newly resettled residents who are heavily burdened with high commercial water bills, and thereby improving hygiene in the households.

1.6. This rainwater harvesting system project includes construction of two (2) concrete underground rainwater reservoirs, each with the pump house at the top, elevated GRP tank with its support structure (concrete structure) and corresponding piping systems from and into the buildings to be supplied with rainwater. Rainwater will be harvested from some selected roofs of buildings and collected into the underground reservoir conveyed by down pipes forwarded into storage tank (underground reservoir).

1.7. The project also considers the training of residents in the respective neighborhoods on operation and maintenance of the system put in place purposely ensuring the facility management.

1.8. In September2023, UNDP contracted a provider to produce the following documents:

1.8.1. Schedule of requirements

1.8.2. Bill of materials.

1.8.3. Technical studies

1.8.4. Design and required drawings.

2. SCOPE OF THE WORKS

2.1. This document shall be read and understood in conjunction with the Bill of Quantities (BOQ = Annex 5. Financial Offer Form) and design drawings provided in the Annexes of this process.

2.2. The contractor shall supply the necessary materials and build two (2) rainwater harvesting systems, each per site (Busanza & Mpazi) that will be composed by: underground concrete reservoir, elevated GRP tank with its support structure, disinfection unit, water pump powered by solar panel system and its shelter also known as pump house and piping system connecting reservoirs to households to be served (This includes the household internal plumbing system).

2.3. The contractor will be responsible for the supply and procurement of materials, excavation works, filling and back filling, the construction of the system, the completion of construction of the infrastructure along with the necessary electrical and plumbing works as per the engineering designs provided as part of the annexes.

2.4. The contractor will also organize and deliver four (4) capacity training sessions in total, specifically for a total of 200 end-users of rainwater harvesting systems built. This means that a batch of 50 people will receive one training; therefore, four sessions will be necessary to train 200.

2.5. The participants and venue of the above-mentioned training will be selected by the project team together with the local authority of the respective neighborhoods. It won't be a training company responsibility to select and look for the participants

2.6. One contractor will be selected and required to implement the 2 rainwater harvesting systems at Busanza and Mpazi.

2.7. Though it's at two different sites, works of the two rainwater harvesting systems will be executed in parallel.

3. ESTIMATION OF SERVICES

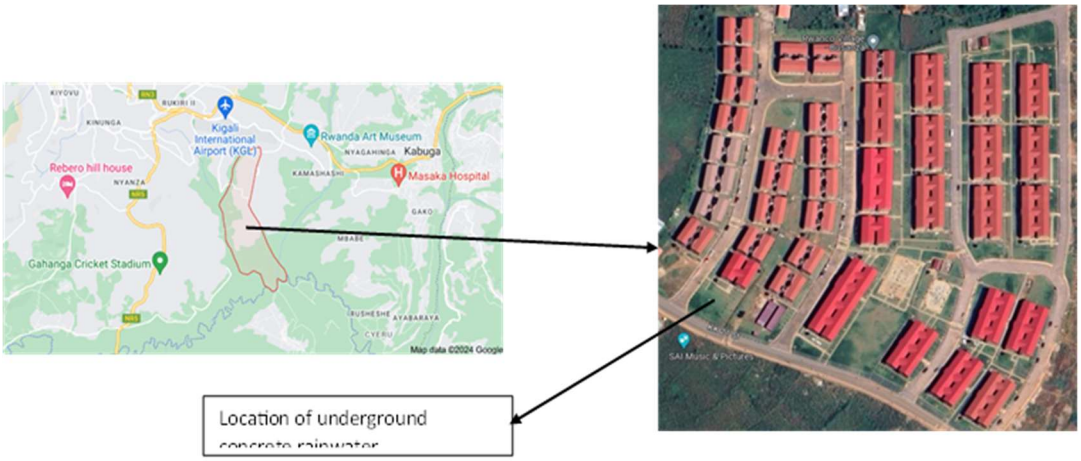
3.1. The Service provider will be required to execute the construction of one rainwater harvesting system at each of the two neighborhoods of Mpazi and Busanza in Kigali, Rwanda.

3.2. UNDP will not accept conditional bids, such as minimum or maximum quantities of the requirement listed in BOQ and Design Drawings.

3.3. Unit prices will be fixed through the contract duration

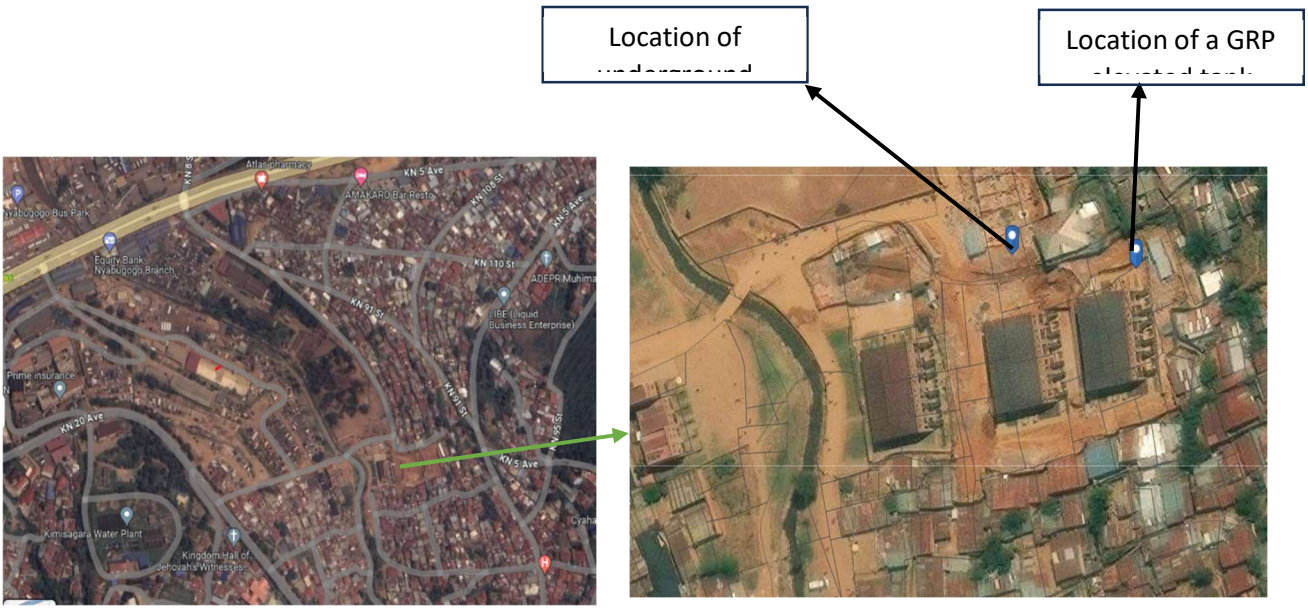
4. SITE CONDITIONS

4.1. Busanza site is on a gentle slope with laterite/murrum soil and alkaline property of bearing capacity of below 2.5m varying from 1.1Mpa to 2.35Mpa. The site areas designated specifically for the construction of the underground water reservoir (-1.9994, 30.1480) and the elevated tank (-1.9988, 30.1478) are currently free spaces with no any structure built on, and that will need no demolition.



4.2. Mpazi site is on a higher steep slope with a cohesive clay soil exhibiting acidic properties and of a bearing capacity varying from 1.1Mpa to 2.67Mpa. The site areas designated specifically for the construction of the underground water reservoir (-1.9437, 30.0500) and the elevated tank (-1.9437, 30.0504) are currently s free space with no any structure built on except being a paved compound.

4.3. However, the contractor is solely responsible for visiting and assessing the site conditions, including topographic conditions and sources of materials, prior to submitting a bid to the client (UNDP) through email address. Any other conditions that may hinder execution should also be considered. During construction, the safety of personnel and accessibility of materials should be ensured.



5. SITE VISIT

5.1. To have a better insight about the project and site conditions an optional site visit will be organized. The time and place will be on the **22th of March** 2024 at **11 am meeting at City Hall**. Any claims on lack of awareness on site conditions after project bid is awarded will not be considered.

5.2. In case the contractor would like to attend please send an email confirmation to: sdgaction.procurement@undp.org before the date and time that the site visit will take place so the exact address can be shared with you and your team.

5.3. Please note that the attendance is at the sole expense of the prospective contractor, and it is not mandatory, contributing no score.

5.4. In case there are more questions during the site visit, minutes addressing these questions will be produced by UNDP.

Note: please note that no verbal statement made during the site visit shall modify the terms and conditions of this quotation unless such statement is specifically written as an amendment to the request for quotation.

6. CLARIFICATION OF BIDDING DOCUMENTS

6.1. Bidders may send any clarification or questions they might have via the system QUANTUM.

6.2. These questions received before the site visit will be answered during the site visit, and those received after site visit. The last date to send clarifications is **27th of March 2024**

6.3. The Minutes of all questions and answers (including the one asked during the site visit) will be posted on the UNDP QUANTUM system and disseminated to the firms who have registered or expressed interest with the contract, whether they attended the site visit or not.

7. OPTIONAL INFORMATIVE SESSION

7.1. An optional informative session will take place. Bidders may attend the informative session to learn more about the project and to determine related risks, contingencies, and circumstances, which might influence or affect the execution of works.

7.2. The online informative session will be on the ……. of March 2024 at 3:00 PM, Kigali Time. You can access the meeting through this Zoom link which will also be shared on the UNDP Quantum system.

7.3. The Minutes of the informative session will be posted on the UNDP QUANTUM system and disseminated to the firms who have registered or expressed interest with the contract, whether they attended the informative session or not.

8. UNDP RESPONSIBILITIES

8.1. To establish a responsible focal point (1) and hire a supervising company for the administration of the contract and in charge of supervising the progress and reception of the work.

8.2. UNDP, the supervising company and the project team will supervise the execution of the works, and shall review and authorize the work performed and adjustments to the work.

8.3. UNDP, the supervising company and the project team will ensure the correct execution of the contract, verifying that the contractual obligations are fulfilled to satisfaction within the agreed terms.

8.4. The provider shall record the outcomes of management meeting and provide copies of the record to those attending the meetings.

8.5. Any modification or adjustment to the work must be previously validated by the supervising company and project team, and approved by UNDP through an amendment to contract, which must be signed by both parties. The supplier/contractor shall not process any order not stipulated in the contract, or any applicable amendments.

8.6. Once the work has been completed, the Supplier/contractor shall communicate this fact to Project team, so that it can verify the proper completion of the work and proceed to its physical reception with the opinion of the work supervisor.

8.7. To initiate the payment process according to the contract once the works have been physically and duly received.

8.8. To manage payments to the supplier/contractor in a period not exceeding 30 calendar days after receipt of the invoice and approval of the services received.

8.9. To facilitate a clear and effective collaboration with the contractors of the ongoing infrastructure project involving new buildings; roads and drainage, led by the City of Kigali in partnership with the World Bank, on the same site.

8.10. To facilitate the connection of utilities by engaging and requesting residents to allow direct connections to their lines, especially regarding electricity and water.

8.11. To facilitate a clear and effective collaboration with the contractors of the ongoing infrastructure project involving roads and drainage, led by the City of Kigali in partnership with the World Bank, on the same site

9. CONTRACTOR RESPONSIBILITIES

9.1. **Before starting works**

9.1.1. The contractor is expected to commence the works immediately after the contract is signed.

9.1.2. The contractor must comply with the object of the contract, in the terms established in these terms of reference and in accordance with what is offered in its bid.

9.1.3. The contractor shall conduct all measurements and inspection necessary to determine the accuracy and adequacy of the nature of works of this quotation.

9.1.4. Supply, procurement of materials and construction of each rainwater harvesting system.

9.1.5. The contractor shall supply, procure and construct based on the provided detailed engineering documents:

9.1.5.1. Annex 5: for bill of quantities for Busanza and Mpazi respectively,

9.1.5.2. Annex 1: for design drawings for rainwater harvesting system of Busanza and Mpazi sites respectively.

9.1.6. Please note: any changes to the provided detailed engineering documents, drawings, and bill of materials in unavoidable situations shall be intimated to the UNDP Project Supervisor and approval to be taken prior to the commencement of the works.

9.1.7. The contractor will need to specify any requirements before the start of the project. Any requirement mentioned after the contract has been issued will need to be assumed by the contractor without any time or cost implications.

9.1.8. The contractor must ensure supply of all civil, electrical, instrument, insulation, and mechanical items for the proper execution of the work. Any requirement during construction/fabrication and erection should be taken care of without additional time or cost implications.

9.1.9. The contractor will provide a detailed planning schedule for time execution of the project.

9.1.10. The contractor will ensure that hazardous materials on sites are identified, that sedimentation is restricted to the site and that waste generated by the works is disposed of properly.

9.1.11. The contractor will ensure due provision to be made during construction supervision for the control of waste and site effluent.

9.1.12. The contractor will ensure that internal spaces will be designed to be healthy and non- toxic, based on good ventilation, sunlight sterilization, humidity and moisture control, including use of safe materials and appropriate water and sanitation provision.

9.1.13. To comply with the labor obligations of the personnel hired in the execution of the contract.

9.1.14. The contractor must follow all working safety rules and regulations as mandated by Rwanda´s laws, incorporate the necessary measures to comply with said regulations, and provide appropriate safety equipment in the site (Warning tap, Personal Protective Equipment (PPEs), Signages, full equipped First Aids Kits per site; etc…).

9.1.15. Items of work should comply with the general technical specifications prescribed under the Rwanda Building Construction Codes Specifications and Rwanda water Board guidelines for rainwater harvesting facilities implementation in Rwanda.

9.1.16. The contractor must maintain in force all the policies and guarantees that cover the contract during its execution, liquidation, and future liabilities.

9.2. **During the works**

9.2.1. To work under the supervision of UNDP, the supervising company and the project team.

9.2.2. To comply with the object of the contract, in the terms established in this Schedule of Works and in accordance with what is offered in its bid.

9.2.3. The contractor is expected to commence the works immediately after the contract is signed.

9.2.4. The contractor must finish work within the time established in the contract.

9.2.5. To maintain during the execution of the contract, the personnel presented in its bid. The change of any of the personnel that make up the proposed work team must be previously authorized by the UNDP. Their replacement may only be made by professionals with the s ame or higher profile after receiving the resignation letter of the predecessor.

9.2.6. To maintain at each stage of the execution of the work the required personnel, equipment and minor tools to carry out the work activities in compliance with the technical specifications requested herein.

9.2.7. The contractor will be responsible for the risk liability of all personnel associated with the implementation and realization of the project.

9.2.8. To be civilly and criminally liable for the fulfilment of the obligations derived from this contract, as well as for the acts or omissions attributable to it.

9.2.9. To strictly comply with the designs, specifications and construction procedures approved in the studies, designs, and technical specifications.

9.2.10. To inform the project team if any change or adjustment is needed during implementation.

9.2.11. To correct, in the shortest possible time, any mismatches that may arise, and determine the pertinent mechanisms and procedures to foresee or solve quickly and efficiently any differences that may arise during the execution of the contract.

9.2.12. To provide timely supply of information, in the appropriate formats (digital and/or printed), of all information related to the progress of data collection, preparation of technical specifications and technical designs, schedule of works, preparation of drawings and tender/solicitation documents and others that may be required and in general of everything required in the course of the contract, so that UNDP has complete and updated information on the progress of the contract.

9.2.13. The provider is required to attend weekly management meetings to review the plans for the remaining works and to deal with matters that may be raised.

9.2.14. To submit progress reports together with the corresponding invoices and/or bills, for review.

9.2.15. To handle all information provided by UNDP in a confidential manner.

9.2.16. To be responsible that the works meet local regulations and environmental protection regulations

9.2.17. To be responsible of the review of the correctness of the designs, calculations and drawings.

9.2.18. To maintain in force all the policies and guarantees that cover the contract during its execution, liquidation, and future liabilities.

9.2.19. The contractor will be responsible for any maintenance of defects on the building due to lack of quality during the defect liability period.

Note: The defect liability period for the project is 12 months from the date of handoverof the final product.

9.2.20. To repair, at its own cost, all areas damaged as a result of the activities carried out.

9.2.21. To mitigate dust and excessive noise so as not to unnecessarily disrupt the work of personnel working in adjacent areas and buildings.

9.2.22. To be responsible for the safekeeping and custody of its own materials, tools and equipment used in the activities resulting from this contract.

9.2.23. The contractor must take care of maintenance of the site including removing debris, cleaning and keeping the site tidy at all times to the approval of the supervising firm until completion, leaving all in good order in turning over. Debris and unwanted materials must be disposed to the proper disposal site.

9.2.24. All goods and services to be executed in accordance with the technical specifications, scope of works and drawings.

9.2.25. In addition to the main supply, installation, commissioning works and equipment, the contractor scope shall include buy not limited to the following:

9.2.26. Adequate site survey and investigation, in line with provided layout drawings in Annex 1 to accommodate the provisional requirements of the equipment needed.

9.2.27. Executing all necessary civil, electrical, mechanical, plumbing, Drainage, and tie-in works all as required for the installation and commissioning of the sites.

9.2.28. The contractor shall provide trained personnel, skilled and fully experienced in their respective trades and / or professions to perform the work.

9.2.29. The contractor must maintain during the execution of the contract, the personnel presented in its bid. The change of any of the persons that make up the proposed work team must be previously authorized by the contract project. Their replacement may only be made by professionals with the same or higher profile.

9.2.30. The contractor shall ensure sufficient supply of equipment for the successful competition of the project. The equipment shall be procured and ordered in a timely manner, considering the time criticality of the project handover

9.2.31. Contractors will be responsible for paying the utility fees, which they must include in their offer.

9.2.32. To establish a clear and effective collaboration with the contractors of the ongoing infrastructure project involving new buildings; roads and drainage, led by the City of Kigali in partnership with the World Bank, on the same site.

9.2.33. The contractor must correct, in the shortest possible time, any mismatches that may arise, and determine the pertinent mechanisms and procedures to foresee or solve quickly and efficiently any differences that may arise during the execution of the contract.

9.2.34. The contractor must have the minimum key personnel with expertise as below for carrying out the work on-site.

9.2.35. The contractor must provide timely supply of information, in the appropriate formats (digital and/or printed), of all information related to the physical progress of the works, progress drawings of the constructed work, preparation and timely submission of the work minutes, collection accounts and/or invoices, adjustment and others that may be required and in general of everything required in the course of the contract, so that UNDP and the project has complete and updated information on the progress of the contract.

9.2.36. Contractors will be responsible for paying the utility fees, which they must include in their offer.

9.2.37. To establish a clear and effective collaboration with the contractors of the ongoing infrastructure project involving roads and drainage, led by the City of Kigali in partnership with the World Bank, on the same site.

10. ACTIVITIES AND DELIVERABLES

Table 2: Activities and deliverables

Stage	Details of the activity	Deliverable	Expected Delivery period/Date	Payment %
10.1 Contract signature and fulfilling requirements before starting construction works	10.1.1 Conduct kick-off meeting with UNDP and project team on the timeline for construction of two rainwater harvesting systems at Busanza and Mpazi to discuss andfinalize the work schedule plan, drawings, and bill of materials. 10.1.2 Obtain risk liability insurance for the period of construction for each site. 10.1.3 Provide a performance bank guarantee equivalent to 5% of the contract amount, covering both the contract period and the liability period.	10.1.1 Final work schedule plan in free format 10.1.2 Final drawings including any changes from provided drawings. 10.1.3 Provide evidence of risk liability insurance of all personnel associated with the construction, including insurance against any accident from start to commissioning of the project. 10.1.4 Performance bank guarantee equivalent to 5% of the contract amount, covering both the contract period and the liability period.	1 week after signing the Purchase Order (PO) tobe sent via email	**Payment 1 (5%):** Upon submission of the required deliverables before startin gconstruction works.

10.2	Construction works of two rainwater harvesting systems for both sites (Busanza &Mpazi)	**Per rainwater harvesting system each of the following activities need to be done:** 10.2.1 Delivery of materials needed for the construction works as per Table 3. 10.2.2 Construction works done either in parallel or one at a time for the two project sites i.e. Busanza and Mpazi 10.2.3 To communicate to the supervising company once work has been completed, so that they can inspect and verify the proper completion of the work. 10.2.4 The contractor shall leave the site perfect and tidy on completion & any permission required for clearance and disposal of debris shall be taken up by the contractor. 10.2.5 The contractor shall also clearly specify the one-year warrantee of the system and at minimum the specific warrantees for the two rainwater harvesting systems should cover the entire infrastructure. 10.2.6 Final handover of completed facilities to the UNDP and then to the City of Kigali 10.2.7 To provide as-built drawings of the finished project	10.2.1 Provide a monthly and quarterly reports of the progress of the works as per the construction schedule agreed in point 10.1 and the supervising company has to endorse them 10.2.2 Final report of rainwater harvesting systems for both sites signed by contractor, supervising company and the project team representative 10.2.3 Two (2) Built rainwater harvesting systems, one at each project site that each include one concrete underground reservoir tank, an elevated tank, pump house and piping system collecting rainwater from the roofs and distributing into the housing units 10.2.4 Final compliance of technical specification and drawings provided for each site applicable till this activity. 10.2.5 Signed from supplier site in-charge and UNDP Project Supervisor and Certificate of Substantial Completion. 10.2.6 Provisional handover for the two rainwater harvesting systems. 10.2.7 As-built drawings of the finished sites.	150 days (5 months) after contract signature	**Payment 2 (20%):** 100% completion of underground reservoir at Busanza **Payment 3 (20%):** 100% completion of underground reservoir at Mpazi **Payment 4 (15%):** 100% of construction works for the elevated tank and the pump house at Busanza **Payment 5 (15%):** 100% of construction works for the elevated tank and the pump house at Mpazi **Payment 6 (15%):** 100% completion of installation and proper working system of the piping systems at Both sites. (inside and outside households to be served)

10.3 Capacity building of end-users about the operationalization and maintenance of the rainwater harvesting systems for two sites	10.3.1 Demonstration, coaching and mentoring on operation and maintenance of the rainwater harvesting facilities (face-to face training) Note: To ensure a high turnout of participants in Busanza and Mpazi, the organizers (winning training company) must cater for breakfast and lunch during the sessions, presented in a workshop format 10.3.2 Creation of training design and materials that will serve as guide for the use and maintenance of rainwater harvesting systems. The training manual should include at minimum, instructions on how to use the facilities, maintenance, and troubleshooting, Note: The training company should factor in and plan for motivation fees to be given to each participant, not exceeding an equivalent of $10 per person. The training company will be responsible for paying participants according to the agreed-upon terms in the financial proposal. * Please refer to point 14.14 of these terms of reference for more detail regarding the training session. 10.3.3 An operations and maintenance manual that contains at least the following: Operating procedures: a comprehensive, detailed explanation of all major operating procedures should be documented so that a new beneficiary can learn quickly. The Manual should also include all the Dos & Don'ts of reservoir along with Graphical Representation with	10.3.1 Face to face training/workshop 10.3.2 Training report on the number of Participants, subjects and photos. 10.3.3 Training manual (in word with pictures) clearly showing content of training (step by step guide on how to use and maintenance of waste collection stations and troubleshooting) with picture Illustrations. 10.3.4 Operations and maintenance manual. 10.3.5 Maintenance procedures manual report.	1 week after Completion of construction works at each respective site. And it will be within a period of only month. Note: The total duration for the training sessions in Busanza and Mpazi is four days, with each session of 50 participants planned for one (1) day. All four sessions are expected to be completed in not more than one month.	**Payment 7 (5%):** Upon submission of the approved training report

	indication of proper methodology for cleaning, Operation and Maintenance etc. 10.3.4 Maintenance procedures: The preventive and corrective maintenance programs should be explained thoroughly including schedules, procedures, responsibilities, troubleshooting and test requirements. Step by step maintenance and troubleshooting procedures shall also be given in the manuals.			
10.4 Completion of defect liability period- 12 months and client support	10.4.1 To enable time for any defects to become identified and rectified. 10.4.2 Restoration of any structural damages. 10.4.3 Provision of post installation support to residents	10.4.1 Report of any defect and rectification. 10.4.2 Certificate of Final Completion. 10.4.3 Final handover to the City of Kigali.	Completion of defect liability period- 12 months	**Payment 8 (5%):** Completion of liability period i.e., 12 months from the date of handover

11. PROJECT TIMELINE

11.1 The UNDP and 2021 Global Mayors Challenge Project Management aims to fully have operationalized rainwater harvesting system facilities at both sites by December 2024.

11.2 The UNDP and 2021 Global Mayors Challenge Project Management will order the Construction of the above facilities in one lot (batch).

11.3 Each of rainwater harvesting system is expected to be done after mobilization including the weekend days i.e., in 150 days. The required two rainwater are expected to be fully constructed and in operation in that period (the two-rainwater harvesting systems ware expected to be executed in parallel).

11.4 Site Mobilization will be done within 7 days of signing the purchase order. Below in Table 2 a proposed implementation timeline is presented.

11.5 Capacity building for the end-users from both sites is expected to be done within a period of 30 days (1month) immediately after completion of construction works respective of the sites.

11.6 A full year (12 months) is required as a liability period for identifying and rectifying the defects realized on built facilities. This will be counted a day after a provisional handover for both site rainwater harvesting systems.

Table 3. Proposed implementation timeline

Activity	Feb 24	Mar 24	Apr 24	May 24	Jun 24	Jul 24	Aug 24	Sep 24	Oct 24	Nov 24	Dec 24	Jan 25 to Nov 25
Procurement of rainwater harvesting system provider by UNDP team												
Award of contract												
Signing of a purchase order												
Construction works												
Capacity training of end-users of rainwater harvesting system												
Provisional handover												
Liability period												

12. PAYMENT SCHEDULE

12.1. The contractor may submit a request for payment for work accomplished. Such request for payment shall be verified and certified by the UNDP project team and the supervising company. The supplier shall not process any order not stipulated in the contract, or any applicable amendments.

12.2. UNDP shall process payments to the contractor only when, based on assessment, the work accomplished claimed is completed and upon receipt of the certification from the project team stating that the work accomplished is completed and accepted and duly signed on by the supervising company.

12.3. The contractor must submit invoice to UNDP based on the payment modalities and UNDP will transfer the payment within 20 days from the date the complete invoice is received.

12.4. Upon the Supplier's request before the start of construction works, UNDP may authorize an advance payment of 20% as an exception, subject to risk analysis and value considerations. Once authorized, the Supplier should submit an advance payment guarantee equivalent to the requested amount.

13. TECHNICAL SPECIFICATIONS FOR GOODS

13.1. **The Technical View Point**

13.1.1. The minimum requirements for site setting, functional and structural requirements of the rainwater harvesting facilities should comply with the Rwanda Building Codes and other related laws and regulations.

13.1.2. Refer to Annex 5 bill of quantities (BoQ) for both Mpazi and Busanza sites respectively and Annex 1 design drawings for the rainwater harvesting systems for both Mpazi and Busanza to provide the general specifications for the works needed for each site.

13.1.3. The Contractor in charge of the implementation of the works in the present project, should take knowledge of all the specific parts of the work specified in the whole of document that form in all a homogeneous and complete work. This implies that all works and supplies must be completed in a perfect manner.

13.1.4. In a way to avoid other contentions the contractor shall inform the supervising company, in a separate note to his/her Bid, all mistakes, omission or contradiction sighted in the document during studies. In case of omissions in the description of certain particular works, the contractor shall in all cases execute all necessary works to the perfect completion.

13.2. **The unit prices of the Contractor**

13.2.1. Prices for the replacement of damaged materials and/or equipment must always include the dismantling and the evacuation of materials and /or the equipment including the repair of the works damaged during the dismantling of work and other surroundings.

13.2.2. The descriptive bills of quantities in the technical clauses do not alone make up contractual statements. The contractor shall not signal out any alterations in the present document, be it in the different sections or plans or other documents relating to this tender document.

13.2.3. The contractor should be conscious and verify all quantities during the time of Bid preparation. If he finds out that some quantities indicated in the descriptive and quantitative clauses are improper or missing the contractor shall correct them in a separate note joined to his/her Bid and shall not in any way ask for any price modifications.

13.3. **During works execution**

13.3.1. The contractor shall signal out all expenses, materials and other equipment or plans and diagrams that he judges necessary for the perfect execution of the works. These documents shall be submitted to the consultant/supervising company for approval who replies in 5 calendar days following the receipt of the requests.

13.3.2. All details of supplies leading to the performance of principle plans must be submitted inevitably for approval by the supervising firm before the beginning of works execution, he shall always make sure that he gives his reactions in said above period.

13.3.3. The contractor shall not ask for any prolongation or compensation in terms of time for any modification he will have been asked to do.

13.3.4. The contractor must always present to the client for testing and approval any material or equipment before they are put to use.

13.4. **Security**

13.4.1. The Contractor must always know the working environment and should adhere to the existing laws, should always adhere to the conditions of the security and policies. The contractor shall always be liable to any losses caused by fire and shall always be responsible for the entire security of the site.

13.5. **Water and electricity**

13.6. The contractor shall be responsible for paying all the water and electricity bills at the sites during execution of the works.

13.7. **Access to the Site**

13.7.1. The utilization of the existing routes by trucks and by other equipment should not cause any nuisances to the environment (dusts, noises, ruts etc.). All deterioration of surface caused to the adjacent works shall be repaired to the expense of the contractor.

13.8. **Implantation of works**

13.8.1. All the Works and parts of works implantations will be done by the contractor and at his expenses. Before commencement of works execution or implantation, the contractor shall begin by a sub–implantation to verify the leveling of the land and inform the client of any possible inaccuracy. The representative of the client should first verify the implantation before works execution commences. A statement to the implantation shall be pronounced and given to the contractor. Before all beginning of works, the enterprise must be precise in the presence of the engineer, the pegging defining the time of works on the basis of data provided by the engineer: bench mark, origin of each intervention zone. He will be responsible for all accidents and should always endeavor to prevent them.

13.9. **Utilization of materials**

13.9.1. Materials to be used should be in conformity with the norms and laws in Rwanda and should conform to the present tender document. The conditions stipulated here shall always be considered as the required minimum required for the implementation of the works.

13.10. **Environment Protection**

13.10.1. The contractor must respect the norms and prescriptions in relation to environment protection. On this note he is supposed to remove all garbage and unused materials out of the site and deposited far away in conformity with environmental regimes.

13.11. **Consistence of unit prices**

13.11.1. The contractor should be well conversant with the conditions that would influence the execution of the works especially:

- ✓ The nature and the quality of soils and grounds,
- ✓ The conditions of transport and access to the site,
- ✓ The water and rain regimes in the region,
- ✓ The conditions of accessing water to the site,
- ✓ Any other particular conditions relative to the present site,

13.11.2. The contractor should not therefore, raise any claims relative to the difficulty or other eventualities except in case of major unforseen conditions, fully recognized by all parties. The contractor should therefore calculate all the unit prices on the basis of the complete execution of the works and in accordance with the techniques of high labor intensity.

13.11.3. The unit prices of the present tender cover all the contractor's expenses, without any exceptions, in order to achieve the total completion of the foreseen works, this includes, the profit as well as other rights, taxes, general expenses, and all expenses done in Rwanda as a result of this work, mainly:

- ✓ All expenses (wages, social security funds, holidays, lodgings, transport etc…), of supplies, renting, depreciation of equipment and upkeep of the material,
- ✓ All expenses for the edible matters bought in Rwanda or abroad, materials for site implantation and quarries.
- ✓ All insurances of any nature, access to quarries, repair of roads, laboratory expenses, storage of materials.
- ✓ Prices also include expenses of site debarking and any other cost that is not to be incurred by the client.

13.12. **Specifications of materials**

13.12.1. **General**

13.12.1.1. All materials must be the best quality and free from any shortcoming that might compromise the solidity and durability of the work for all its life time.

13.12.1.2. The contractor at the request of the client should justify their origin either by presentation of the invoice or any other document agreeable upon by both parties. The contractor must present to the client the results to all tests or exams that were requested.

13.12.1.3. All materials and tests requested will be done at the contractor's expenses and delivered to their designated places. If the quantity of materials refused exceeds 10% of the materials submitted for testing, then all the materials submitted will be disqualified. The contractor, on a permanent basis, should facilitate for easy access, the client's personnel to all quarries, factories, laboratories, workshops in order to follow up and

monitor closely the execution of the tender document in whatever concerns the origin and quality of the materials.

13.12.1.4. The time allowed for tests is 10 days from the time of sample submission, but if this time is passed due to the clients request the time will be prolonged to an equal number of days to the delay. The engineer can allow the use of the similar products to those that are prescribed, if he judges that these products' value is of equal value in quality and efficiency. In case of doubt, he will proceed for tests.

13.13. **Stone size and gravel**

13.13.1. Stones and gravel shall always be collected from the best places identified by contractor and approved by consultant. They will have qualities of healthy sandstone. Their density must be near to 2500 kg/m³ and their resistance equal or greater than 30 N/mm².

13.14. **Gravels and sands**

13.14.1. Gravels and sands will be extracted from the best quarries approved by the consultant. These gravels and sands can also be extracted from bottom of the rivers but should be well washed and purified to remove silt before their utilization. The Prescriptions fix minimal qualities, for their granular metric spindles and their utilizations. Their minimal resistance is 30 N/mm²s.

13.15. **Forged laminated Iron and steel, griddles**

13.15.1. Iron and steel bars to be used shall be approved by the consultant; they should be strong, resistant to cold weather and with the following characteristics (tested and approved by a certified/independent engineering laboratory in the presence of consultant):

- ✓ Apparent elasticity limit: 4200kg/cm2 (420mpa) (> 480 N/mm2)
- ✓ Tensile stress: 5000kg/cm2 (500mpa) (240 N/mm2)
- ✓ Compressive stress: 14% (< 10%)

13.15.2. Steels for reinforced concrete must be able to bend in cold weather without changing the diameter of the rod.

13.15.3. The griddle hovers must be united, shiny, of uniform thickness, without cracks nor rips. Clippings must detach themselves without breaking.

13.15.4. The wavy griddle will be in sheets whose measurements are those on market.

13.15.5. The works for putting on protective layers like galvanization, aluminum layers are made exclusively in the factory and according to the manufacturer's specifications.

13.16. **Prescription of materials for concrete**

13.16.1. **Sand 0-4 mm:**

13.16.1.1. The sand for concrete must come from natural layers or a crushing station (quarries have to be visited and approved by the consultant before any supply). It must be free from all foreign bodies like organic matters, dusts, oxides, pyrites or silt or adhesive clays. It must not contain grains bigger than 5 mm. The equivalent of sand must be greater than 75%. The consultant can, if necessary, prescribe the washing of the sands. The granulometric test should be continuous with the following picture:

Sieve opening in mm (square mesh)	Percentage of weight passing through the sieve
5	100
2	50
0.5	20
0.08	5

13.16.2. **Gravel 5-25 mm**

13.16.2.1. The intended gravels to the concrete must be free from foreign bodies like organic matters, dusts and adhesive clays. They must come of layers whose sites are proposed by the contractor but must be visited and approved by the engineer. Gravels should present a regular shape and should neither be long nor flat. Their toughness and origin should be from proven tests with the following particle size:

Sieve opening in mm (square mesh)	Percentage of weight passing through the sieve

25	100
20	75
15	50
10	15
5	0

13.16.3. **The Cement**

13.16.3.1. The cement must come from factories accepted by the client. The contractor will provide a certificate showing the origin of the cement. The recommended cement is the ordinary Portland type Cement class P 32.5N and 42.5N. In case of doubt on the quality of the cement, the client or consultant shall request for tests at the expense of the contractor.

13.16.3.2. The consultant reserves the right to exercise his control in factory on the manufacture, conservation and the expedition of the cements that will be provided for works. The cement will be delivered in intact sacks and stored in watertight stores. The delivery of cement in a jumble as well as the utilization of set cement is forbidden.

13.16.3.3. In the case that there would be cements of several qualities or several origins, the different supplies should be stored separately. Sacks will rest on the stilted boards and will be stacked in approximate blocks of 20 tons. A rotation of stocks must be respected. All cement presenting traces of humidity or hold at the time of work will be rejected.

13.16.4. **Water**

13.16.4.1. The Water for concrete mixing must be clean, clear and odorless. It must not contain matters in abeyance beyond 2 grammes of liter. It must not provoke, on the cement, any chemical reaction that would prevent it from holding.

13.16.5. **Reinforcement steel bars**

13.16.5.1. The steels chosen by the contractor for the execution of the market will be firstly approved by consultant in the presence of client technical team. They should have a diameter not less than 40 mm in calculations; the characteristics of the reinforcements with high binding are as follows:

- ✓ Apparent elasticity limit: 4200kg/cm2 (420mpa)
- ✓ Tensile stress: 5000kg/cm2 (500mpa)
- ✓ Compressive stress: 14%

13.16.5.2. The properties of round and smooth reinforcement bars are as follows:

- ✓ Normal elastic limit: 2200kg/cm2 (220 mpa)
- ✓ Tensile stress: 3400kg/cm2 (340mpa)
- ✓ Compressive stress: 25%

13.16.5.3. The reinforcement iron bars for concrete are the high tensile and high adherence type with a diameter of not less than 40mm, with the following properties have to be check within a competent engineering laboratory:

- ✓ Elastic limit: 400 N/mm²
- ✓ Tensile stress: 480 N/mm²

13.16.5.4. They should always be free from any spot of oil, painting, or soil particles; they will be ridded entirely of the adhesive rust. They will be stowed by ligatures of appropriate solidity and in sufficient number so that they can displace themselves during the setting up of the concrete.

13.16.6. **Making and setting up of concretes**

13.16.6.1. All concretes are made mechanically, except if the quantity of the concrete to be made on the site is lower than 1 m3. All precautions should be taken such that the temperature at the time of concrete setting is not greater than 40 ° C. The tightening should be tidy and without provoking a beginning of segregation. The casting of concrete should be completed in 40 minutes (maximum time) following the mixing and before it begins to set. Concretes should be maintained in good condition of humidity for at least 15 days and should be protect from direct sunshine.

13.16.7. **Casing frames and their removal**

13.16.7.1. All reinforced concrete will be made in casings of wooden frames. Framings will be strong enough to resist the weight and to the thrust of the concrete works. The vertical part of the frames can be removed 48 hours after setting but the horizontal ones should never be removed in less than 15 days. The contractor is not allowed to remove the frames before the guarantee given by the consultant.

13.16.7.2. **Composition of concretes**

Type of concrete	Dosage and application	Composition of granulates (in liters)	Resistance to the compression in 28 days
Concrete B 150	Reinforced concrete to be spread under the foundations and the base of	Cement: 200 kg Sand: 400 litres Gravel: 800 litres	10 N/mm²
Concrete B 250	Reinforced concrete for the slab at a dose of 250 kg/m3	Cement:250kg Sand: 400litres Gravel: 800 litres	16 N/mm²
Concrete B 300	Slightly reinforced concrete for pit covers dose of 300 kg/m3	Cement: 300kg Fine Sand: 400litres Gravel:800Lts	16 N/mm²
Concrete B 350	Reinforced concrete for columns slabs, and lintel. Dose at 350 kg/m3	Cement: 350kg Sand: 400litres Gravel: 800littres	16 N/mm

13.16.8. **Prescriptions of materials for mortar**

13.16.8.1. **Sand 0.03–3 mm:** The sand for mortar should come from natural layers or crushing stations. It should be free from all foreign bodies like; organic matter, dusts, silt or adhesive clays. Spindle granulometry is continuous, sieving through meshes between 0.03 mm and 3mm

13.16.8.2. **Cement:** the cement must come from factories accepted by the client. The contractor will provide a certificate showing the origin of the cement. The recommended cement is the Portland type Cement class P 32.5 or 42.5N (to be approved by the consultant). In case of doubt on the quality of the cement, the client or consultant shall request for tests at the expense of the contractor.

13.16.8.2.1. The consultant reserves the right to exercise his control in factory on the manufacture, conservation and the expedition of the cements that will be provided for works. The cement will be delivered in intact sacks and stored in water tight stores. The delivery of cement in a jumble as well as the utilization of set cement is forbidden.

13.16.8.2.2. In the case that there would be cements of several qualities or several origins, the different supplies should be stored separately. Sacks will rest on the stilted boards and will be stacked in approximate blocks of 20 tons. A rotation of stocks must be respected. All cement presenting traces of humidity or hold at the time of work will be rejected.

13.16.8.3. **Water**

13.16.8.3.1. The Water for concrete mixing must be clean, clear and odorless. It must not contain matters in abeyance beyond 2 grammes of liter. It must not provoke, on the cement, any chemical reaction that would prevent it from holding.

13.16.8.4. **Composition and preparations of mortars**

Destination	Cement Dosing (kg/m³)	Sand (litres)
Masonry of Cement bloc	250	1.200
Masonry of quarry stones (gravel)	300	1.200
Block masonry	300	1.200
Rough casting of walls (Plastering)	350	1.200
Joining works	500	1.200

13.16.8.4.1. It is important to protect the mixed mortar from wind, rain and the sun. The prepared mortar must be put to use within 45 minutes of mixing. The mortar that has set should not be used.

13.16.9. **Prescriptions of brick masonry**

13.16.9.1. **Execution of masonries:**

13.16.9.1.1. All finished walls must be flat. Foundations must be horizontal. Joints have a uniform thickness of 1 cm. The vertical joints alternate themselves. Bricks are joined by a back fill of M 250 mortar.

13.16.10. **Description of quarry stone masonries**

13.16.10.1. **Stone Masonry**

13.16.10.1.1. The stones to be used for masonry are those without visible fissures. The masonry will be executed according to rules of the art and the prescribed mortar is the M 300. Bigger sized stones will be put in the horizontal sense. At least not more than a third of the stones should be put to protrude through the thickness of the wall.

13.16.10.1.2. The big volumes of mortar should be avoided; the spaces between quarry stones should not exceed 6 cm, and should be filled with mortar. All direct contact between quarry stone should be avoided.

13.16.10.1.3. Before the temporary receipt, all the masonry work will be cleaned brushed and washed with water. Joints and the masonry work will be revisited in order to be made clean in appearance.

13.16.10.2. **Dry Masonry**

13.16.10.2.1. The dry-stone masonries are identical to masonries in stones, but their joints are not joined by mortar.

13.16.11. **HDPE Pipes and parts**

13.16.11.1. Pipes and couplings will be made of HDPE (High Density Polyethylene Pipes)). They comply with HDPE pipe and fittings Standard Specification ASTM D 3350 and EN 12201, BS 12201. The FAT (factory acceptance tests must be done before any supply to the site)

13.16.11.2. They are defined by their external nominal diameter (ED) in millimeters and by their maximal pressure in service (PN) expressed in bars: PN 10 and 16.

13.16.11.3. They are made for adhesive bonding for interlocking diameters inferior to 63 mm (ED < 63) and for elastomeric seals coupling for interlocking diameters superior or equal to 63 mm (ED >= 63).

13.16.11.4. Seals and dope necessary for the assembly are part of the supplies. They will be delivered according the quantities foreseen by the provider (evidence) and increased by 20%.

13.16.11.5. The measurement unit is the meter of pipe, measured in effective length (without the jointing part).

13.16.12. **HDPE pipes for adhesive jointing**

13.16.12.1. The pipes comply with the quality requirements of the European standard EN 12201. They are of dark with colored lines.

13.16.12.2. All the pipes with external diameter inferior to 63 mm are for male and female joints (adhesive jointing). They are part of the series 10 (PN10) or 6,3 (PN 16).

13.16.12.3. Their jointing is made by adhesive bonding.

13.16.13. **HDPE pipes to be jointed**

13.16.13.1. Pipes with an external diameter superior or equal to 63 mm are push-fit fittings. Joints are made with lip seals for underground works. Resistance to pressure of pipes and joints is identical.

13.16.13.2. All the products must be checked by the producer on a regular basis according to the quality requirements of ISO1167-1:2006.

13.16.13.3. **HDPE parts for adhesive bonding**

13.16.13.3.1. For diameters inferior to ED 63, coupling parts are of HDPE for adhesive bonding. They comply with standard ISO 1167-1:2006, ASTM F1962 and AWWA M55.

13.16.13.4. **PVC Pipes**

13.16.13.4.1. Materials to be used of polyvinyl chloride (PVC) shall have the following characteristics:

- ✓ **Lightness:** they are light, easy to manipulate and portable in big quantities**.**
- ✓ **Flexibility:** flexibility permits them to adjust to curliness of trenches on the hill sides, in shallow bottoms and in other curves as according to the tracing.
- ✓ **Low prix:** they are the cheapest of all the PVC types.
- ✓ **Resistance to waters corrosiveness:** they are not attacked by the chemical agents and offer the best-known resistance known.
- ✓ **Locally Available:** they are produced locally, consistently to the international norms. The recommended types are the SONATUBES Product
- ✓ **Resistance to shocks, to sunburns and chlorine:** Since they are destined to be used underground, they are protected against all shocks.

14. PARTICULAR TECHNICAL SPECIFICATIONS

14.1. Site Installation

14.1.1. Access

14.1.1.1. there is an existing access path and roads to the site.

14.1.2. Store and Toilets

14.1.2.1. the contractor shall construct an appropriate store that can be used on site, it shall be made of materials accepted by the engineer. This shelter shall be used as a store of materials.

14.1.2.2. Also, contractors shall construct an appropriate toilet that can be used by the workers, it shall be made of materials accepted by the engineer. All shall be done to keep to the local hygienic standards.

14.1.2.3. Areas for storage of material shall be well prepared in order to avoid their contact with unwanted materials.

14.2. Various connections

14.2.1. Water and electricity

14.2.1.1. The contractor shall endeavor to get connected to the main water and electricity supply, all the costs for getting connected shall be at his expense. However, the project team together with the city of Kigali will facilitate the connection of utilities by engaging and requesting residents to allow direct connections to their lines, especially regarding electricity and water.

14.2.2. Security and site protection

14.2.2.1. The contractor is responsible for the site security. The contractor must take all necessary measures to avoid accidents on the site and must respect all labor laws in relation to the protection of the workers. The contractor e must protect the site against theft or damages to installations or materials. He will be responsible for all this until temporary receipt of works.

14.3. Temporary enclosure

14.3.1. The contractor shall insure a temporary enclosure of the site up to the end of the works, this will be demolished and the surrounding restored.

14.3.2. The contractor must protect efficiently, by means accepted by UNDP and the City of Kigali, houses and others utilities found at the site, as well as those of which the client asks for their conservation. The contractor is prohibited from either destroy or removed any structures without the agreement of the UNDP and the City of Kigali. Penalties, in case of no observation by the contractor of the instructions of the client, are envisaged and shall follow regulations in Rwanda in matters of infrastructures protection.

14.4. **Supply and Leveling of Soil on the Site**

14.4.1. **Leveling of arable soil**

14.4.1.1. The arable soil is leveled to a thickness of 20 cm especially for the soil in which some plantations will be done. The contractor shall ensure that no rubbish or garbage is mixed in this soil.

14.4.2. **Transport and Evacuation of the Soil**

14.4.2.1. The means of transport to be utilized on site for the evacuation and transport of the excess soil should not provoke or cause any damage to the excavations in progress, or to the existing infrastructures and other facilities. The excess soil becomes a property of the contractor and shall be deposited on a site of his choice provided it is in accordance with environmental regulations.

14.5. **Excavations**

14.5.1. **Excavation of the top soil**

14.5.1.1. Terracing and excavation of the top soil shall conform to the following:

- ✓ The removal of the soil and its evacuation
- ✓ Works and supplies necessary to the good execution of works and the security of the site.
- ✓ Cleaning, sorting and temporary stocking of some materials whose reuse is envisaged.

14.5.2. **Excavation for the embankments**

14.5.2.1. Excavations for embankments should conform to:

- ✓ The weeding and garbage removal on the land to embank, as well as the evacuation of these products outside of the site.
- ✓ The filling of the pits with the soil, in case it is not enough soil from another identified site is brought provided it got prior approval by the engineer.
- ✓ The compaction of embankments

14.5.2.2. Before the constitution of embankments, the contractor must clean the area and must get it free of roots, stumps etc.

14.5.2.3. Embankments will be executed by successive layers of 10 to 15 cm to the maximum and according to the suitable compaction material. Soil will be added progressively and leveled horizontally watered and compacted.

14.5.2.4. The prescribed compactness must be at least equal to 90% of the optimum modified Proctor.

14.5.2.5. Materials used in embankments, must be free from any organic matters and other impurities.

14.5.3. **Common Prescriptions to all Excavations**

14.5.3.1. **Measurements of excavations**

14.5.3.1.1. Excavations for foundations, pipeline, drainage, ditches, etc., are opened according to measurements that permit works verification without difficulties. The calculation of quantities in cubes shall be made in accordance to the planned measurements for the excavations.

14.5.3.2. **Partitions of excavations**

14.5.3.2.1. Partitions of excavations will be vertical; however, if crumbling is feared during works, they will be sloped.

14.5.3.3. **Depth of excavations**

14.5.3.3.1. The depths of excavations are leveled according to the plan or the horizontal successive plans, in the steps form and consistently to plan.

14.5.3.4. **Access to excavations**

14.5.3.4.1. The appropriate accesses to the bottom of the excavation are established and maintained in good state, and should conform to security norms.

14.5.3.5. **Control measures**

14.5.3.5.1. The work is consistently traced from the plan by the contractor. With the completion of terracing works the engineer proceeds to the control of levels and the tracings for the excavations. However, these controls do not remove any responsibility of alignment, levels or corners from the contractor.

14.6. **Surface Concrete**

14.6.1. The surface concrete is constituted by the concrete B 200. It will be poured into the excavations, consistently to plan. It should have a thickness of 5cm and its width equal to the size of the excavations.

14.7. **Cement mortar tread on the foundation**

14.7.1. The stone foundation should be followed on its top by a tread of concrete covering its entire periphery. This layer serves as anti-termites; it should have a thickness of 5 cm and a width equal h to the thickness of the wall (40 cm.). Its composition is the concrete of sand B 250.

14.8. **Reinforced concrete lining.**

14.8.1. The reinforced concrete utilized is the B 350 type. The frames will be made up of at least 4 steel bars of Ø 12 mm in the longitudinal sense and Ø 6 mm for the horizontal all 15 cm. However, plans will be describing the frames in details.

14.9. **Frameworks**

14.9.1. **Metallic frameworks**

14.9.1.1. If metallic frame works are to be utilized, linear steel, bars prefabricated and will be brought to the site, they will be held together by welding and they should be welded according to plan and the dimensions in the plan. Always the contractor must seek approval of the engineer.

14.9.2. **Welded Assemblies: constructive Arrangements to respect**

14.9.2.1. The height of welding cords won't be lower than 3mm.it should have even accumulation of soldering in one point.

14.9.2.2. In the case of welding tip to tip or conjugation of a welding boils to tip and a welding of angle, meetings of assemblies in shape of T are admitted, while meetings in shape of cross are to be avoided.

14.9.2.3. In the case of an assembly of piece angle forming tried, it is recommended to truncate the top of the secondary piece of the assembly

14.9.2.4. Except special justifications, recommended are:

- ✓ Not to bring back some perpendicular welding cords to the axial effort on the surface of a tense wing
- ✓ Not to weld dishes of superior thickness to 30mm

14.9.3. **Drawings of execution**

14.9.3.1. For the execution of all metallic construction, the contractor will design all drawings including their details to define all elements of the construction precisely.

14.9.3.2. On the detailed drawings, the contractor will consign complete way:

- ✓ Arrangements of assemblies
- ✓ The adjusted ends
- ✓ Measurements of welding cords and their order of execution
- ✓ Beams.

14.9.3.3. In case the project id modified during the execution of works, drawings and calculations will be rectified so that the finished work is defined precisely by these pieces.

14.10. **Roofing for supporting solar panel**

14.10.1. **Roofing is done by using galvanized iron sheets (28 BG).**

14.10.1.1. Roofing will be by pre-painted qualified iron sheets with respect to specifications such as: thickness of: 0,40mm (BG 28).

14.10.1.2. The uniform weight distributed for a scope of 2, 75 m between supports must be able to reach 95 kg/m2 for 2 continuous bays, with a lower arrow to 1/200 of the reach.

14.10.1.3. The fixing of the iron sheets to the metallic frames will be by Ø 63mm hooks, with small discs in PVC hoods. The longitudinal recoveries will follow the manufacturer's prescriptions according to the product and the slope of the roofing. All measurements shall assure the strict tightness. They are notched according to the profile of ferries with tilted wings to 10%. Their development is 610 mms and the recovery of 260 mm wings. Joint foams to closed cells cut up according to the profile will assure the tightness

14.10.2. **Gutters for the descending water**

14.10.2.1. Steel gutters will be used to collect water from the roof while the PVC pipes of 110mm will be installed for the descending water. They will end, in an elbow at the lower end towards the discharging end into a plastic tank.

14.10.3. **Plastering**

14.10.3.1. **Cement mortar plaster**

14.10.3.1.1. Plastering is usually executed when all hard work on construction is finished and should be done immediately when the masonry work has dried up. It is important to understand the following preparations before plastering and coatings or painting

- ✓ Removal of any dirt, grease, dusts, clay etc
- ✓ Removal of protruding nails and other non-smooth foreign bodies
- ✓ cleaning and leveling flat all objects that are not flat

14.10.3.1.2. After this apply the single layer of coating made of cement mortar with a 350 kg/m3 composition. The thickness of the plaster should be between 1.5 cm to 2 cm and the wall surface must be flat.

14.10.3.1.3. The following have to be plastered: all internal walls, all sinks, urinals, lintels

14.10.4. **First layer**

14.10.4.1. This layer, called layer of grappling, has 5 mm of thickness. Its mortar is prepared with the thick sand.

14.10.5. **Second layer**

14.10.5.1. A second layer or layer of smoothening has 5 cm of thickness. It is executed with a mortar prepared with the thin sand (lower diameter to 0.2 mms).

14.10.6. **Coating of local flat stones**

14.10.6.1. The surface of the layer must be compacted and leveled. It must receive a layer of sand of 5 cm of thickness. Stones are carved and are thinned until a regular thickness of 15 to 20 cm.

14.10.6.2. The organized coating of layers on burnt soil is identical to the coating in local flat stones, but it has a uniform thickness of 10 cm.

14.10.7. **Water and sanitary installations**

14.10.7.1. **Water connection and distribution**

14.10.7.1.1. The water connection to the external distribution point shall be at the expense of the contractor. The internal and external water pipes shall be UPVC and shall be laid at least 80 cm deep on top of a layer of sand with a thickness of 15 cm. The backfilling shall be done in layers; the first layer shall be that of fine soil15 cm of thickness followed by successive layers of compacted soil free of organic matter.

14.10.7.2. **Water Distribution**

14.10.7.2.1. The interior water pipes should be only PPR pipes and should be laid technically. The state of laid and conned pipes should always be verified for any malfunctions before speeding up to finish the whole work.

14.10.7.3. **External clearing**

14.10.7.3.1. Areas that are left free are planted with postpartum. This involves bringing in fresh soil that is spread over the whole area to make a thickness of at least 5cm into which the postpartum is planted and watered until it fixes and germinates well

14.10.7.4. **Existing structures to be demolished & repaired**

14.10.7.4.1. There are existing structures that will be demolished first to allow construction of new structures necessarily for piping passages, access to the site and enabling excavations. These include but not limited to; pavers, masonry, retaining wall and others. These have been considered in the Bill of quantities.

14.11. **Busanza Pumping Details**

14.11.1. Details:

Parameters	Unit	Quantity
Discharge	m3/h	30
HEAD	m	20
Overall efficiency	%	75.0
Input power	KW	2.180
Power of Motor	KW	2.507
Normal power	KW	5.0
Power source		SOLAR PANEL

14.11.2. In Busanza Site, the distance from the underground reservoir to the elevated tank was estimated to be twenty meters (20m) which is called head.

14.11.3. The elevated tank has Forty-five-meter cube (45 CUM) which will require to be charged in one and half hour i.e. the discharge of the pump should be 30 m3/h.

14.11.4. The overall efficiency of the pump is 75.0%.

14.11.5. Input power of the pump is 2.180 KW.

14.11.6. The power of the motor is 2.507 KW.

14.11.7. The power motor to be supplied and installed should have 5 KW.

14.11.8. The source of power must be solar panel to be installed are 4 units having 500W each.

14.11.9. The total power delivered by solar panels is 2000W required to charge 10 batteries having 150AH each and the Inverter of 3000W should be supplied and installed so that to run the pump.

14.12. **Mpazi Pumping Details**

14.12.1. Details:

Parameters	Unit	Quantity
Discharge	m3/h	30
HEAD	m	25
Overall efficiency	%	75.0
Input power	KW	2.18
Power of Motor	KW	2.507
Normal power	KW	4.0

Power source		SOLAR PANEL

14.12.2. In Mpazi Site, the distance from the underground reservoir to the elevated tank was estimated to be twenty meters (25m) which is called head.

14.12.3. The elevated tank has Forty-five-meter cube (30 CUM) which will require to be charged in one and half hour i.e. the discharge of the pump should be 30 m3/h.

14.12.4. The overall efficiency of the pump is 75.0%.

14.12.5. Input power of the pump is 2.18 KW.

14.12.6. The power of the motor is 2.507KW.

14.12.7. The power motor to be supplied and installed should have 4.0 KW.

14.12.8. The source of power must be solar panel to be installed are 4 units having 500W each.

14.12.9. The total power delivered by solar panels is 2000W required to charge 10 batteries having 150AH each and the Inverter of 3000W should be supplied and installed so that to run the pump.

14.13. **Control System and Protection**

14.13.1. The elevated tank is designed to always remain full of water. When consumers use the harvested rainwater, the water level in the overhead tank decreases to a predetermined level. This triggers the floating valve, which in turn activates the pump. The pump then refills the overhead tank with water. Once the tank is full, the floating valve automatically stops the pump. This cycle continues to ensure a consistent supply of water.

14.13.2. The control system is integrated into the control panel, which includes components such as contactors, pressure switches, water level sensors, and relays. The entire system is safeguarded by a lightning arrestor and bonding to protect against electrical surges. Additionally, the control system should be equipped with circuit breakers, contactors, residual current devices, and arresters

14.14. **Capacity Training**

14.14.1. The total number of planned training participants/individuals is 200, including 50 for Mpazi and 150 for Busanza.

14.14.2. Participants will be selected by the project team in collaboration with the local authorities of the respective neighborhoods. The responsibility of selecting and identifying participants will not fall on the training company; instead, the local authority and the project team will ensure the targeted number is met without any omissions, given the substantial sample space.

14.14.3. To ensure a high turnout of participants in Busanza and Mpazi, the organizers (winning training company) must cater for breakfast and lunch during the sessions, presented in a workshop format.

14.14.4. The venue will be government office premises, such as meeting halls at the cell office, sector office, district office, or City Hall—whichever is available at the time. The project team, in collaboration with the City of Kigali, will oversee finding the nearest venue to minimize travel distance and reduce transport costs.

14.14.5. The primary qualification for trainers is a deep understanding of facility operations and maintenance techniques. Trainers are expected to be key staff involved in the construction works.

14.14.6. The trainer/bid winner is expected to be responsible for preparing content and producing training materials, focusing on the operation and maintenance plan of the facility.

14.14.7. There is an existing training manual provided by design consultants, shared in Annex 2 The trainer/bid winner is permitted to refine it upon approval by the Project Team

14.14.8. Trainees will be divided into four (4) groups, including 3 for Busanza and 1 for Mpazi, each comprising 50 participants. This setup allows each group to have its own day session, not exceeding seven (7) hours. Therefore, accommodation is unnecessary.

14.14.9. The training company should factor in and plan for motivation fees to be given to each participant, not exceeding an equivalent of $10 per person. The training company will be responsible for paying participants according to the agreed-upon terms in the financial proposal.

14.14.10. The total duration for the training sessions in Busanza and Mpazi is four days, with each session of 50 participants planned for one (1) day. All four sessions are expected to be completed in not more than one month.

14.14.11. The project team, in conjunction with the City of Kigali, will communicate the location or venue about two weeks before the training commences.

15. KEY PERFORMANCE INDICATIORS

15.1. The following Key performance indicators (KPIs "Key Performance Indicators") will be considered by UNDP for the awarded supplier.

Table 5: KPIs "Key Performance Indicators of the project

No	Specific	Measurable	Achievable	Result-	Time Limited	Penalty
1	Delivery of each activity at the time and place agreed by the supplier in the contract - purchase order (PO).	Time and place of delivery according to the contract- purchase order (PO).	Comply with the established delivery date and with the place of delivery in the purchase order. Grace period of 7 calendar days for the whole project.	Both solar panels should be installed and functioning on the agreed delivery work schedule.	Delivery of each activity at the time and place agreed in the contract - purchase order (PO).	A discount of 1% will be applied to the total cost of the undelivered activity (as per the scheduled payment) for each extra day of delay from day seven grace (7) of the whole project up to a maximum of 5% (maximum 7 grace day + 5 days normal delay. If the supplier fails to deliver within 12 calendar days after the original delivery date, then UNDP shall have the right to cancel the item(s) that were not delivered without any cost/penalty and use the bank guarantee.
2	Provision of post installation support to residents after handover of the project	Evaluation survey to be answered residents after completion of the project	In a scale of 1 – 5, with 5 being the highest, achieve a score of 3 or better.	In a scale of 1 – 5, with 5 being the highest, achieve a score of 3 or better.	Evaluation will be done within one month after the completion	To have a meeting with UNPD and agree to an improvement measure plan that should be executed. In case the improvement measure plan is not implemented UNDP shall have the right to cancel the contract without any cost/penalty.