



**DEMOCRATIC REPUBLIC OF TIMOR-LESTE**  
**Ministry of Planning Investment and Strategic**  
**NATIONAL PROCUREMENT COMMISSION**  
Avenida de Balide, Património do Estado, Díli, Timor-Leste

---

## **REQUEST FOR PROPOSALS**

### **CONSULTING SERVICES FOR DETAILED ENGINEERING DESIGN OF TIMOR-LESTE FOUR MUNICIPAL CAPITALS WATER SUPPLY & SANITATION PROJECT**

**RFP NO.: RFP/039/MOP-2019**

**August 2019**

## **TABLE OF CONTENTS**

- **Section 1 – Letter of Invitation**
- **Section 2 – Instructions to Consultants and Data Sheet**
- **Section 3 – Technical Proposal – Standard Forms**
- **Section 4 – Financial Proposal – Standard Forms**
- **Section 5 – Terms of Reference**
- **Section 6 – Conditions of Contract and Contract Forms**

## TABLE OF CLAUSES

### **PART I**

#### **Section 1. Letter of Invitation**

#### Section 2. Instructions to Consultants and Data Sheet

#### **A. General Provisions**

1. Definitions
2. Introduction
3. Conflict of Interest
4. Unfair Competitive Advantage
5. Corrupt and Fraudulent Practices
6. Eligibility

#### **B. Preparation of Proposals**

7. General Considerations
8. Cost of Preparation of Proposal
9. Language
10. Documents Comprising the Proposal
11. Only One Proposal
12. Proposal Validity
13. Clarification and Amendment of RFP
14. Preparation of Proposals – Specific Considerations
15. Technical Proposal Format and Content
16. Financial Proposal

#### **C. Submission, Opening and Evaluation**

17. Submission, Sealing, and Marking of Proposals
18. Confidentiality
19. Opening of Technical Proposals
20. Proposals Evaluation
21. Evaluation of Technical Proposals
22. Public Opening of Financial Proposals (for QCBS, FBS, and LCS methods)
23. Correction of Errors

- 24. Taxes
- 25. Combined Quality and Cost Evaluation

**D. Negotiations and Award**

- 26. Negotiations
- 27. Conclusion of Negotiations
- 28. Award of Contract

**E. Data Sheet**

- Appendix 1 – Summary Evaluation Sheet
- Appendix 2 –Personnel Evaluation Sheet

**F. Disqualification of an Expert**

**Section 3. Technical Proposal – Standard Forms**

Checklist of Required Forms

- Form TECH-1
- Form TECH-2
- Form TECH-3
- Form TECH-4
- Form TECH-5
- Form TECH-6

**Section 4. Financial Proposal - Standard Forms**

**Section 5. Terms of Reference**

**PART II**

**Section 6. Conditions of Contract and Contract Forms**

Lump Sum Form of Contract

- I. Form of Contract
- II. General Conditions of Contract
- III. Special Conditions of Contract
- IV. Appendices

- 6. All Water Supplies
  
- XV. ANNEX B – MUNICIPAL TOWNS NON-DOMESTIC WATER SUPPLY & SANITATION
  - 1. School Water Supply and Sanitation
  - 2. Non-domestic Wastewater
  - 3. Detailed Design
  
- XVI. ANNEX C – POSSIBLE PROJECT TEAM STRUCTURE

## I. INTRODUCTION

### 1. Definitions

a. Project

The Project is Timor-Leste Four Municipal Capitals Water Supply & Sanitation Project.

b. Services

The Services is Detailed Engineering Design of Timor-Leste Four Municipal Capitals Water Supply & Sanitation Project.

c. Employer

The Employer is the Owner of this project which is the Ministry of Public Works (MPW) of Republic Democratic of Timor-Leste.

The counterpart government agency under the MPW is the Office of the Directorate General of Water and Sanitation (DGAS).

d. Management of Activities

The overall management of activities is led by a Project Manager appointed by the MPW under the guidance from the Employer and Project Steering Committee (PSC). PSC will consist of the representatives from the Ministry of Public Works (MPW), the Agency of National Development (ADN), and the Ministry of Finance (MOF).

e. Procurement Process

Procurement of the Consultant will be carried out by the National Procurement Commission (NPC). NPC will arrange pre-bid meeting, receive the proposals, evaluate the proposals and propose the winner.

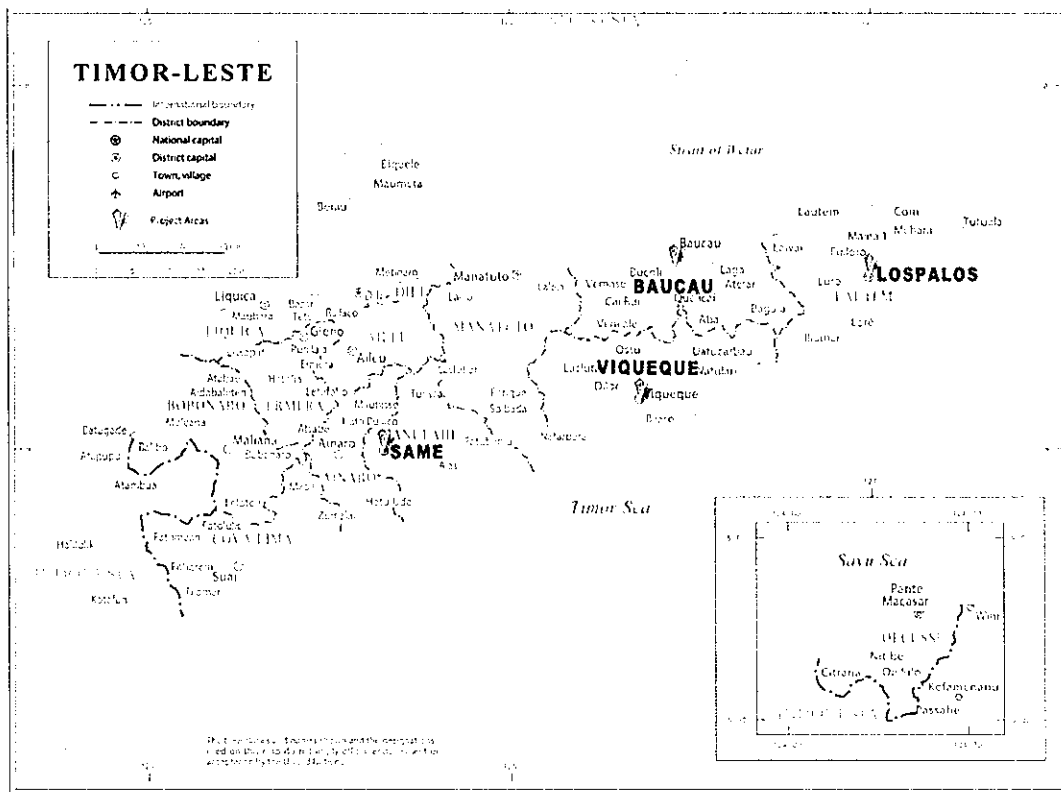
f. Consultant

The Consultant is the consulting company which has been determined the winner of the procurement process and who will sign the contract together with the Employer.

**2. Background**

- a. This Terms of Reference (TOR) concerns the provision of Detailed Engineering Design (DED) for water supply and sanitation improvements in the municipals of Baucau, Lospalos, Same and Viqueque. Locations map of the municipals are shown in Figure 1. A summary of projected population is presented in Table 1.

**Figure 1: Project Locations Map**



**Table 1: Summary of Four Municipal Capitals Population Projection**

Year	Baucau	Lospalos	Same	Viqueque
2014	27,982	16,268	20,149	11,370
2020	38,396	21,186	25,002	13,775
2030	59,915	31,360	34,879	18,967

*Source: Table ES-1 of the Water Supply and Sanitation Master Plan*

- b. The Master Plan period was up to 2030. However circumstances have meant that the detailed engineering design has been delayed so that now construction and commissioning are likely to be completed around 2014 at the earliest. With this in mind, the Government has decided to extend the detailed engineering design period to be based on the projected 2040 population (solution still refer to 2030) to make best use of the investment opportunity. Population projections produced for the Master Plan were based on pre-2015 census figures as the 2015 census results were not available at the time. The 2015 census results are now available and indicate that the growth rates are mostly less than projected in the Master Plan. The 2015 census results as well as current information from local municipality administrations should be assessed and inform the revision of projected growth rates and 2030 population and distribution.
- c. Water Supply and Sanitation Master Plan prepared as part of the Second District Capitals Water Supply Project (46160-001) ADB TA-8064 TIM, January 2016. The Water Supply and Sanitation Master Plan prepared for the municipal capitals of Bacau, Lospalos, Same and Viqueque identified that:
  - (i) All four water supply systems were largely dysfunctional providing a very poor level of service; inadequate quantity and quality, highly intermittent and low pressure. The systems have a limited number of customers and have progressively deteriorated due to lack of maintenance and deterioration of key infrastructure elements;
  - (ii) An assessment based on household surveys undertaken in the four municipal capitals indicated that 28% of households practice open defecation 35% use unhygienic toilets while 37% use hygienic toilets;
  - (iii) An assessment of a sample of schools in the municipal capitals identified that the school water supplies and sanitation are in a “dire situation” due to a combination of poor water supply to school; inadequate school water supply and sanitation infrastructure; and a total lack of day to day maintenance and management. As there are 81 schools in the four towns catering for 31,500 students which is a significant proportion of the town population. It is very important this situation improves to removed a significant impediment to education;



- (iv) Public toilets are rare in the four municipal capitals at places like markets, bus terminals and other public spaces. The lack of facilities is leading to open defecation and increased environment health risks; and
  - (v) There is no septic tank sludge management system. However there are a significant number of septic tank installations for Government (schools, hospitals, clinics, Government offices, barracks, etc.), religious buildings, Non-Government Organization (NGO) premises and private premises such as offices and commercial properties including hotels and guest houses.
- d. The Government proposes to address both water supply and sanitation service levels in the four municipal capitals through a project to upgrade and provide new facilities, and improve:
- (i) Package A: Detailed Design;
  - (ii) Package B: Bacau Water Resources Investigation has been incorporated in Package A;
  - (iii) Package C: Household Sanitation Program and Pilot School Water Supply and Sanitation Implementation;
  - (iv) Package D: Private Sector Engagement Studies and Implementation Support;
  - (v) Package E: Stakeholder Communication , Advocacy and Community Development;
  - (vi) Package F: Tariff System Implementation; and
  - (vii) Package G: Management and Technical Support to PMU.
- e. The project will ensure that more people enjoy an improved supply of drinking water and sanitation facilities in Timor-Leste contributing to reducing the high incidence of water and poor sanitation related diseases, particularly in children under 5. By the end of the project safe and reliable water supply will be provided to the municipal towns of Baucau, Lospalos, Same and Viqueque. In addition all households will have improved hygienic toilets as well as toilets available in public places in the towns. The improved water supply and sanitation facilities in the pilot schools will provide children with safe and reliable water supply and toilets operated by competent operators in each pilot school. The pilot will provide

a template to improve water supply and toilets in other schools. Finally, septic tank sludge will be safely transported and disposed of in purpose built treatment facilities in each of the four towns with the sludge transport and treatment facility operation contracted to a competent operator.

- f. **Output 1:** The project proposes to rehabilitate and expand the Baucau, Lospalos, Same and Viqueque municipal capitals urban water supply systems. This will include: (i) rehabilitation and improvement of the existing intakes in Same and Viqueque; (ii) in Baucau, development of new sources to supplement or replace the existing source; (iii) in Lospalos, identification treatment to address water hardness; (iv) rehabilitation and improvement of existing water supply storage and treatment facilities; (v) rehabilitation of existing water supply distribution systems forming distinct distribution zones simplifying management and substantially improving the level of service; and (vi) installation of bulk / system water meters and replacement and/or installation of meters for all existing and new connections.
- g. **Output 2:** The project establishes fully functioning water supply and sanitation infrastructure in pilot schools that is effectively operated, maintained and managed to provide a minimum level of service for water supply and sanitation to all children while they are at school.
- h. **Output 3:** The project will facilitate achieving new or improved household sanitation in all household in the municipal capitals of Baucau, Lospalos, Same and Viqueque.
- i. **Output 4:** The project establishes septic tank sludge treatment and disposal facilities and associated sludge transport system in the municipal capitals of Baucau, Lospalos, Same and Viqueque that are effectively operated, maintained and managed and that safely transports, treat and disposes of district capital septic tank sludge.
- j. The scope of this Terms of Reference is limited to the detailed design package (Package A) and is as follows:
  - (i) Detailed design for:
    - a) Municipal capitals urban water supply infrastructure;
    - b) Public toilet; and

- c) Septic tank sludge treatment and disposal facilities.
  - (ii) Inventory of school water supply and sanitation infrastructure;
  - (iii) Inventory of non-domestic wastewater requirements and facilities; and
  - (iv) Preparation of environmental and social safeguards plan.
- k. Descriptions of the four town water supplies and improvements proposed in the Master Plan are summarized in Annex A. Description of significant non-domestic water supply and sanitation issues in the municipal towns and proposed septic tank sludge treatment and disposal facilities are presented in Annex B.
- l. A consulting firm will be engaged through Quality and Cost-Based Selection (QCBS). A total of 181 person-months are required (59 international and 122 national).

### **3. Objective**

This Terms of Reference (TOR) should be used for guidance for the Project. This TOR sets out the output, principles, criteria, process and input.

In this task, it is expected that the Design Consultant implement its duties in a good manner so as to deliver the outputs in accordance with the technical specifications and standards that is mentioned in this TOR.

The main objective of this TOR is to provide technical guide and instructions to the bidders so that they can fulfil the technical specifications.

### **4. Scope of Services**

The scope of services is Detailed Engineering Design of Timor-Leste Four Municipal Capitals Water Supply & Sanitation Project of Baucau, Lospalos, Same and Viqueque.

### **5. Location**

The location of the Project is in four municipal capitals of Baucau, Lospalos, Same and Viqueque, Timor-Leste.

## II. SCOPE OF SERVICES

The Consultant will undertake the following works:

1. Prepare detailed engineering design and documentation for the upgrading of the municipal capitals water supply and sanitation in Baucau, Lospalos, Same and Viqueque;
2. Provide detailed engineering design and documentation for public toilets to be installed in public places in the municipal capitals of Baucau, Lospalos, Same and Viqueque;
3. Provide detailed engineering design and documentation for septic tank sludge treatment and disposal facilities for the municipal capitals of Baucau, Lospalos, Same and Viqueque;
4. Provide an inventory of school water supply within 15 km of the municipal capitals of Baucau, Lospalos, Same and Viqueque;
5. Provide an inventory of non-domestic wastewater facilities and requirement within 15 km of the municipal capital of Baucau, Lospalos, Same and Viqueque.
6. Provide community engagement plans to be implemented as part of the infrastructure improvement contracts;
7. Prepare an environment impacts option report and a report on social safeguards assessment for all works;
8. Preparing all detailed cost estimates and specifications for the works, equipment, and materials, in collaboration with government agencies and private groups as necessary.
9. Carry out all necessary surveys, field verification, studies, collection of data, and analysis needed to prepare the detailed engineering designs for the Project.
10. Prepare all design and specifications in accordance with ISO standards, and in compliance with the Gender Action Plan (GAP), Environmental Management Plan (EMP), and consultation and participation plan of the Project.
11. Identifying and developing a new water source for the Baucau urban water supply. This includes but is not limited to all exploration / test bores, surveying, flow testing, water quality testing, etc to determine the viability of the source or sources.

12. Developing a bore field in the Papapa area for the Lospalos urban water supply. This includes but is not limited to all exploration / test bores, surveying, flow testing, water quality testing, etc to determine the size of the bore field and the number of bores required.
13. Determining an effective treatment to address water hardness and deposition of calcium carbonate for the source water for the Baucau, Lospalos, Viqueque and Same urban water supply. This includes all testing equipment, logistics, etc. to complete the work.
14. Review existing sources for the Same and Viqueque urban water supplies and assess alternative sources to ensure there will be adequate supply to meet projected demands. Purchasing and installing flow measuring equipment and setting up a monitor program to determine reliable flow from the sources. Only simple robust technologies should be considered such a V-notch weir at each intake to measure stream flow downstream of the intake and venture tubes or orifice plates in pipelines from the intakes. The flow for can thus be routinely spot checked by measuring height of water over the weir and temporarily attaching a manometer to the venturi tube / orifice plate apparatus to measure the flow in the intake pipelines. Combining the flows at each intake will determine total flow available at the intake.
15. Purchasing turbidity measuring equipment and other equipment as necessary and setting up a monitor program to determine the reliable water turbidity from sources for the Same and Viqueque urban water supplies.  
  
Undertaking topographic and cadastral surveys as required for design of infrastructure, land acquisition, and statutory requirements (consents).
16. Undertaking GPS surveys to:
  - a) Identify and map all properties to have a water supply service connection in each municipal capital;
  - b) Prepare an inventory of school water supply and sanitation infrastructure; and
  - c) Prepare an inventory of non-domestic wastewater requirements and facilities.
17. Undertaking geotechnical assessment, including site surveys and field and laboratory tests in the municipal capitals of Baucau, Lospalos, Same and Viqueque as required for the design of project infrastructure.

18. Undertaking a structural assessment of the slow sand filter structure at the Lospalos urban water treatment plant.
19. Researching engineering standards drawings related to pumps, tanks, treatment plants, pipe bridges, and other water supply and sanitation components;
20. Researching engineering standards drawings to ensure that all relevant facilities are accessible to persons with special needs (children elderly or disabled persons).
21. Conducting field investigations, data collection, and validation in the field where possible particularly of existing water infrastructure assets in coordination with national government and district offices. The Consultant is to state what existing infrastructure information is to be validated by the Construction Contractor e.g. location and condition of specific existing pipe work to be considered for retention.
22. Reviewing and updating hydraulic models and making recommendations on any changes or improvements.
23. Designing any intake upgrade work, bores and bore heads, tanks, treatment plants for calcium carbonate deposits and chlorination plants. Also provisions for further treatment if turbidity monitoring identifies additional treatment (may be required), pipe networks (transmission and distribution lines), service connection and metering, pipe bridges, pipe supports, and production wells including pumps, O&M buildings, warehouses, and backup generators for the upgrading of the Baucau, Lospalos, Same and Viqueque urban water supplies.
24. Designing robust control systems appropriate for Timor-Leste municipal capitals to allow operators to easily operate the system and to monitor system performance. It is envisaged that the overall control of the system will be largely automated with Supervisory Control and Data Acquisition (SCADA) links or similar, between the different components of the system. However the system will also have simple manual control back up in the event the automated system fails.
25. Prepare functional description for each of the four municipal capital water supplies. The functional description for each supply will include a description of:
  - a) Each component, intakes, bores water treatment plants and components thereof, reservoir, and the distribution network including booster pumps;

- b) Control equipment associated with each component and how the component will function including alarms;
  - c) Overall control of the water supply; and
  - d) The data management system including how data such as system flows, reservoir water levels, water quality, etc will be recorded and how the data will be reported on.
26. Designing public toilets appropriately four proposed per town for the municipal capitals of Baucau, Lospalos, Same and Viqueque.
27. Designing site layouts, receiving structures, facultative and aerobic lagoons, and treated effluent irrigation and storage areas for the disposal of septic tank sludge effluent from the municipal capitals of Baucau, Lospalos, Same and Viqueque.
28. Prepare functional descriptions for each of the four municipal septic tank sludge effluent treatment and disposal plants. The functional description for each municipal plant will include a description of:
- a) Each component, receiving structure, facultative and aerobic lagoons, and treated effluent irrigation area and how they will function;
  - b) Overall operation and control of the plant to ensure treatment and safe disposal is achieved.
29. Providing drawings and technical specifications of water system components to follow standards acceptable to MPW/NDWS/NDBS.
30. Providing architectural and structural design of office building, warehouses, pump houses, break pressure tanks, pipe bridges, reservoirs, water treatment plants, public toilet, etc.
31. Scoping the likely environmental impact using a matrix evaluation approach with a multi-criteria assessment. If an option is identified as unacceptable for environmental reasons based on completion of task (i) – (vi) below it will be clearly identified in the options report and multi-criteria assessment. Impacts will be identified through identification of:
- (i) The influence area;
  - (ii) Sensitive receptors and ecologically sensitive areas in the influence area;

- (iii) Areas of critical and / or natural habitat within or adjacent to the influence area;
  - (iv) Key differential impacts during the construction, operation and post closure stages of project development and ability for impacts to be avoided or mitigated;
  - (v) Likely categorization under the Environmental Licensing law and Safeguard Policy; and
  - (vi) Perspectives and inputs of stakeholders and directly and indirectly affected people and communities.
32. **Assessing potential social safeguards impacts including:**
- (i) Receiving all the options and their likely involuntary resettlement / land acquisition impacts and likely involuntary resettlement category;
  - (ii) Undertaking risk assessment associated with land acquisition and involuntary resettlement in consultation with affected persons and other key stakeholders, to determine if there are ongoing land disputes on sites to be acquired, existing sacred sites, any outstanding land issues and feedback from all relevant stakeholders including directly and indirectly affected persons and civil society organizations/non-government organizations (CSOs/NGOs);
  - (iii) Estimating the resources and actions required to possess likely site/s or implement safeguards requirements given issues/risks involved from point (ii) in this paragraph.
33. Preparing community engagement plans for each municipal capital associated with the urban water supply and sanitation infrastructure improvement. The community engagement plans are to be implemented as part of the infrastructure improvement contracts.
34. Preparing detailed cost estimates and specifications for the works, equipment, and materials, in collaboration with government agencies. The works will be packaged into four packets; one for each of the four municipalities.



### **III. RESPONSIBILITIES OF CONSULTANT**

1. The Consultant is responsible professionally on the design services to conform to the regulations and in accordance with ethical code and professionalism.
2. In general, the responsibilities of the Consultant cover the following:
  - a. The result of design services should fulfill design qualification standards.
  - b. The result of design services should accommodate the limitations expressed by the Employer including through this TOR such as in the aspect of payment, work schedule and the quality of Dili urban water supply to be constructed.
  - c. The result of design services should fulfill the regulations, standards and technical guidance of water supply that are generally in effect.

#### **IV. COST OF SERVICES**

1. The consulting services shall be a fixed cost contract based on the winning Consultant's Financial Proposal and finalized in negotiation with the Owner.
2. Upon signing of contract, no additional cost will be allowed, unless as subsequently agreed between the Consultant and the Employer through, and incorporated in, a written contract amendment.

## V. OUTPUT OF DESIGN SERVICES

The output resulted by the Consultant of these services is a clear product of report and consistent that is presented in a systematic and good format as follows:

### 1. Inception Report

The stage of design concept/technical design will consist of the following:

- a. The concept of technical design including concept of number and qualification of team members and its responsibilities, methodology of implementation and schedule of design.
- b. The concept of schematic technical design including number of connections, location, condition of legal or illegal connections.

These documents should be submitted in 6 hard copies and 6 CD copies and/or other forms of electronic copies.

This design concept should be submitted to and approved by the Employer within one month of assignment, before continuing to the stage of preliminary design.

### 2. Water Resources Report

- a. Purchasing of source metering and water quality monitoring equipment.
- b. Water resources report for Baucau, Lospalos, Same and Viqueque water supplies including flow and water quality monitoring result.
- c. Lospalos water treatment report.

These documents should be submitted in 6 hard copies and 6 CD copies and/or other forms of electronic copies.

This design concept should be submitted to and approved by the Employer within two month of assignment, before continuing to the stage of preliminary design.

### 3. Survey and Mapping Report

- a. Purchasing of GPS equipment.

- b. Individual topographical and geotechnical survey reports for water supply and wastewater infrastructure in each municipality.
- c. GPS mapping reports for all properties in each of the municipal towns. Report to include inventory of school water supply and sanitation infrastructure, and an inventory of non-domestic wastewater requirements and facilities.

These documents should be submitted in 6 hard copies and 6 CD copies and/or other forms of electronic copies.

This design concept should be submitted to and approved by the Employer within two months of assignment, before continuing to the stage of preliminary design.

#### **4. Preliminary Design Report**

Preliminary design of water supply and wastewater infrastructure for each the municipality.

These documents should be submitted in 6 hard copies and 6 CD copies and/or other forms of electronic copies.

This design concept should be submitted to and approved by the Employer within three months of assignment, before continuing to the stage of design development.

#### **5. Design Development Report**

Design development of water supply and wastewater infrastructure for each the municipality.

These documents should be submitted in 6 hard copies and 6 CD copies and/or other forms of electronic copies.

This design concept should be submitted to and approved by the Employer within four months of assignment, before continuing to the stage of detailed design.

#### **6. Draft Detailed Engineering Design Report**

The stage of Draft Detailed Engineering Design and functional description for each municipal capital will consist of the following:

- a. Drawing of Detailed Engineering Design of Baucau, Lospalos, Same and Viqueque water supply and sanitation network
- b. Technical Specifications

- c. Bill of Quantities
- d. Unit Price of Labors, Materials and Equipments
- e. Unit Price Analysis of Works
- f. Cost Estimates
- g. Implementation Schedule and "S" Curve
- h. EIA, EMP and LARAP Report
- i. Geotechnical Survey Report and Laboratory Test
- j. Design Report of Baucau, Lospalos, Same and Viqueque water supply and sanitation upgrade distribution network, and utilities to conform to the design drawings and other calculation needed.

These documents should be submitted in 6 hard copies and 6 CD copies and/or other forms of electronic copies.

This Draft Final Report should be submitted to and approved by the Employer within five months of assignment.

#### **7. Final Detailed Engineering Design Report**

The document of the Final Report should be submitted in 6 hard copies and 6 CD copies and/or other forms of electronic copies.

This Final Report should be submitted to the Employer within six months of assignment as the result of Draft Final Report that has already been discussed and approved by the Employer.

Design's documentation is to include:

- 1. Drawings and specifications and functional descriptions for water supplies, toilets, and septic tank sludge disposal facilities, and functional descriptions for water supplies and septic tank sludge disposal facilities,
- 2. Bills of quantities including engineers estimates
- 3. Community engagement plans associated with the water supply and sanitation infrastructure improvements for each municipal town. The community engagement plans are to be implemented as part of the infrastructure improvement contracts;

4. Environmental Impact Assessment Report and Monitoring Plan;
5. Social Safeguards and Involuntary Resettlement Assessment Report.

The Government will nominate an independent peer review to review all the outputs before approval.

Six draft copies of each of the following shall be provided in English; the Inception Report, the Preliminary Design Report and the Draft Detailed Design Report Executive summaries and printed copies of presentations shall be provided in Tetum.

All final copies of deliverables shall be provided in English and in Tetum; six copies in English and six copies in Tetum. These include the Inception Report, Water Resources Development Report, the Lospalos Water Treatment Report, the Survey and Mapping Reports, and the Final Design and associated documentation. Executive Summaries and printed copies of presentations shall be provided in Portuguese.

The design services are to be packaged for implementation into four packages. The suggested makeup of the contract packages is to provide one package for each municipal town with each package including:

1. The town water supply upgrade works;
2. The four public toilets (actual number to be determined at detail design stage); and
3. The town septic tank sludge treatment and disposal plant.

## VI. PRINCIPLE

The Consultant in the implementation of his tasks should take note of the principles as follows:

1. The water supply and sanitation network should be functional, efficient, and effective.
2. The design should consider minimize the consumption of energy.
3. By the limitations of not disturbing the works productivities, the investment cost and the operation and maintenance cost along the life time of the water supply and sanitation network should be undertaken as low as possible.
4. The design of the water supply and sanitation network should be made so that the construction work be done in short time and utilized as soon as possible.
5. The water supply and sanitation network should increase the quality of environment surroundings.
6. Any design prepared by the Consultant for the Employer under the Contract shall belong to and remain the property of the Employer. The Consultant may retain a copy of such document and software, but it shall not be used for other purposes without the express written consent of the Employer.

## VII. DESIGN CRITERIA

### 1. General Criteria

For the implementation of the works, the Consultant should take notice of the general criteria of water supply distribution network to conform to its functions and complexity, those are:

- a. The quantity of water should be available adequately and fulfil the quality required.
- b. The water should be available at any time continuously.
- c. The water should be available with reasonable price affordable for the communities or customers.
- d. The water supply distribution network should be provided with operation & maintenance manual.

### 2. Specific Criteria

The specific criteria cover as follows:

- a. The design period adopted is to be 2030.
- b. The target of services in the beginning should give the priority for the area that has no water supply services, the area with high density of population, and the strategic area. Then, the priority of services will be forwarded to the developing area.
- c. To get optimum design, the strategy should be managed as follows:
  - 1) To use available water that is in idle capacity.
  - 2) To reduce quantity of free charged water.
  - 3) To carry out new development to increase production and extension of network.
- d. Water supply distribution network could use loop distribution system, dead-end distribution system, or combining both systems (grade system).



- e. The form of distribution network will be determined by the condition of topography, location of reservoir, extent of service area, total amount of customers, and road network where the pipes will be installed.
- f. Layout of distribution network will be determined based on the topographical condition of the service area and the location of the water treatment plant.
- g. Whenever the topographical condition is not suitable using gravitation system for the whole area, the type of distribution network could use combination of gravitation system and pumping system. Whenever the whole area is relatively flat, direct pumping system could be used combining with water tower, or utilizing additional booster pump.
- h. Whenever existed significant different elevations among service areas, more than 40 meters, these service areas could be divided into several zones, so that it fulfils the minimum pressures requirement. For excessive pressure, it could use pressure reducing valve. For overcoming low pressure it could use booster pump.
- i. Distribution pump
  - 1) Discharge of distribution pump is determined based on fluctuation of water to be used in a day. Big pump will supply water in peak hour, while small pump for minimum supply.
  - 2) Booster pumps to be used for increasing pressure for the longest piping network.
  - 3) The elevation of booster pump should be located above flood surface elevation of 50-year flood period.
- j. Layout of piping distribution network will be determined based on the followings:
  - 1) Condition of road network in the service area
  - 2) Customers density
  - 3) Topographical condition and boundaries of service area
  - 4) Spatial planning of service area
- k. Components of distribution network comprises as follows:
  - 1) Zone of piping distribution network

- 2) Primary piping
  - 3) Secondary piping
  - 4) Tertiary piping
  - 5) Service piping
  - 6) Primary cell
  - 7) Elementary zone
- l. Material of pipe  
Material of pipe should be selected by quality testing.
  - m. Diameter of pipe  
Diameter of pipe should be determined based on the peak flow.
  - n. Water demand should be determined based on followings:
    - 1) Projection of population that should be calculated for 5 years interval during the period of planning.
    - 2) Progress of water use in litter/man/day should be projected for every 5 years interval.
    - 3) Availability of water.
  - o. Capacity of water supply distribution network  
Main component of water supply distribution network should be adequate for delivering maximum water demand and to conform to the peak hour demand as follows:
    - 1) Raw water unit should be designed based on peak day demand that is approximately 130% of average demand.
    - 2) Production unit should be designed based on peak day demand that is approximately 120% of average demand.
    - 3) Distribution unit should be designed based on peak hour demand that is approximately 115% to 130% of average demand.

### **VIII. DESIGN PROCESS**

1. In the process of designing to produce the outputs required, the Consultant should make schedule of periodic meetings with the Employer.
2. In the periodic meetings, it should determine the inception products, intermediate products, and main products that will be provided by the Consultant to conform to output plan determined in the TOR.
3. In the implementation of the tasks, the Consultant should always consider that the work time schedule is fixed.
4. The duration of the design consultancy services will be 6 months.
5. The Consultant will report directly to the Director General of Water and Sanitation (DGAS).
6. The Consultant will coordinate closely with DGAS in all aspects of the consultancy design services.

## IX. DESIGN INPUT

### 1. Information

- a. To implement the tasks, the Consultant should collect information required, beside the information provided by the Employer.
- b. The Consultant should check the validity of information to be used in the implementation of his tasks either the information provided by the Employer or collected by himself.
- c. The faults of design work as the result of faults of information will be the responsibility of the Consultant.
- d. The information required should be obtained for design are data to be collected on existing condition for relevant factors as follows:
  - 1) Previous report regarding the water supply distribution network and spatial planning.
  - 2) Photos of water source, route of transmission pipe, treatment plant, reservoir, and service area.
  - 3) Technical data regarding the climate, geography and hydrology, spatial planning, technical report regarding the existing water supply distribution network, and socio-economic data.
  - 4) Number of population.
  - 5) Map of project area, map of service area, map of existing water supply distribution network, length of pipes and topographical conditions.
  - 6) Components of service area including housing, commercial, public, schools, social, industry, tourism, and port.
  - 7) Existing facilities:
    - a) Quality of raw water.
    - b) Number of connections, locations, and its condition of legal or illegal connections. Consultation with the Direcção Nacional de Serviços de Água (DNSA) Customer Service Department as to details coupled with field survey.

- c) Size of pipes, material, physical leakage record and its layout. Consultation with DNSA Leak Detection Team as to details coupled with field survey and excavation.
  - d) Storage capacity of reservoir. Consultation with DNSA Production Department as to details coupled with field survey.
  - e) Pumping capacity of bore hole. Consultation with DNSA Production Department as to details coupled with field survey.
  - f) Capacity of water treatment plant. Consultation with DNSA Production Department as to details coupled with field survey.
- 8) Other data for water supply distribution network simulation method.
- 9) Confirmation of presence or absence of other projects such as land readjustment.
- e. Items to be analyzed by each zone as follows:
- 1) Population growth and population distribution
  - 2) Water demand
  - 3) Hydraulic model simulation
  - 4) Size and layout of pipes, its capacity and layout of reservoir
  - 5) Technical and non-technical issues arising

## 2. Personnel

The Consultant should provide personnel who fulfill the requirements to implement this services, either considering based on the scope of services or the level of complexity of the services. **All international experts should carry out all services for this detailed engineering design in Timor-Leste, not in their country of residence.** The personnel required for this design activities should consists as follows:

### a. Key Experts – International

#### 1) Team Leader – Water Supply & Sanitation Specialist

The Team Leader should have a Master Degree in Water Supply & Sanitation Engineering with minimum 15 years relevant international experience in designing urban water supply & sanitation network and

preferably registered in an internationally recognized professional engineering body. The Team Leader will have at least minimum 5 years experience as Team Leader and demonstrated ability to manage interdisciplinary team, cultural empathy, and strong organizational, communication and reporting skill. The Team Leader will have to submit in this bid a Certificate of Expertise issued by a professional institution. The Team Leader must have expertise in contract management for water supply & sanitation engineering works. Previous work experience in Timor-Leste and proficiency in Tetum or Bahasa Indonesia or Portuguese will be an added advantage.

The tasks of the Team Leader are the following:

- a. To report to the DGAS.
- b. All project team members international and national experts will report to the Team Leader.
- c. To manage liaise of the team with the government representatives.
- d. To plan, coordinate and control all activities and personnel involved in this work, so that the work could be finished in a good manner within the scheduled time and achieve the expected result.
- e. To prepare implementation guidance in the stage of data collection, processing, and final presentation of the whole works.
- f. To plan and implement all activities covering design of water supply & sanitation network and give input to the other experts related to this design services.
- g. To involve in the overall water supply & sanitation design.

**2) Water Supply Design Specialist**

The Water Supply Design Specialist should have a Bachelor Degree in Water Supply Engineering with minimum 15 years relevant international experience in designing urban water supply infrastructures and preferably registered in an internationally recognized professional engineering body. The Water Supply Design Specialist will have to submit in this bid a Certificate of Expertise issued by a professional institution. Previous work

experience in Timor-Leste and proficiency in Tetum or Bahasa Indonesia or Portuguese will be an added advantage.

The tasks of the Water Supply Design Specialist are the following:

- a) To report to the Team Leader.
- b) To be responsible for designing water supply network and involve in the overall water supply design along with identifying the existing network, developing hydraulic model of the new network based on the new philosophy, and designing deep bore pumps.
- c) To involve in the overall water supply design.
- d) The international Water Supply Design Specialists will be responsible for planning and designing water supply infrastructure for all municipal towns and managing the team which will include two national Water Supply Engineers, one national Sanitation Engineer, AutoCAD Operators and topographical survey team that will be contracted to undertake survey works.
- e) The international Water Supply Design Specialist will co-ordinate project activities in their town as required with the other international experts.

### **3) Water Resources Specialist**

The Water Resources Specialist should have a Bachelor Degree in Water Resources Engineering from with minimum 10 years relevant international experience in the field of ground and surface water resources development and management for designing water supply & sanitation network and preferably registered in an internationally recognized professional engineering body. The Water Resources Specialist will have to submit in this bid a Certificate of Expertise issued by a professional institution. Previous work experience in Timor-Leste and proficiency in Tetum or Bahasa Indonesia or Portuguese will be an added advantage.

The tasks of the Water Resources Specialist are the following:

- a) To report to the Team Leader.

- b) To be responsible for planning, assessing and identifying suitable water resources for all sources but critically for the Baucau, Lospalos and Viqueque water supplies.
- c) The international Water Resources Specialist will manage the two national Water Resources Engineers and co-ordinate their project activities as required with the other international experts.

**4) Water Quality Specialist**

The Water Quality Specialist should have a Bachelor Degree in Water Supply & Sanitation Engineering with minimum 10 years relevant international experience in water chemistry and water treatment for designing urban water supply & sanitation network and preferably registered in an internationally recognized professional engineering body. The Water Quality Specialist will have to submit in this bid a Certificate of Expertise in water chemistry and water treatment issued by a professional institution. Previous work experience in Timor-Leste and proficiency in Tetum or Bahasa Indonesia or Portuguese will be an added advantage.

The tasks of the Water Quality Specialist are the following:

- a. To report to the Team Leader and coordinate with the international Water Supply & Sanitation Specialist.
- b. To be responsible for planning, assessing and identifying suitable water treatment primarily for the Baucau, Lospalos and Viqueque water supply.
- c. To provide guidance to the town water supplies.
- d. To work with the national Water Quality Technician.

**5) Water Treatment Plant Design Specialist**

The Water Treatment Plant Design Specialist should have a Bachelor Degree in Water Supply & Sanitation Engineering with minimum 10 years relevant international experience in water treatment plant design works and preferably registered in an internationally recognized professional engineering body. Previous work experience in Timor-Leste and proficiency in Tetum or Bahasa Indonesia or Portuguese will be an added advantage.



The tasks of the Water Treatment Plant Design Specialist are the following:

- a. To report to the Team Leader.
- b. To be responsible in water treatment plant design works.
- c. To contribute to the preparation of technical specifications, DED drawings, Bill of Quantities, and cost estimation of the associated works.

**6) Wastewater Treatment Plant Design Specialist**

The Wastewater Treatment Plant Design Specialist should have a Bachelor Degree in Water Supply & Sanitation Engineering with minimum 10 years relevant international experience in wastewater treatment plant design works and preferably registered in an internationally recognized professional engineering body. The Wastewater Treatment Plant Design Specialist will have to submit in this bid a Certificate of Expertise in water chemistry and water treatment issued by a professional institution. Previous work experience in Timor-Leste and proficiency in Tetum or Bahasa Indonesia or Portuguese will be an added advantage.

The tasks of the Wastewater Treatment Plant Design Specialist are the following:

- a) To report to the Team Leader.
- b) To be responsible in wastewater treatment plant design works.
- c) To contribute to the preparation of technical specifications, DED drawings, Bill of Quantities, and cost estimation of the associated works.

**7) Structural and Geotechnical Specialist (4 positions)**

The Structural and Geotechnical Specialist should have a Bachelor Degree in Civil Engineering with minimum 10 years relevant international experience in designing foundation and structural aspect of urban water supply & sanitation network and preferably registered in an internationally recognized professional engineering body. The Structural and Geotechnical Specialist will have to submit in this bid a Certificate of Expertise issued by

a professional institution. Previous work experience in Timor-Leste and proficiency in Tetum or Bahasa Indonesia or Portuguese will be an added advantage.

The tasks of the Structural and Geotechnical Specialist are the following:

- a) To report to the Team Leader.
- b) To be responsible for assessing the condition of the Lospalos slow sand filter structure with a view to using it as a water reservoir.
- c) Leading geotechnical assessments of around 46 sites where structures are to be built such as reservoirs, BPTs, wastewater treatment facilities, specifically Baucau water source intake/pumping facilities, etc.

**8) Systems Engineer**

The Systems Engineer should have a Bachelor Degree in System Engineering with expertise in engineering systems with minimum 10 years relevant international experience in the field of control systems with specific experience in water supply systems control and preferably registered in an internationally recognized professional engineering body. The Systems Engineer will have to submit in this bid a Certificate of Expertise issued by a professional institution. Previous work experience in Timor-Leste and proficiency in Tetum or Bahasa Indonesia or Portuguese will be an added advantage.

The tasks of Systems Engineer are the followings:

- a) To report to Team Leader.
- b) To be responsible for assessing and planning appropriate systems that will automate the control of the water supplies and manage system data.
- c) To co-ordinate activities as required with the other international and national experts.

**9) Quantity Surveyor / Cost Engineer**

The Quantity Surveyor / Cost Engineer should have a Bachelor Degree in Water Supply Engineering with minimum 10 years relevant international

experience in preparing the technical specifications, bill of quantities and cost estimates for urban water supply & sanitation project and preferably registered in an internationally recognized professional engineering body. The Quantity Surveyor / Cost Engineer will have to submit in this bid a Certificate of Expertise issued by a professional institution. Previous work experience in Timor-Leste and proficiency in Tetum or Bahasa Indonesia or Portuguese will be an added advantage.

The tasks of Quantity Surveyor / Cost Engineer are the followings:

- a) To report to the Team Leader.
- b) To prepare technical specifications; bill of quantities; unit price of labors, materials and equipments; unit price analysis of works; and cost estimates for designing urban water supply & sanitation network.
- c) To give input to the other experts related to this design services.

**10) GPS/GIS Mapping Engineer**

The GPS/GIS Mapping Engineer should have a Bachelor Degree in Geodetic Engineering with minimum 10 years relevant international experience in the using GPS software and undertaking GPS mapping and preferably registered in an internationally recognized professional engineering body. The GPS/GIS Mapping Engineer will have to submit in this bid a Certificate of Expertise issued by a professional institution. Previous work experience in Timor-Leste and proficiency in Tetum or Bahasa Indonesia or Portuguese will be an added advantage.

The tasks of GPS/GIS Mapping Engineer are the followings:

- a) To report to the Team Leader.
- b) To be responsible for setting up and managing the GPS surveys and data collection of household, school and non-domestic properties.
- c) To manage and report on the survey data.
- d) To prepare a GIS data base and mapping of all data collected consistent across the four towns and adaptable as the basis for future consumers' data and billing.

- e) To prepare GIS mapping system to be compatible with the AutoCAD format.

**11) Environmental Specialist**

The Environmental Specialist should have a Bachelor Degree in Environmental Engineering or relevant related field with minimum 10 years relevant international experience and preferably registered in an internationally recognized professional engineering body. The Environmental Specialist will have to submit in this bid a Certificate of Expertise issued by a professional institution. Previous work experience in Timor-Leste and proficiency in Tetum or Bahasa Indonesia or Portuguese will be an added advantage.

The tasks of Environmental Specialist are the followings:

- a) To prepare environmental assessment including detailed Environmental Impact Assessment and detailed Environmental Management Plan of water supply & sanitation infrastructure network.
- b) To undertake climate change risk vulnerability assessment using available climate risk information and data.
- c) To identify required investments for climate proofing of the investment.

**12) Social Development Specialist**

The Social Development Specialist should have a Bachelor Degree in Social Science or relevant related field such as public health, sociology, applied social science or other related discipline with minimum 8 years relevant international experience working in the water supply & sanitation sector in developing countries in social, poverty, gender impact assessment, participatory planning and social safeguards, and involuntary resettlement assessment and planning. Specific experience in design and implementation of water supply & sanitation awareness and behavior change, participatory community consultation and engagement processes would be desirable. The Social Development Specialist should preferably be registered in an internationally recognized professional engineering body. The Social

Development Specialist will have to submit in this bid a Certificate of Expertise issued by a professional institution. Previous work experience in Timor-Leste and proficiency in Tetum or Bahasa Indonesia or Portuguese will be an added advantage.

The tasks of Social Development Specialist are the followings:

- a) To report to the Team Leader.
- b) To assess social safeguards and involuntary resettlement in the project.
- c) Prepare community consultation plan to be implemented by the Construction Contractor.

**13) Translator Specialist**

The Translator Specialist should have a Bachelor Degree in Linguistics or relevant related field with minimum 8 years relevant international experience working in translation for documentation on the water supply & sanitation sector in developing countries. The Translator Specialist should preferably be registered in an internationally recognized professional association of translators. The Translator Specialist will have to submit in this bid a Certificate of Expertise issued by a professional institution. Previous work experience in Timor-Leste and proficiency in Tetum and Bahasa Indonesia and Portuguese will be an added advantage.

The tasks of Translator Specialist are the followings:

- a) To report to the Team Leader.
- b) To translate the documentation in Portuguese, English and Tetum..

**b. Key Experts – National**

**1) Water Supply Design Engineer (4 positions)**

The Water Supply Design Engineer should have a Bachelor Degree in Water Supply Engineering with minimum 7 years relevant experience in designing urban water supply & sanitation network.

The tasks of the Water Supply Design Engineer are the following:

- a) Each national Water Supply Design Engineer will work on design one of the municipal town water supply & sanitation.
- b) Report to the international Water Supply Design Engineer responsible for that town.

**2) Water Resources Engineer (2 positions)**

The Water Resources Engineer should have a Bachelor Degree in Water Resources Engineering with minimum 7 years relevant experience in the field of ground and surface water resources development and management for designing water supply & sanitation network.

The tasks of the Water Resources Engineer are the following:

- a) To report to the international Water Resources Specialist and work with them in assessing and identifying suitable water source.
- b) One Water Resources Engineer working for Baucau & Lospalos, and the other one for Viqueque & Same.

**3) Water Quality Technician**

The Water Quality Technician should have a Bachelor Degree in Water Supply & Sanitation Engineering with minimum 5 years relevant experience for designing water supply & sanitation network.

The tasks of the Water Quality Technician are the following:

- a) To report to the Team Leader
- b) Working with the international Water Quality Specialist and the DNSA National Laboratory in identifying and assessing suitable water treatment solutions for all towns.

**4) Structural and Geotechnical Engineer (4 positions)**

The Structural and Geotechnical Engineer should have a Bachelor Degree in Civil Engineering with minimum 3 years relevant experience in designing structures of infrastructure projects.

The tasks of the Structural and Geotechnical Engineer are the following:

Each national Structural and Geotechnical Engineer will be guided by the international Structural and Geotechnical Specialist working on geotechnical assessment for around 46 sites and designing structures for these sites including reservoirs, BPTs, wastewater treatment facilities, etc.

**5) Mechanical and Electrical Engineer**

The Mechanical and Electrical Engineer should have a Bachelor Degree in Mechanical and Electrical Engineering with minimum 3 years relevant experience in water supply and sanitation project. Previous work experience in Timor-Leste and proficiency in Tetun or Bahasa Indonesia or Portuguese will be an added advantage.

The tasks of the Mechanical and Electrical Engineer are the following:

- a) To report to the Team Leader.
- b) To be responsible for assessing the mechanical and electrical instrumentation and designing upgrading work as required.
- c) To coordinate with the AutoCAD Specialist in preparing drawings of mechanical and electrical equipment.

**6) Wastewater Design Engineer (2 positions)**

The Wastewater Design Engineer should have a Bachelor Degree in Water Supply & Sanitation Engineering with minimum 3 years relevant experience in designing wastewater infrastructure projects.

The tasks of the Wastewater Design Engineer are the following:

- a) Each national Wastewater Design Engineer will work on designing the municipal two of the municipal town's septic tank sludge treatment and disposal facilities and public toilet structures.
- b) To report to the international Water Supply & Sanitation Design Engineer responsible for those towns.

**7) AutoCAD Operator (6 positions)**

The AutoCAD Operator should have a Bachelor Degree in Software Engineering with minimum 5 years relevant experience in applying AutoCAD to water supply & sanitation projects.

The tasks of the AutoCAD Operator are the following:

- a) Four AutoCAD Operators will report to the Water Supply Design Engineer.
- b) Two AutoCAD Operators will report to the Wastewater Design Engineer.
- c) One of the operator to be nominated as the coordinator to closely work with the international GIS mapping engineer to ensure consistency across the drawings

**8) Quantity Surveyor (4 positions)**

The Quantity Surveyor should have a Diploma 3 Degree in Water Supply & Sanitation Engineering or related field with minimum 5 years relevant experience for 3 projects in costing and preparing specifications for water supply or sanitation projects.

The national Quantity Surveyor will be guided and report to the international Quantity Surveyor/Cost Engineer.

**9) Environmental Engineer**

The Environmental Engineer should have a Bachelor Degree in Environmental Engineering with minimum 3 years relevant experience in designing water supply and sanitation projects.

The task of the Environmental Engineer is to work with the international Environmental Specialist.

**10) Social Development Assistant**

The Social Development Assistant should have a Bachelor Degree in Social Science or relevant related field such as public health, sociology, applied social science or other related discipline with minimum 3 years relevant experience in designing water supply and sanitation projects.

The task of the Social Development Assistant is to work with the international Social Development Specialist.



**c. Technical Support and Administrative Staff**

The Consultant Firm is responsible for ensuring adequate technical support and administrative staff which may include but not limited to Office Manager, Secretary, and Finance Officer.

**3. Person-Month Requirement**

The person-months of key experts will be required as tabulated below:

No.	Key Experts	Number of Position	Person-Months
<b>A.</b>	<b>INTERNATIONAL</b>		
1.	Team Leader / Water Supply & Sanitation Specialist	1	6
2.	Water Supply Design Specialist	1	6
3.	Water Resources Specialist	1	6
4.	Water Quality Specialist	1	2
5.	Water Treatment Plant Design Specialist	1	4
6.	Wastewater Treatment Plant Design Specialist	1	6
7.	Structural and Geotechnical Specialist	4	12
8.	Systems Engineer	1	3
9.	Quantity Surveyor/Cost Engineer	1	3
10.	GPS/GIS Mapping Engineer	1	4
11.	Environmental Specialist	1	4
12.	Social Development Specialist	1	2
13.	Translator Specialist	1	1
	<b>SUB TOTAL INTERNATIONAL</b>	<b>16</b>	<b>59</b>
<b>B.</b>	<b>NATIONAL</b>		
1.	Water Supply Design Engineer	4	24
2.	Water Resource Engineer (Baucau & Lospalos and Viqueque & Same)	2	10
3.	Water Quality Technician	1	2
4.	Structural and Geotechnical Engineer	4	16
5.	Mechanical and Electrical Engineer	1	4
6.	Wastewater Design Engineer	2	12
7.	AutoCAD Operator	6	31
8.	Quantity Surveyor	4	16
9.	Environmental Engineer	1	4
10.	Social Development Assistant	1	3

Section 5 – Terms of Reference

---

<b>No.</b>	<b>Key Experts</b>	<b>Number of Position</b>	<b>Person-Months</b>
	<b>SUB TOTAL NATIONAL</b>	<b>26</b>	<b>122</b>
	<b>TOTAL INTERNATIONAL + NATIONAL</b>	<b>42</b>	<b>181</b>