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## **SECTION 6**

# **EMPLOYER'S REQUIREMENT**

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## **Section 7 – Employer’s Requirement**

This document outlines the requirements for design and construction of the water supply system. The document is divided into the following parts:

- 1- Employer’s Requirement: Island Specific Data and Design Requirements
- 2- Employer’s Requirement: Construction Part 1: General Works
- 3- Employer’s Requirement: Construction Part 3: Water Supply System Works
- 4- Employer’s Requirement: Typical Drawings

Note: Preparation of reports, design and construction shall be as per EPA Guidelines:

1. Design criteria and technical specifications - design and construction of water treatment and supply system

These documents will be available from Environmental protection Agency (EPA).

## Island Specific Data

<b>Island Name</b>	<b>Sh.Kandhitheem</b>
<b>Type of System</b>	<b>Water Supply System</b>
<b>Population (2017 Dec)</b>	<b>1,546</b>
<b>Number of Households</b>	<b>310</b>
<b>Estimated Network Length (m)</b>	<b>12,500</b>
<b>Number of Institutional/Commercial Connections</b>	<b>47</b>
<b>Provisional connections</b>	<b>31</b>
<b>RO plant Capacity (2Nos) (CBM)</b>	<b>55</b>
<b>Product water Tank Capacity (2Nos) (CBM)</b>	<b>350</b>
<b>Raw Water (Rain Water) Tank Capacity (CBM)</b>	<b>200</b>

- Estimated Network Lengths area specified is considered for the inhabited area.
- Two RO plants should be provided each having the capacity stated above
- Two product water tanks should be provided each having the capacity stated in above table.
- The bidder should verify the estimated quantities of network lengths, and connections by carrying out own estimation and analysis and should check the completeness of the information.

## Design Requirements

Below section provides the requirements for the design phase of the project including, Carryout surveys, investigation, Conduction of EIA, Preparation of Concept Design and Detailed Design.

The design phase of the project will encompass the following works detailed below. The contractor should carry out the works as per the requirements set out and in accordance with the technical guidelines from EPA. Where there is a conflict between the stated requirement and EPA guidelines, the higher requirement should be considered.

Below are the expected outcomes from the design phase of the project.

### 1. Survey:

The survey should be carried out in accordance with the guidelines set out from Maldives Land Survey Authority (MLSA). The following aspects should be covered in the survey.

- a) Three bench mark should be placed as per Control Survey Guideline of MLSA standards and should be registered with MLSA
- b) The land use plan of the islands
- c) Topographic survey for the entire island at plot levels should be carried
- d) Names and details of roads should be properly marked
- e) Public buildings should be taken with internal layouts to demarcate the exact position of the building and roof areas.
- f) High tide line, low tide line, and vegetation lines should be taken.
- g) Harbor basin and any revetment should be mapped in the drawing
- h) Significant trees, electric distribution boxes, electric light poles should be marked in the survey map.
- i) Where possible type of vegetation should be provided and any trees falling on immediate network coverage area or on facility locations should be properly mapped in the survey.
- j) All septic tanks or preferred locations of house inspection chamber by the houseowner should be surveyed
- k) Where septic tanks or existing networks are located, it should be marked in the map.
- l) The levels on all existing roads should be taken at 10m intervals from the center of the road and at all junctions
- m) Proposed facility locations and alternative locations should be mapped with existing ground levels.
- n) Bathymetry for proposed outfall locations and alternatives should be taken.

## 2. Land Allocation Process

- a) Locations including alternatives for Water Supply system facilities should be identified in consultation with island councils and based on approved land use plans of the island
- b) The outfall locations should be selected to maximize the dispersion of brine discharge.
- c) LUP should be updated based on survey carried
- d) All survey files, including editable copies should be provided to client with the survey report and land approval request documents.

## 3. Geotechnical Investigations:

- a) Preliminary Geotechnical survey should be carried and can be restricted to inspection pits or scalar penetrometer tests.
- b) Inspection pits up to a depth of 1.5m with the log of soil conditions should be provided.
- c) Inspection pits at all facility locations should be carried and any requirement for ground improvement should be identified

## 4. Social survey

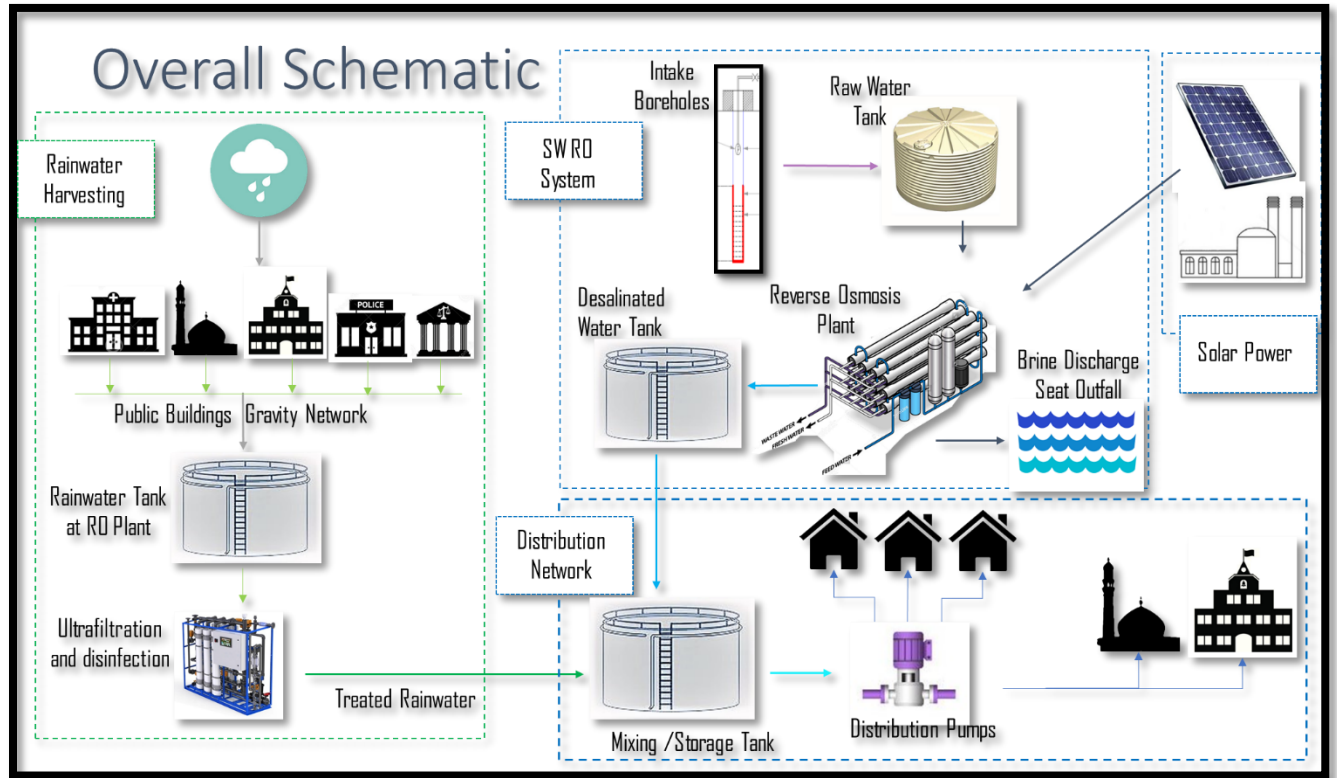
- a) As part of the community engagement, meetings with all relevant stakeholders and public should be carried
- b) Meeting minutes for all the community consultation meetings should be provided with survey report.
- c) Household willingness to pay survey for a minimum of 30% of the households should be carried.
- d) Locations including alternatives for system facilities should be identified in consultation with island councils and based on approved land use plans of the island.

## 5. Concept Design:

The Design should be provided for the entire island (where draft or approved LUP is available). However, the civil works as part of the scope will be limited to immediately inhabited areas and to areas where developments are foreseen within the short term. The island specific data provided reflects some of these developments.

The Overall Concept of the System should be based on the Typical Concept layout provided.

### A. Water Supply System



The Water Supply System design should be based on IWRM systems which include the following components (Where one of these components are available in the island the system should be designed to incorporate the other components)

- Rainwater Collection: From public building roofs through a gravity network
- Rainwater Treatment: Ultrafiltration and UV/Chlorine disinfection treatment
- Sea Water Intake: From borewells placed at Treatment Plant Plot Area. A minimum of two borewells to be placed.
- Desalination System: Sea Water RO treatment with pretreatment and post treatments. The RO plant should be compact and sized based on the island specific data provided.
- Solar power: Photovoltaic modules in plant building roof top should be used to either provide a grid connection or it should be provided with inverters and a standalone system where energy can be utilized for RO plant operation
- Storage Tanks, Feed Water Tanks and Brine Tanks
- Distribution Network: The network should cover the entire island
- Household Connections: each household will be provided with a metered connection.

The concept design documents presented should include the following documents along with the requirements stated in the EPA technical guidelines.

- Background of the project: Geographical setting, Existing facilities, all surveys carried
- Demographic data: Detailed assessment of existing population and housing including future projections
- For Water supply systems: The water demand should be calculated based on 50 lpcd for the first 15 years and 75 lpcd for 35 years. The RO plant and Storage tanks are sized based on this and provided in island specific data. The design of distribution network should consider the demand based on the 35 year demand (75 lpcd) or by using the loadings provided in the EPA technical guidelines.
- Design Considerations of Intake Structures( borewells)
- Design Considerations for Rainwater collection network and Distribution network
- Design considerations for treatment plant: Compact RO desalination Plants should be provided.

## 6. Detailed Design

The detailed design should provide all the hydraulic calculations required for Distribution Network. Administration building if required should be considered

- a) Preparation of Design of civil, electrical and mechanical works of Water Supply System i.e. Borehole, RO Plant including Brine Disposal, Sea Outfall, Ground Storage Tank, Rainwater Harvesting System and Water Distribution System etc.
- b) Preparation of Construction Drawings
- c) All Electrical drawings should be approved from Maldives Energy Authority.
- d) All the gravity profiles should be provided.
- e) Approval of Survey and Investigations, Concept Designs, EIA, Detailed Design and Construction Drawings from EPA.
- f) Follow International Design Standards/Engineering Practices for the design and construction of sewerage system of the Islands of the Contract Package in case EPA Design Standards / Guidelines/Technical Specifications are missing or silent for the item/component of the sewerage system.
- g) Construction of civil, electrical and mechanical works of Sewerage System i.e. Borehole, RO Plant including Brine Disposal, Sea Outfall, Ground Storage Tank, Rainwater Harvesting System and Water Distribution System etc.

## 7. EIA

After completion of the Concept, EIA works should be commenced based on the approved concept and should be carried according the EIA regulation.

## Land Use Plan Map of the Island