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## **PROJECT: EXTENDING WATER AVAILABILITY TO THE RURAL AREAS OF CARRIACOU**

### **TERMS OF REFERENCE**

#### **COMPARATIVE ASSESSMENT OF RAW WATER INTAKE OPTIONS FOR THE SWRO PLANT LOCATED ON CARRIACOU, GRENADA**

##### **1. INTRODUCTION AND BACKGROUND**

The Island of Carriacou has a population of approximately eight thousand (8000) people based on the 2011 National Population Census. Until early in 2016, Carriacou was without a consistent supply of potable water to suffice both domestic and developmental demands. Its people depended primarily on rainwater harvesting to meet this essential need. There are no permanent lakes or streams that can provide a reliable or significant quantity of fresh surface water to meet potable water demands (*Burnside May 2012*).

Ninety (90) percent of the houses and building on the island have storage tanks with capacities ranging from 1000 imperial gallons to 100,000 imperial gallons, as is the case with the Carriacou hospital. In 2014 the Ministry of Carriacou and Petite Affairs (MCPMA) in collaboration with National Water and Sewerage Authority (NAWASA) through a project implemented by the Caribbean Community for Climate Change Centre (CCCCC) commenced the process to install a reverse osmosis desalination plant together with a water storage tank with the aim of mitigating the shortage of water during the dry seasons.

In April of 2016, the CCCCC completed the installation of a Salt Water Reverse Osmosis (SWRO) desalination plant powered by a Photo Voltaic (PV) Renewable Energy System that provides potable water to the main town of Hillsborough and surrounding areas. That project was funded jointly by United Kingdom Department of Foreign Investment and Development (UKDFID) and European Union- Global Climate Change Alliance (EU-GCCA) Caribbean Program.

The SWRO, which is capable of producing up to 300 m<sup>3</sup> /day (79,251 US Gallons/day) with a quality that exceeds the WHO standard. The 150 KW Photo Voltaic (PV) renewable energy system for powering the SWRO plant, water storage tanks, and the force main pipes for distribution with home connection capability were included in the project.

The plant has suffered many interruptions during its operations due to the inadequacy of the salt-water intake. Currently, the line intake extends approximately seventy-five (75) feet offshore in open water and is consistently affected by wave action and turbidity of the water. As a result, the plant currently operates at less than half of its capacity and this is inadequate to meet the water demands of Carriacou during the dry seasons.

There is a need to review the current intake system with the aim of ensuring that the quality of water entering the SWRO plant is free from the effect of wave action and turbidity in order to ensure the constant operation of the plant. The issues affecting the plant are namely clogging of membranes failure of the high-pressure pump changing of filters etc.

The Government of Grenada has obtained grant funding from the Government of Italy through a partnership with the Caribbean Community plans use these funds to build on the gains of the previous investments in the Carriacou water program by the UKDFID and the EU-GCCA programs. The existing water production and distribution program will be expanded to provide water to the rural areas of Carriacou not currently served with running water. Specifically part of the proceeds of this grant will be utilized to finance a comparative assessment of the options for raw water intake into the Carriacou SWRO plant as described in this Terms of Reference.

## **2. AIMS AND OBJECTIVES OF THE PROJECT AND THE CONSULTANCY**

The aim of the project is to expand the system that has been installed so that potable water can be made available throughout the island of Carriacou. This will help to increase the island's resilience to withstand periods of extended drought arising from Climate Change and support quick recovery in the aftermath of any natural disasters like hurricanes. The supply of potable water will contribute to the health and wellness of the island through a reduction in the likelihood of incidence of water borne diseases outbreaks.

### **2.1 The objectives of the project are to:**

1. Deliver potable water to over 4,000 people throughout the rural communities of Carriacou; and
2. Create/increase employment through economic opportunities and activities that will be generated from access to safe and reliable supply of water.

### **2.2 The objective of the consultancy is to:**

Provide a technically sound solution for addressing the raw water intake problems at the Carriacou SWRO plant.

## **3. THE TASK**

The NAWASA requires the services of a consultant to provide assistance in the conduct of a comparative assessment of the existing raw water intake for the SWRO on Carriacou and the possible use of a borehole as an intake source. The selected consultant must demonstrate a

thorough understanding of and familiarity with the subject matter, practical experience in the water industry and operation of SWRO plants.

The consultant will work with NAWASA to achieve the stated objective of this consultancy and shall be solely responsible for the analysis and interpretation of all data received and collected, the timely completion of the reports, and for the accuracy and completeness of the findings and recommendations. All-important data and calculations shall be presented in sufficient detail to permit verification and later updating.

### **3.1 General Tasks**

The selected consultant will at minimum undertake the following activities:

1. Facilitate an inception meeting (virtual) with the NAWASA, MCPMA and the CCCCC where a plan of work will be presented that will guide the implementation of the consultancy.
2. Review all the relevant documents provided by NAWASA any other source documents deemed necessary to complete the consultancy.
3. Consult with the NAWASA and other relevant stakeholders as required.
4. Prepare a final report of the work undertaken in this consultancy.

### **3.2 Specific Tasks**

The consultant will be specifically required to:

1. Analyze the existing water intake system, identify deficiencies, and make recommendation for correcting deficiencies. This analysis should include a cost proposal for correcting the deficiencies;
2. Examine the potential for the use of a bore hole as an alternative intake option for the SWRO and make recommendation on its technical feasibility and cost of installation and operation. This should include a cost proposal for acquiring, installing and operating the bore hole;
3. Provide an objective comparison of the pros and cons for the use of the rejuvenated existing intake system against the adoption of the bore hole intake system; and
4. Prepare a comprehensive report on the work done under this consultancy, as a summary of the Final Report, which should include related findings with clear and specific recommendations.

## **4. OUTPUTS OF THE CONSULTANCY**

At minimum, the consultant must produce and deliver the following reports and outputs:

### **4.1 Outputs**

- i. **Inception report** on the decisions taken at the Inception meeting, any initial findings and issues that require decision-making to ensure the successful completion of the Consultancy;

- ii. **A draft report** – that covers all matters described in Section 3.2 above; and
- iii. **The final report** – that incorporates comments on the Draft Report.

## **5. REQUIREMENTS**

### **5.1 Level of effort**

The level of effort required for the completion of the tasks is estimated at twelve (12) person days.

### **5.2 Personnel**

The selected consultant should have specialist expertise and will possess demonstrated skills and experience in the field.

#### **Qualifications and skills:**

University degree in mechanical engineering, water resource management or related field. Master's degree and specialist training in these areas or related fields will be considered an asset.

#### **General professional experience:**

At least ten (10) years continuous working experience in the water sector.

#### **Specific professional experience:**

The consultant must have: (i) relevant experience in water and sewerage sector, hydrology/ water engineering; (ii) at least five (5) years' of experience in water resource engineering with knowledge of water supply and distribution and the necessary skill sets to complete the requisite hydrologic and hydraulic analysis; and (iii) at least three (3) years' experience within the CARICOM Region.

### **5.3 Place of Work**

The Consultant will perform the Services at his / her home base but will be required to make one field visit to the SWRO Plant in Carriacou to perform the necessary tests.

### **5.4 Language**

The Consultant must be fluent in English. All reports and other documents must be in English.

## **6. SUPERVISION AND REPORTING**

### **6.1 Supervision**

The selected consultant will report to the Manager- Planning and Development Department of

NAWASA or his designee.

## **6.2 Reporting**

The proposed schedule for submission of reports / field trip is:

<b>Type of Report / Field Trip</b>	<b>Estimated Date</b>
Inception Report	March 27, 2018
Field Trip to Carriacou	Week of April 9, 2018
Draft Report	April 23, 2018
Presentation of Draft Report	April 25, 2018
Final Report	One (1) week after comments are received on Draft Report – estimated May 11, 2018

- The Reports must be presented in electronic form to the Manager- Planning and Development Department of NAWASA, who will be responsible for the distribution and review by NAWASA, MCPMA and CCCCC among other stakeholders.
- The consultant will incorporate comments, feedback and inputs from the stakeholders into the Final Report.

## **7. DURATION OF THE CONSULTANCY**

It is expected that the implementation of this activity will be completed over the period commencing on or about March 26, 2018 and ending May 15, 2018.