### **DRAFT TERMS OF REFERENCE**

## <u>TECHNICAL ASSISTANT – SENSOR AND WIRELESS NETWORK SYSTEM</u> <u>DESIGN AND DEVELOPMENT</u>

### 1. <u>BACKGROUND</u>

1.01 Under the supervision of the component lead – Disaster Risk Mitigation and Management, the Technical Assistant will play a key role in designing and testing the sensor and wireless communications systems (hardware and software) as well as their subsequent installation in the field. He/she will provide support with the assessment and selection of remote sites, the installation of equipment at the selected site(s), and the collection and analysis of field data during the testing and post-installation phases. The Technical Assistant should possess a good undergraduate degree in a Physics or related Engineering field, and should have demonstrable knowledge and competence in computer programming and the design of electronic systems. This project provides an early-career opportunity for an individual to engage a real-world project that applies technological solutions to water resource management.

# 2. <u>OBJECTIVES</u>

2.01 To assist the component lead with the tasks required under this component, including primary research, the design of electronic and communications systems for field placement, and site determination, and data acquisition and analysis.

2.02 To assist the component lead with the development of a reliable communications link for the acquisition and reliable/secure transmission of sensor data from the field, review of techniques, data storage, analysis, reporting, and subsequent dissemination.

2.03 To provide an opportunity for an early-career graduate in the field to develop and apply skills learnt as well as engaging in a real-world project that aims to improve water resource management capabilities at the UWI, nationally, and regionally.

# 3. <u>SCOPE OF WORK</u>

- 3.01 The duties of the technical assistant will fall under five (5) main areas as follows:
  - (a) Design of Wireless Communications System
    - (i) Develop detailed work plan.
    - (ii) Assess conditions and related parameters at remote sites using a mapping tool(s) and through field assessment.
    - (iii) Perform wireless link design using established methods and software tools (where appropriate), including recommending the locations of remote and relay site(s).
    - (iv) Assess current wireless equipment and make recommendations for suitable hardware based on field parameters and design results.
    - (v) Assist with procurement of equipment.
    - (vi) Perform testing of wireless equipment in both lab and field environments.
    - (vii) Install and test wireless equipment at all sites remote, relay and local (UWI) receiver site.
    - (viii) Perform verification of the secure and reliable transmission and reception of sensor data from remote site(s) to relay and local (UWI) sites.
    - (ix) Produce thorough and accurate documentation for all stages.

- (b) Design of Sensor System
  - (i) Develop detailed work plan.
  - (ii) Research and assess current sensor equipment and make recommendations for suitable hardware based on parameters to be measured and field conditions.
  - (iii) Perform site visit(s) to ascertain optimum site(s) for sensor placement.
  - (iv) Design and configure sensor network(s) using established techniques and software tools (where required) considering parameters of selected sensor(s).
  - (v) Assist with procurement of sensors.
  - (vi) Perform testing of stand-alone sensors in both lab and field environments.
- (c) Integration of Sensor and Wireless Communications Systems
  - (i) Perform testing to integrate sensor and communication equipment in lab environment and analyse results.
  - (ii) Use test data to make adjustments to ensure optimum performance of integrated system.
  - (iii) Install integrated sensor and communications system and relevant equipment at remote site(s).
  - (iv) Test performance of integrated sensor and communications system on site using established techniques.
  - (v) Produce thorough and accurate documentation for all stages.
- (d) Configuration of Server, Data Acquisition, and Data Analysis
  - (i) Assist with the assessment of network and server hardware and software.
  - (ii) Develop interactive user interface (UI) on the server to enable the visualization of data acquired remotely from designed sensor communications system.
  - (iii) Configure the server to acquire and securely store sensor data received from remote and relay sites in a format(s) that simplify the process of analysis.
  - (iv) Verify the ability to reliably receive accurate data from remote site to local site (UWI) through any relay site(s).
  - (v) Perform data analysis using data received and assess the need for design improvements.
  - (vi) Perform any improvements required based on data analysis.
- (e) General
  - (i) Support the organization of meetings and stakeholder engagement.
  - (ii) Support the planning of site visits.
  - (iii) Liaising with field workers and other individual(s) related to the project.
  - (iv) Develop presentations and related materials.
  - (v) Co-authoring research reports and journal paper.
  - (vi) Assist with dissemination of data for various purposes, e.g., workshops.

# 4. **QUALIFICATIONS AND EXPERIENCE**

4.01 The Technical Assistant should have:

#### Required:

- (a) An undergraduate degree in electronics and computer science or engineering.
- (b) Experience in the design, building and testing of electronic systems.
- (c) Excellent writing and analytical skills.
- (d) Familiarity with the use of wireless equipment, e.g. spectrum analysers and antennas.
- (e) Experience with the development of web-based server systems.
- (f) Willingness to travel to remote sites at least twice per month.

#### Desirable:

- (a) Quantitative research experience.
- (b) Experience with data acquisition using sensors.
- (c) Familiarity with a variety of software simulation tools.

#### 5. <u>DELIVERABLES</u>

- 5.01 The Technical Assistant will prepare monthly reports that will include:
  - (a) Main activities undertaken and a detailed summary of results achieved.
  - (b) Key challenges encountered.
  - (c) Solutions that have been proposed, tested and implemented to overcome challenges.
  - (d) Recommendations.
  - (e) Opportunities.

### 6. **DURATION**

6.01 The Technical Assistant will be hired for 16 consecutive months and will be paid on a monthly basis.