REQUEST FOR INFORMATION

RFI NUMBER:	JW RFI 01/07/2026	**CLOSING DATE:**	09 July 2026 @ 13:00 pm
DESCRIPTION:	**DESIGN, UPGRADE, BUILD, REPAIR AND MAINTAIN THE JW TELEMETRY SYSTEM**		
ISSUE DATE	01 July 2026		
Submit via Email to:	maria.chirrindze@jwater.co.za OR Submit on the Etender portal using the link below https://www.etenders.gov.za/Home/opportunities?id=1		

ENQUIRIES MAY BE DIRECTED TO:			
Bidding procedure enquiries must be sent to		**Technical enquiries must be directed to**	
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SUPPLIER INFORMATION				
NAME OF BIDDER				
STREET ADDRESS				
TELEPHONE NUMBER	**CODE**		**NUMBER**	
CELLPHONE NUMBER				
E-MAIL ADDRESS				
VAT REGISTRATION NUMBER				
CENTRAL SUPPLIER DATABASE No:				
MANUFACUTER OR THIRD PARTY(If Applicable)				

1. PURPOSE OF THE REQUEST FOR INFORMATION

To assist the organisation with business decision making purposes for an upcoming 36-month Request for Tender with regards to budget, cost effectiveness, risk assessment, specific goals to include in the tender, award and allocation strategy to incorporate, non-firm prices, pricing schedule and special conditions of tender.

2. BACKGROUND

Johannesburg Water (JW) invites service providers (contractors) to respond to a Request for Information (RFI) for the Design, Upgrade, Build, Repair and Maintain of the Telemetry System.

JW is undertaking a strategic initiative to support the City of Johannesburg's Smart City Framework through the maintenance, optimisation and selective expansion of its existing telemetry system. This initiative forms a critical component of the City's vision to become a smart, connected, efficient, and service-driven metropolitan authority.

The existing telemetry system plays a vital role in the monitoring and control of Johannesburg Water's water and sanitation infrastructure. To enhance operational efficiency, reliability, and long-term sustainability, JW intends to modernise and standardise its telemetry communications environment by optimising the current infrastructure and migrating legacy and disparate communication protocols to a unified, open-source platform.

As part of this standardisation, the proposed telemetry solution shall utilise the open-source DNP3 communication protocol as the telemetry communication standard. The use of DNP3 is a mandatory requirement and is intended to ensure vendor neutrality, interoperability and avoidance of proprietary communication dependencies, while supporting seamless integration with existing and future systems within the City's Smart City ecosystem.

3. SCOPE OF WORK

The scope of work includes, but is not limited to:

- Repair and Maintenance: Preserve the existing Maestro Telemetry System to maintain Smart City functionality.
- Protocol Migration: Transition telemetry RTU-CPU equipment to the DNP3 open protocol platform within the shortest possible timeframe.
- System Redesign: Where necessary, redesign telemetry stations and enclosures to accommodate upgraded equipment.

- Asset Reuse: Prioritise the utilisation of existing telemetry components and associated components to minimise migration costs and prevent unnecessary material waste.
- Radio Network Upgrade: Maintain the current radio network while progressively migrating to the GE-Orbit platform to establish a fully managed radio network.
- SCADA Integration: Integrate and migrate all DNP3 compliant stations into the current JW SCADA system at the two designated Control Rooms.
- Ongoing Maintenance: Provide comprehensive maintenance for all migrated stations as specified in this document.
- Supply the required spare parts as needed to ensure that specified response times are achieved and lead times are minimized for telemetry equipment and associated components.

The Telemetry System currently operates on an extensive Maestro RTU solution utilising licensed UHF radio-based systems (MDS-SD4 and MDS Orbit). Due to the mission-critical nature of this system, reliance on third-party networks or unlicensed frequencies is restricted. The city currently utilises three licensed radio frequencies deployed across three distinct geographic areas.

Control Room Architecture and Network Design

Johannesburg Water shall operate two fully functional Control Rooms strategically located across the city. These two Control Room SCADA is to be interconnected via a dedicated Johannesburg Water virtual local area network to ensure seamless data exchange and system redundancy. The contractor shall design the radio communication network to enable all remote (field) telemetry stations to report data to both Control Rooms simultaneously.

The Control Room systems shall be configured in hot standby clustering to guarantee high availability. Each Control Room shall include three (3) primary digital radios (one per frequency) operating as masters, complemented by three (3) standby radios (one per frequency) in full readiness. In the event of a master radio failure, the standby unit shall automatically assume communication responsibilities without service interruption.

Telemetry Network Scope

Johannesburg Water operates an extensive Maestro 2000 and Maestro 2500 RTU solution distributed across its water bulk distribution network. The estimated number of telemetry equipped sites is as follows:

- Master / Slave Control Rooms : 2
- Environmental Monitoring Control Stations : 2
- Potable Water Sites : 90

- Digipeater / Repeater Sites : 6
- Sanitation Pump Station (SPS) Sites : 37
- Booster Pump Station Sites : 23

Tender Scope and Deliverables

The tender will encompass the execution of work, supply of equipment and spares and provision of specialised technical services to achieve the following objectives:

- Comprehensive System Maintenance: Perform extensive repairs, maintenance, replacement of end-of-life components, version upgrades and installation of new telemetry outstations, including all associated services and functions, to ensure a fully operational system during and after the contract period. This service shall be provided over 36-months term.
- Protocol Migration: Transition all existing telemetry stations to the DNP3 protocol standard within the contract period.
- 24/7 Operational Support: Ensure continuous operation of the Telemetry System and Control Rooms, adhering to prescribed response times, with availability 365 days a year.
- Skills Development: Deliver training for existing and newly appointed Johannesburg Water personnel in configuration, programming, maintenance and repair of Telemetry Systems, data networks and management platforms.

4. SYSTEM IMPLEMENTATION AND ROLLOUT

The implementation of the Telemetry System shall be executed in distinct phases to ensure seamless migration, integration and expansion. The following parts define the scope of work:

Part A: Migration of Existing Telemetry Stations to DNP3

All existing telemetry stations shall be migrated to the DNP3 protocol standard. This migration includes the deployment of DNP3 telemetry equipment and upgrading the radio communication network where necessary, while maintaining full functionality of the existing Maestro telemetry and radio systems throughout the process.

The migration shall adhere to predefined I/O count ranges categorised as Small, Medium, Large and X-Large RTU outstations, as detailed later in this document. Maintenance of both existing and migrated telemetry sites shall be strictly implemented in accordance with the specifications provided.

The migration process must ensure that repeater stations, master stations and the SCADA system can seamlessly handle both the new DNP3 protocol and existing telemetry

protocols concurrently. This guarantees that the introduction of DNP3 stations does not negatively impact legacy systems during the transition period.

Part B: Deployment of New DNP3 Telemetry Stations
This phase addresses the expansion of the telemetry network through the design, manufacturing, installation and commissioning of new stations, including replacements for vandalised or stolen or beyond economical repair units. The scope includes full RTU outstations, repeater stations and complete base station replacements.

Each new installation shall incorporate the following components:

- enclosures (cabinets)
- surge protection
- knife-disconnect terminal blocks
- minimum 48-hour battery backup
- access control with security alarming
- instrumentation

The design must align with existing telemetry construction standards and functionality. Pricing for new installations shall be based on the number of I/O signals per outstation site.

SCADA Integration
During migration, the contractor shall ensure that the SCADA system supports both DNP3 protocol drivers and existing telemetry protocols. These protocols must operate seamlessly through the existing and new radio (communication) network.

The scope includes:

- SCADA programming and configuration for migration from legacy protocols to DNP3
- Reconfiguration of all SCADA scan points for migrated station I/O
- Ensuring full HMI functionality
- Correct implementation of trending, alarming, historical data storage, database management and reporting

The complete SCADA system shall be tested and re-commissioned during and after migration to confirm operational integrity.

Training Requirements

Comprehensive training shall be mandatory to ensure that Johannesburg Water personnel are fully capacitated to independently operate, manage, maintain and troubleshoot the Telemetry System. The contractor shall be responsible for providing a complete training programme as part of the contract scope. The training programme shall include, but shall not be limited to, the following:

- Introductory & Intermediate Telemetry Communication (OPC and DNP3) – Theoretical and practical exercises
- Advanced Telemetry Communication (OPC and DNP3) – Full self-sufficiency level
- Introductory & Intermediate RTU Configuration and Programming Tools
- Advanced RTU Configuration and Programming Tools – Including peer-to-peer communication, advanced alarming, fundamental PLC control programming
- Data Communications Network Training – Digital radios, repeaters, GSM modems, routers (introductory and advanced)
- Advanced Network Infrastructure Training – Routing, switching, redundancy, RF theory, antennas, cybersecurity
- RTU, IO Modules & Surge Protection – Introductory, intermediate and advanced levels
- Telemetry and Digital Radio Software Tools Training – Programming, configuration, and remote fault-finding

Training shall be mandatory and shall combine both theoretical and practical components to ensure that Johannesburg Water achieves full operational capability and self-sufficiency in the installation, configuration, programming, repair and maintenance of the DNP3 based Telemetry System. The intent of this requirement is to ensure that Johannesburg Water personnel are fully capacitated to perform these functions independently, such that engagement with external contractors, service providers or system integrators occurs by strategic choice and not due to operational dependency or necessity.

The contractor shall provide a minimum training duration of not less than one hundred and sixty (160) hours per technician or engineer. The training programme shall involve the Original Equipment Manufacturer (OEM) / Agent of the telemetry and digital communication systems to ensure that recognised industry standards and best practices are applied.

Bidders shall clearly specify the training cost per person for Year 1, Year 2, and Year 3, and such pricing shall comprehensively address all training requirements outlined in this specification.

5. TELEMETRY GENERAL SPECIFICATION

Materials and Workmanship

All materials and components supplied under this contract shall conform to SABS, ISO, or original equipment manufacturer (OEM) specifications. Equipment must be new, of the highest quality and suitable for the intended purpose. Workmanship shall meet industry best practices to ensure reliability and longevity.

Design and Standardisation

All equipment shall be designed and installed to ensure maximum continuity of service and ease of inspection, testing, maintenance, repair and cleaning. Components must consist of readily available standard items, preferably sourced from local stock, to minimize downtime and ensure efficient support.

Occupational Health and Safety

The contractor shall provide a coordinated and formally documented Occupational Health and Safety Plan for the contract. Compliance with the Occupational Health and Safety Act is mandatory, including the provision of plans, files, representatives, and training where necessary. All documentation must be submitted to Johannesburg Water within six weeks of contract award. Full responsibility for legal compliance rests with the contractor, and all associated costs must be included in the tender pricing.

Environmental Conditions

The Highveld region experiences frequent lightning storms during summer, extreme temperature variations (below freezing to above 40°C) and high humidity levels that may cause condensation. All equipment shall be adequately enclosed, sealed and protected to operate reliably under these conditions.

Documentation and Tools

The contractor shall provide comprehensive documentation, including:

- Overall system description
- Block diagrams of equipment arrangement
- Outline dimensions and fixing details
- Cable-block requirements with sizing and layouts
- Full technical specifications for each component / module, including schematic drawings
- Printed publications illustrating equipment details
- Operating instructions enabling system reprogramming
- Revised As-Built drawings for each station

All tools and test instruments listed in the Pricing Schedule for Johannesburg Water personnel shall be supplied as part of the contract and shall be of high quality, fit for purpose, and suitable for long-term use. Where applicable, such test instruments shall be calibrated in accordance with relevant standards and manufacturer recommendations.

Layout of Installation

Johannesburg Water requires a modular RTU system design to facilitate easy removal, replacement and repair of individual units without dismantling entire assemblies.

Key requirements include:

- Modular CPU, IO, Radio, Power, Surge Protection and Sub-components
- Expandable IO, Surge Protection and Communication modules
- All wiring contained within conduit, trunking or metal enclosures
- Minimum 120 mm clearance between parallel rows of terminal blocks
- Use of junction boxes / marshalling panels for grouping tail cables where multiple equipment pieces share similar signal or supply conditions
- Bottom-entry cable routing for outdoor junction boxes
- Compliance with cable segregation standards (e.g. 230V AC vs analogue signals)
- Signal cables buried at 400 mm, LV cables buried at 600 mm and HV cables at 1000 mm below ground level, bedded in sifted soil or river sand

Installation of Equipment

Equipment shall be mounted for maximum accessibility and visibility. All cutting, drilling and welding shall be neat and professional. Completed installations, including supports and wiring, must present a clean, compact appearance. All fixing hardware shall be free of burrs or sharp edges.

Key Personnel

Hourly rates for key personnel must be included in the Pricing Schedule for normal and after-hours work. Minimum qualifications include:

- **Telemetry Technicians:** Minimum National N diploma (N6) in electrical / electronic engineering, advanced OEM training on proposed telemetry products.
- **Radio Specialist:** Minimum National N diploma (N6) with OEM training on radio equipment.
- **Telemetry Engineer:** Minimum National diploma in electrical / electronic engineering, ECSA registration (Professional Technologist or Professional Engineer), 10+ years' experience with advanced large Telemetry Systems i.e. built

and or maintained system(s) of 50 stations or more and Advanced OEM training on proposed telemetry products.

- **SCADA System Integrator:** Completed Adroit Advanced Smart UI training, 10+ years' experience integrating telemetry with Adroit SCADA.

6. TELEMETRY EQUIPMENT CONFIGURATION

Johannesburg Water's Telemetry System is built on a modular architecture to ensure reliability, ease of maintenance and scalability. The system consists of the following functional building blocks:

- Telemetry Enclosure housing the RTU, Data Radio, surge protection and associated equipment
- Instrumentation Junction Box (Marshalling Box) for termination of instrumentation and other cabling signals
- Dedicated Battery Enclosure for telemetry power backup

Master Station (Telemetry-SCADA) Equipment Room

Johannesburg Water operates two SCADA Control Rooms running simultaneously.

Each SCADA Master Station comprises the following functional components:

- Data Radio Interfaces
- UPS System
- SCADA Servers and Software
- SCADA Workstations
- Environmental Monitoring System
- Access Control and Alarm System

Data Radio Interfaces

Johannesburg Water utilises three (3) licensed UHF frequencies, each covering a specific geographic area. Each Master Station is equipped with six radios and six antenna systems:

- 3x Primary Radios (one per frequency)
- 3x Standby Radios (one per frequency)

Each radio shall have its own power supply and standby battery. Interfaces between radios and the communication server shall be via RS232 serial ports.

Current Status: Existing radios (MDS 4710) are obsolete and must be replaced with GE-MDS Orbit MCR radios, meeting the following minimum specifications at the Master Station:

- 1 x Ethernet Port
- 2 x RS232 Ports
- 1 x USB Port
- UHF Radio Unit
- 4G Cellular Modem

Power supplies shall be upgraded to the latest Maestro units and batteries replaced with 18Ahr $LiFePO_4$ units.

Figure 1 - typical Master Station Enclosure

Control Room UPS

Each control room must be equipped with a 19" rack mounted 10 kVA UPS and rack mounted batteries providing 4-hour standby at 80% load using $LiFePO_4$ battery technology.

SCADA Software

Johannesburg Water currently uses Adroit Technologies SCADA suite. Supply and support of the Adroit platform are excluded from this tender; however, SCADA configuration and programming during migration and for new stations is included.

Environmental Monitoring and Access Control

Both control rooms include a dedicated telemetry station for environmental monitoring and access control, reporting to both SCADA systems. Monitored parameters include:

- Temperature
- Humidity
- Flood detection (where there is raised flooring)
- Smoke detection
- Access Control

Access control is managed via magnetic door locks, keypads and tag readers integrated with both master telemetry stations.

Telemetry Outstation Enclosure Configurations
A typical telemetry outstation consists of three enclosures:

- Telemetry Enclosure
- Marshalling Cabinet
- Battery Cabinet

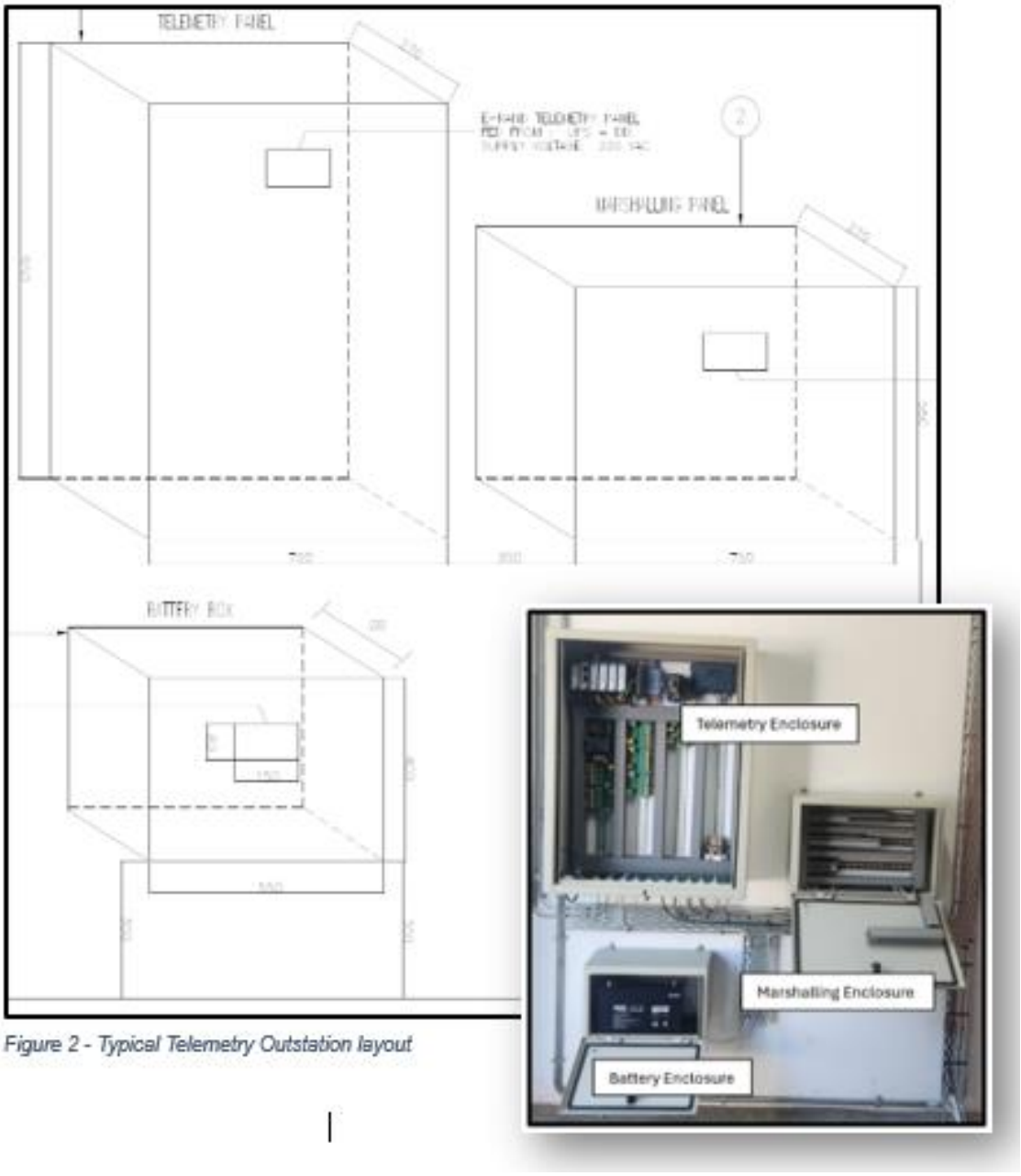

Figure 2 - Typical Telemetry Outstation layout

Telemetry Enclosure

The enclosure shall house:

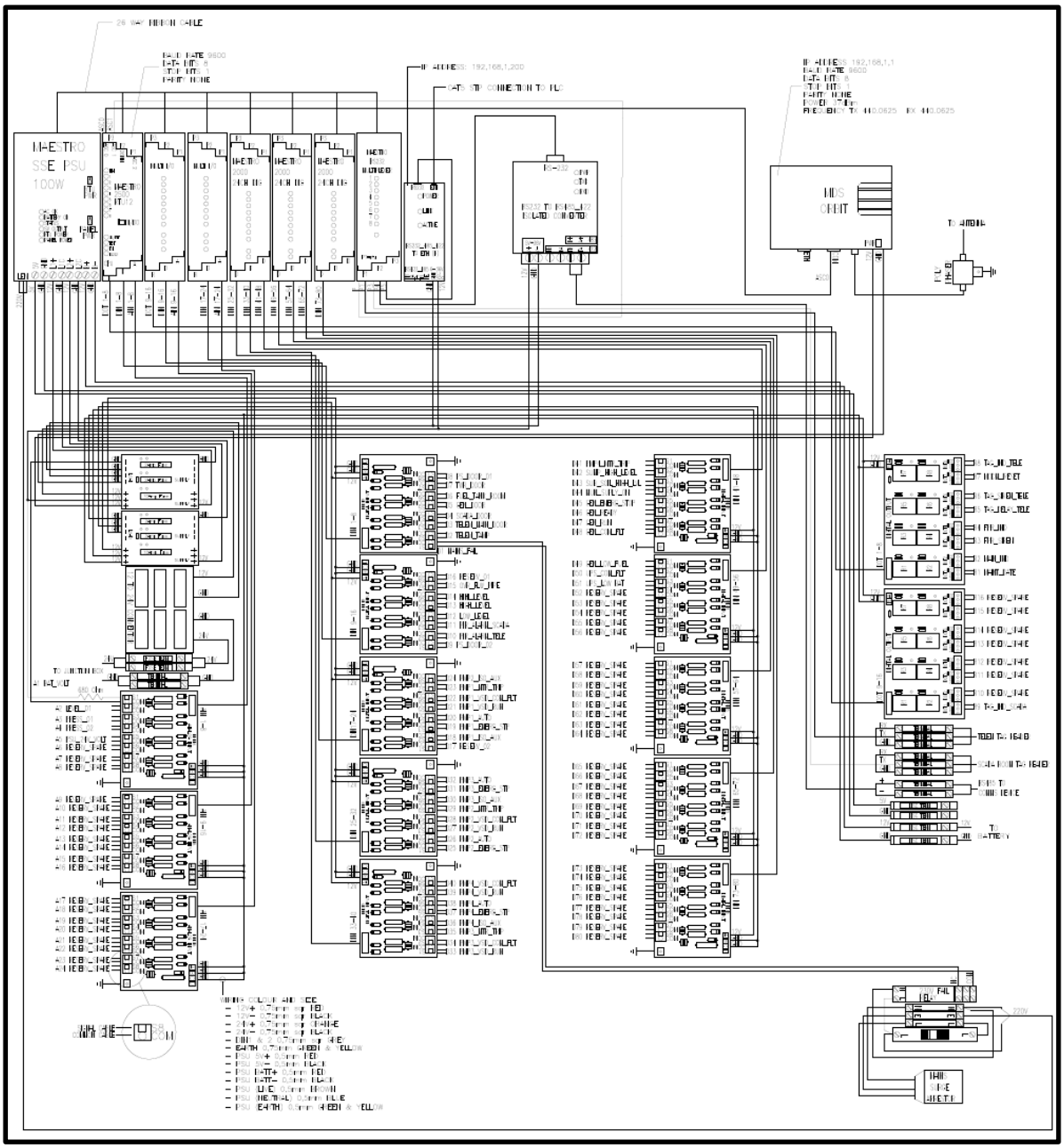

Figure 2 - Typical Wiring Layout for Telemetry (RTU) Outstation

- RTU with communication ports and I/O expansion units (Maestro RTU or equivalent)

- Surge protection for all signal inputs
- Power supply / Charger unit
- Radio unit
- 230V AC surge protection
- RF surge protection
- 48 Ahr $LiFePO_4$ battery (if no separate battery box is installed)
- Isolators and terminals

Design Requirement: Wiring layout must ensure unprotected wires never cross or share trunking with protected signal wires.

Marshalling Enclosure
The terminal enclosure serves as the termination point for all field signal cables.

Requirements:

- Knife-edge terminals for all terminations
- Multicore cable connection from terminal box to telemetry panel
- 20% spare terminals for future expansion
- Detailed drawings to be submitted with the tender

Telemetry Battery Enclosure
Specifications:

- Lockable steel enclosure (minimum 2 mm thickness) with hidden hinges
- Suitably sized galvanized hasp and staple with 40mm configurable 4-digit combination padlock
- Battery capacity: 48 to 100 Ahr $LiFePO_4$, based on station size or requirements

Note: Only passive alarm sensors and water level sensors / instruments to be powered by telemetry power supply and standby battery and no other instruments such as water flow meters.

Typical Compact Telemetry Enclosure (all-in-one)
Sanitation telemetry stations typically require a compact configuration due to space constraints and reduced I/O requirements. The enclosure shall include:

- Small RTU Station configuration (Maestro or equivalent) with communication ports
- Surge Protection for all signal inputs
- Compact Power Supply / Charger
- Radio Unit (GE Orbit or equivalent)

- RF Surge Protection
- Integrated Battery Backup (minimum 24 Ahr $LiFePO_4$)
- Minimal I/O Modules to accommodate standard sanitation signals
- Lockable Vandal Resistant Steel Enclosure with corrosion-resistant finish (detailed technical specification available on request)
- Cable Management ensuring separation of protected and unprotected wires

This configuration is optimised for sanitation pump stations and booster pump stations, where typical IO counts are lower and physical space is limited.

Figure 3 - Typical Compact Telemetry Enclosure as used on Sanitation Pump Station sites

JW Telemetry Station Configuration

To standardize I/O counts across stations, the following combination configurations shall apply:

- Small Outstation: 8 AI, 8 DI, 8 DO
- Medium Outstation: 16 AI, 16 DI, 8 DO
- Large Outstation: 32 AI, 32 DI, 8 DO
- X-Large Outstation: 32 AI, 64 DI, 16 DO

Tenderers shall provide pricing for each configuration, with separate pricing for migration and new installations.

7. TECHNICAL SPECIFICATIONS & SOLUTION REQUIREMENTS

Integration into Existing System

The existing telemetry infrastructure remains operational and must be maintained throughout the migration process. The contractor shall assume full responsibility for extensive maintenance of all existing telemetry stations until migration to DNP3 supported RTUs is complete.

The solution shall maximize reuse of existing infrastructure (Maestro or equivalent) wherever feasible.
The contractor shall guarantee that integration will be free of future compatibility issues.

If the tenderer proposes complete replacement of existing stations with new DNP3 compliant equipment, the new solution must fit within existing enclosures or new enclosures must be supplied. The supply of new enclosures as well as the removal and delivery of old equipment and/or enclosures to Johannesburg Water stores shall be all inclusive in the price tendered.

Remote Terminal Unit (RTU) and Associated Components

The RTU shall be an intelligent, modular unit capable of:

- Data acquisition
- Local data processing
- Control program execution
- Stand-alone operation and networked functionality

The RTU shall be microprocessor-based, supporting software reconfiguration and optimisation both locally and remotely via communication channels. It must comply with the latest RTU technology and support multiple protocols as required per site, with licensing flexibility.

Each outstation shall be individually addressable, with parameter settings downloadable from the master station. The communication strategy shall be event **and** polling based.

RTU Protocols

The RTU shall support, at minimum, the following protocols:

- DNP3
- MODBUS Client-Server and Master-Slave

The tenderer must confirm capability to handle all these protocols, with DNP3 as the primary requirement.

OEM Programming and Configuration Software Tools
A comprehensive OEM software package shall be provided for RTU programming, configuration, diagnostics and development. The software must:

- Support upload/download of configurations and programs
- Operate from SCADA control rooms, field laptops and across the radio network
- Be installed on at least eight (8) devices (SCADA servers and field laptops)

The RTU system shall be fully modular, allowing independent testing and replacement of CPU, IO expansion modules radios, and power supplies. Integrated designs combining all components into a single unit are not acceptable.

The RTU must support applications ranging from basic data logging to advanced logic control, redundancy, and multi-protocol communication. The platform must allow incremental upgrades without hardware replacement.

RTU Communication Mediums
Minimum communication ports required:

- Ethernet (when required)
- 3 x RS232 or RS485 ports
- USB port

Ports must be expandable to at least eight (8) additional RS232/485 ports. The tenderer shall describe how this expansion will be achieved.

RTU Manager and Programming Tool
An RTU Management System shall be deployed at Johannesburg Water master stations to manage the RTU infrastructure. Minimum capabilities include:

- Database storage of site configurations, status, backups, firmware, and security settings
- Read/Write site configurations and logic
- Backup/Restore functionality
- Template creation and editing
- RTU status monitoring
- Hardware overview and network grouping
- Background polling

Digital Inputs
The RTU shall provide digital input functionality meeting the following specifications:

- Bipolar optically isolated digital inputs
- Input voltage range: 10–30 V DC
- Isolation: 2 kV
- Flow pulse counting capability
- User-definable debounce filter

Digital Outputs
The RTU shall provide digital output functionality meeting the following specifications:

- 10 A relay output module
- Isolation: 5 kV
- All digital outputs shall be routed through interposing relays; direct high-voltage switching via RTU internal relays is not permitted

Analogue Inputs
Analogue input channels shall comply with the following:

- Individually configurable channels
- Minimum resolution: 12-bit
- Update time: <50ms
- Accuracy: 0.1%
- Configurable parameters: Range, Delta change, Filter, Scale Min, Scale Max

Analogue Outputs
Analogue output channels shall comply with the following:

- Individually configurable for voltage or milliampere outputs
- Minimum resolution: 12-bit
- Update time: <50ms
- Accuracy: 0.1%
- Configurable parameters: Range, Delta change, Filter, Scale Min, Scale Max

Surge Protection
All incoming I/O signals shall be protected by surge protection devices, including:

- Signals from inside/outside station buildings
- MCC panel signals (with or without interposing relays)
- RF surge protection for antenna feeder cables
- Surge protection for 220 V AC incoming power

Recommended devices: Blitzductor range (or equivalent) proven surge protection units.

Change of Events (Event-Based Communication)
The RTU shall support event-driven communication rather than round-robin polling.

Requirements:

- Ability to report Change of State (COS) for user-configurable I/O
- Remote timestamping of events within 10ms accuracy
- Configurable dead times for digital inputs
- Configurable sampling parameters for analogue inputs

Remote Time Stamping
RTUs shall include a real-time clock and time-stamp all events at the source with ≤5 ms accuracy before reporting to SCADA.

Tag Readers
Tag readers shall:

- Identify authorised personnel at site entry
- Report identification to SCADA control rooms
- Enable/disable station alarms and security systems
- Integrate seamlessly with RTU system
- Retain existing tag readers if compatible; otherwise, provide pricing for new system
- Support both proprietary and Modbus-RTU protocols

Station Alarm System
Each telemetry station shall include:

- Passive infrared sensors
- High-decibel audio siren (sound bomb)
- Integration with RTU for alarm logic
- User-definable entry time for tag identification
- Automatic alarm reactivation after inactivity

Enclosure Locks
All new and existing telemetry and battery enclosures shall be equipped with:

- Stainless Steel Hasp suitable for use with Discus padlock (60mm-80mm). The Hasp must be double hinged, suitable for overlaid doors i.e. where door and frame

are not flush or corner solutions required. ABUS Diskus® 140/190 or equivalent to be supplied.
- 70mm Stainless Steel Discus padlocks with 4-digit combination lock required. ABUS Diskus® Combo 29/70 or equivalent to be supplied.
- Note: Suitably sized stainless steel pot rivets and stainless-steel washers to be used when installing Hasps on existing and or new steel enclosures.

8. TELEMETRY COMMUNICATION

General Overview

Johannesburg Water currently operates a reliable GE-MDS digital radio platform, comprising GE-MDS-SD4 UHF radios and the newer GE-MDS-Orbit UHF radios. The existing GE-MDS radios shall remain in service and be fully utilised during migration. Over time, all telemetry stations will be upgraded to the GE-MDS-Orbit platform, or equivalent, which offers backward compatibility with SD4 radios and advanced capabilities, including:

- Licensed and unlicensed spectrum support
- Cellular (4G/LTE) and Wi-Fi connectivity
- Dual-radio options
- Advanced cybersecurity features

No inferior or untested communication equipment shall be permitted on Johannesburg Water's network. Approved communication technologies include:

- Licensed UHF radio network (ICASA registered)
- GSM-4G cellular network (ICASA approved)
- Wi-Fi radio networks
- Fibre network
- Microwave backbone *(not in scope for this tender)*

Remote station communication shall support multiple medium combinations:

- Fibre as primary, UHF radio as secondary where available and GSM-4G as failover
- UHF radio as primary where fibre is unavailable and GSM-4G as failover
- GSM-4G as primary where fibre or UHF radio is not available or not required

Network Planning Audit

The contractor shall perform a network planning audit and submit a detailed report covering:

- RF profile mapping for optimal UHF routes
- Evaluation of primary and backup communication mediums per site

- Comprehensive network planning report

The network planning audit must include all remote stations, repeater stations as well as master stations to ensure the most optimal communication strategy is implemented and thereafter maintained.

ICASA Compliance
All radio equipment shall be fully ICASA certified. The contractor shall provide type approval certificates upon request.

Communication Functional Requirements
Communication devices at remote stations shall support multiple mediums and interface options in a robust, compact design suitable for indoor and outdoor environments. Two device types are required:

Type 1 – Full Router for Repeater and Major Sites
- UHF radio: 66 kbps in 12.5 kHz bandwidth, adaptive modulation, CSMA
- GSM-4G/LTE module (ICASA-approved)
- Minimum 2 x Ethernet ports (one for fibre interface)
- Minimum 2 x RS232/485 port
- Minimum 1 x USB port
- Layer-2 switching (Spanning Tree, VLANs, IGMP) and Layer-3 static routing
- Advanced cybersecurity
- Forward error correction
- ETSI and ICASA compliance
- Primary/secondary path routing
- RF store-and-forward capability
- MTBF >10 years
- Minimum 5-year warranty on device

Type 2 – Scaled Device for Smaller Sites
- UHF radio: 66 kbps in 12.5 kHz bandwidth
- Minimum 1 x Ethernet port
- Minimum 1 x RS232 port
- Minimum 1 x USB port
- Advanced cybersecurity
- Forward error correction
- ETSI and ICASA compliance
- RF store-and-forward capability
- MTBF >10 years
- Minimum 5-year warranty on device

UHF Radio Equipment

The communication grid shall incorporate a comprehensive security framework addressing device, user and network security. Only Independent Communications Authority of South Africa (ICASA) approved radio equipment shall be offered, and type approval certificates must be provided upon request.

Cybersecurity (Communication Network)

Cybersecurity is critical to maintaining a secure and reliable Smart City communications network for Johannesburg Water. All communication devices shall comply with the following minimum cybersecurity requirements:

Access Control

- Mandatory username/password login
- Configurable minimum and maximum password length
- Enforcement of secure password construction rules
- Support for user-defined password complexity policies
- Automatic lockout after multiple failed login attempts
- No factory or engineering backdoors permitted
- Role-Based Access Control (RBAC) support
- RADIUS role integration
- Ability to disable any logical or physical port

Authentication

- Centralised RADIUS user authentication
- EAP-TLS authentication for wireless links
- 802.1x port blocking on Ethernet interfaces

Data Plane Security

- 256-bit AES CCM encryption for wireless data
- Standards-based IPsec VPN encryption and tunneling
- Stateful Layer 3–4 firewall with port-based filtering
- Layer 2 MAC filtering

Outstation UHF Antennas

All antennas and associated hardware shall meet the following specifications:

Antenna Types

- Master stations and outstations: Webb HD400 heavy-duty dipoles (omni-directional unity gain) or equivalent approved by JW.
- High-gain or directional applications: 3-element or 7-element Yagi antennas (Webb Y425/3 or Webb Y425/7 or equivalent) as approved by the JW Engineer.
- High-gain antenna requirements will be indicated in the Price Schedule.

Antenna Masts

- Outdoor masts made from galvanised steel and mounted with offset brackets and hardware.
- All masts shall be properly earthed as per master station specifications.
- Where feasible, antennas shall be mounted indoors using offset brackets.

RF Cabling

- RF cabling shall be RG214 or equivalent, neatly routed inside masts and secured with cable ties.
- All cabling shall comply with general wiring specifications for installation of RF cables as used in telemetry systems.

Mounting Materials

- Mounting arms, clamps, and supports shall be typical heavy-duty galvanized steel.
- Installation costs for mounting materials shall be included as sundries in the Price Schedule.
- Installation shall be performed by a qualified specialist; subcontracting is permitted if the tenderer lacks in-house expertise.

9. INSTRUMENTATION / EQUIPMENT SPECIFICATION

Instrumentation Overview

Johannesburg Water utilises a wide range of instrumentation and primary devices integrated with Telemetry Systems. The following list provides typical examples (not exhaustive) of devices that may be coupled at outstations:

- Differential Level (Hydrostatic) Pressure Sensors
- Pressure Transducers
- Conductivity Probes
- Ultrasonic Level Sensors
- Radar Level Sensors
- Level / Pressure Switches
- Ultrasonic (Dry) Clamp-on Flow Meters (Modbus RTU protocol)

Installation Requirements

Exact installation positions for instrumentation and connection types shall vary by site and will be determined during site assessments. The contractor shall collaborate with Johannesburg Water's Engineering Specialist Technicians (ESTs) or Engineer to confirm:

- Quantity and type of instruments
- Technical Specifications from Product Datasheets
- Compliance with accuracy, repeatability and reliability standards equal to or better than existing instruments.
- Local availability of instruments / spares with technical support i.e. agents in Gauteng if the OEM of the products are not local.

Warranty

All instruments supplied under this contract shall carry a minimum 12-month warranty. The contractor shall provide a back-to-back warranty equivalent to or better than that of the OEM or authorised agent.

Types of Instruments / Equipment

The technical specifications provided in this document represent the minimum performance
and compliance requirements for the instruments and equipment to be supplied under this contract. Any instruments or equipment that meet or exceed these specifications shall be deemed acceptable for consideration.

The list of instruments and equipment included herein is not exhaustive. Additional instruments or equipment may be supplied under the contract where required, subject to

approval and guidance from the JW Engineer, to ensure suitability, compatibility and compliance with the project requirements.

Hydrostatic Pressure Transducer for H_2O Level

- Output: 4–20 mA (2-wire)
- Range: 0-10m, 0-15m, 0-20m, 0-25m
- Supply Voltage: 10–30 VDC
- Pressure Port: compatible with the field level sensor weight thread or stainless-steel compact adaptor needs to be supplied which will not excessively offset the sensor from the tank or reservoir floor.
- Sensitivity: 0.25% FS
- Long-term Drift: 0.1% FS per year non-cumulative
- Overload: 2x FS
- Burst Pressure: 3x FS
- Response Time: <15ms
- Temperature Compensation: -10 to + 80°C
- Operating Temperature submerged: -10 to 40°C submerged
- Electrical Connection: Fixed cable with vented tube, IP68 - submersible integral cable and sensor.
- Sensor Material: 316/316L Stainless Steel
- Fatigue life: Designed for > 100 million FS cycles

Pressure Transducer

- Output: 4–20 mA (2-wire) or 0-10 V (as specified by the JW Engineer)
- Pressure Ranges: 0-16 Bar, 0-25 Bar, 0-40 Bar
- Supply Voltage: 10-30 VDC
- Pressure Port: (as specified by the JW Engineer)
- Electrical Connection: (as specified by the JW Engineer)
- Sensitivity: 0.25% FS
- Zero Tolerance: 0.5% of span
- Span Tolerance: 0.5% of span
- Long-term Drift: 0.2% FS per year non-cumulative
- Proof Pressure: 2× FS
- Burst Pressure: 10× FS
- Temperature Compensation: -10 to +80°C
- Operating Temperature: -10 to +80°C
- Enclosure: IP67
- Vibration: 40G peal-to-peak sinusoidal as per MIL-STD-810E
- LCD Display: 4.5” (On request by JW Engineer otherwise unit supplied without display)
- Response Time: < 5 ms

- Sensor Material: 304 Stainless Steel
- Fatigue life: Designed for > 100 million FS cycles

Pressure Switch

- Adjustable switching range
- Port: (as specified by JW Engineer)
- Proof Pressure: 2× FS
- Burst Pressure: 10× FS
- Response Time: < 15ms
- Temperature Range: -20°C to +80°C
- Sensor Material: 304/316/316L Stainless Steel

Radar Level Sensor

- Range: 0-10 m, 0-20 m, 0-25m or configurable
- Communication: 4–20 mA and or RS485 Modbus RTU if hard-wired (4G-LTE / LoRa WAN if wireless)
- Frequency: 60–80 GHz, Beam Angle: 6-8°
- Accuracy: +/- 10 mm
- Repeatability: 0.01% FS
- Material: PA6 nylon + fiberglass / Valox / PVDF / suitable non-corrosive material
- Power: 12–30 VDC if Power Supplied. If Battery Powered must operate with locally sourced integrated in housing battery pack to achieve minimum 1½ years operation at 15-minute sampling rate. Battery must be replaceable by client without influencing warranty or calibration of the instrument.
- Operating Temperature: -10 to +50°C
- Enclosure: IP67
- Fitting: 1½ NPT or G 1½
- Configuration Communication Interface and Indication: Bluetooth via smart device / laptop (if range configurable)

Ultrasonic Level Transducer

- Range: 0-10, 0–15 m, 0-20 m, 0-25 m
- Blind Area: ≤ 0.4 m
- Accuracy: +/- 5 mm
- Repeatability: 0.01% FS
- Communication: 4–20 mA and RS485 Modbus RTU
- Material: Polypropylene + fiberglass / Valox / PVDF / non-corrosive material
- Power Supply: 12–30 VDC

Ultrasonic (Dry Transducer) Clamp-On Flow Meters

- Permanent Clamp-on sensors with wall-mounted converter
- Output: 4–20 mA and pulse
- Communication: RS485 Modbus RTU
- Repeatability: ≤ 0.25% FS
- Accuracy: +/- 5% FS
- Power Supply: 12 VDC or 24 VDC

10. OUTSTATION EARTHING & CABLING SPECIFICATION

Outstation Earthing

- All outstations shall be earthed in accordance with the Standard Specification.
- Mast down conductors shall be 25 x 1.6 mm galvanised steel.
- An additional 10mm^2 copper cable shall be installed between Telemetry box and level sensor junction box.

Outstation Cabling

- All IO wiring at the outstation shall be done with screened twisted pair wiring of 0,5mm2 minimum, conductor area. Single core wiring shall not be used. All wiring to be neatly routed in plastic slotted ducting with snap on covers. All wiring shall be marked and numbered to correspond with the information on as-built drawings, to be prepared as part of this Contract.
- The wiring inside panels and junction boxes shall be well planned and neatly arranged in the best possible manner, allowing for forming of cores so that there is no strain on them.
- Unused or spare cables cores shall be strapped together with cable straps should they not be connected to spare terminals.
- The length of spares cores shall exceed the length of the longest used core.
- Consistency in the use of core numbers or colours shall be maintained throughout the installation to avoid confusion.
- Number coding or colours of cores shall be shown on the relevant drawings.
- Cores passing through holes in chassis or screens shall be fully protected by fitted grommets or bushes.
- Cores carried across a hinged portion of a chassis or door shall be flexible. Sufficient slack shall be provided to obviate tension.
- The insulation of a core shall not be stripped back further than or less than necessary. The conductor shall not be exposed with a crimped insulated terminal lug fitted.
- Not more than one core shall be connected to one side of a connection terminal block.
- Tenderers shall allow for a 5m length of ducting, in their price calculations.

- It can be assumed that the existing IO status outputs shall be made available on a marked terminal strip, within 5m of the telemetry outstation position. Wiring between these terminals and the outstation terminals, shall form part of this contract.
- All instrumentation cable shall be 12 Core multi strain 0.5mm oval screened. Lugs / Ferrules on all cables and all cables shall be clearly marked as per drawing. All surface conduits, fittings and bends shall be at least 20mm galvanized such as Bosal.

Trenching

- All trenches shall be at least 400mm deep for signal cables, with a minimum of 50mm diameter sleeving. Mains power (LV or HV) cabling are trenched at a deeper depth as mentioned already in the tender specification.
- Instrumentation and mains power cabling shall be in separate sleeving.
- Instrumentation cable and power cable higher than 24V are not allowed in the same sleeve.
- Not more than 3 cables per sleeve is permitted.
- All sleeves must have at least one draw wire per sleeve.
- Every 20-25 metres or at 90-degree bends there shall be a cable inspection box
- Only soft sand shall cover the sleeves, no rocks or large particles in trenches.

Cable Numbering and Marking

- The Contractor shall produce a cable schedule from which all cable identification numbers shall be derived.
- Cables shall be labelled with the cable number at the origin and destination points and at entries/exists to racking/ducting/penetrations, by means of a label, approved by the JW Engineer, suitably attached to the cable.
- The cable marking label shall be finished with a “fit-for-purpose “plastic sleeve, approved by the JW Engineer, suitably attached to the cable. The cable number must be printed on a yellow tube marker that must slip over the cable end.

Instrument Junction Boxes Numbering and Marking

- The Contractor shall produce a junction box schedule from where all field-mounted box identification numbers shall be derived.
- Field boxes shall be identified by means of a permanent label fixed on the boxes.

Cable Core Marking

- A wire marking systems shall be used to identify all cable cores at both ends in accordance with the wiring diagrams.

Screening and Earthing

- Individual and overall screen wires of all instrumentation cables shall be terminated at the equipment room side only and shall be left disconnected (floating) and insulated at the instrument in the field.
- All single pair cable screen conductors shall be insulated and tied back at the instrument.
- Analogue single pair cable screen conductors shall be connected to individual terminals in a junction box.
- Overall analogue cable screen conductors and digital cable screen shall be insulated and tied back inside the junction box.
- Under no circumstances shall the screen conductors be utilised for any other purposes than for noise immunity.
- The safety earth (or electrical earth) shall be utilised for the safety earthing of all metal automation equipment and supports.

Signal / Instrumentation Cable Installation

- Cables shall be installed neatly, either saddled or strapped to the panel or supporting steelwork. Where there is not possible or practical, the cable loom shall be strapped together.
- Cables shall be secured and connected at terminations to prevent undue mechanical stresses upon glands, conductors or terminals.
- Signal and communication cables shall be segregated and separated from power cables on separate racking, parallel routes shall be separated by a minimum distance of at least 300mm, space permitting and if physically possible.
- Cables shall not be installed double banked on racks.
- Armoured cables shall be secured to racks or angle-iron supports by 10mm wide stainless-steel strapping and purpose-made buckles.
- Unarmoured cables shall be secured to racks or supports by fit for purpose PVC or nylon.
- The span of strapping shall be such as to prevent bunching of cables, and in any event, should not exceed 1000mm.
- Cables running horizontally on cable racks mounted vertically shall be secured to cables racks at 60mm intervals, which shall be reduced as necessary to prevent unsightly sagging of cables.
- Cables laid flat in racks parallel with a slightly inclined ground or floor surfaces need not be secured to the racks more often than is necessary to prevent cables from moving because of expansion, contraction or vibration.
- Any horizontal or vertical cable run that are not strapped or supported in such a way that the cable cannot fall in the event of fire shall be strapped by 10mm wide stainless-steel strapping and purposes-made buckles at 1 metre intervals.

- Holes for cables passing through panel steelwork shall be made smooth or bushed to prevent severing of the cable and fitted with appropriate grommets.
- Joints in cable are prohibited unless the route lengths exceed the maximum lengths the manufacturer can supply. In this eventually, approved proprietary types of junction boxes shall be used. Joints shall only be used the approval from the Employer.
- When stripping insulation from cores, the conductors shall not be nicked or cut.
- All conductors shall be terminated in an insulated double crimped termination lug of the correct size using a crimping tool approved by the manufacturer of the terminal.
- Bare conductor terminations shall not be accepted.
- Pin lugs shall be used for connections using terminal strips and spade lugs when terminating under a screw head.
- Holes into air-conditioned rooms shall be completely sealed off to maintain the air conditioning system performance.
- Cables screens at the unearthed end of the cable are to be tied back and covered with heat shrink sleeve. Cable screens shall not be cut off at the cable sheath.
- Cables shall enter an enclosure from the bottom and shall be formed to relieve stress on the cable end, with a sealing boot fitted over the cable gland.
- Cables to instruments shall be terminated in a locally mounted approved IP65 connection box with a short length of flexible cable with a single 150mm diameter loop strapped to a suitably supported angle iron.
- The connection box can be multiple-way units to accommodate more than one loop, provided the loops are associated. A terminal strip shall be fitted inside the box for core connections
- Sealing boots shall cover the cable glands fitted to connection boxes.

11. SOLAR POWER SYSTEM

Due to unreliable grid electricity supply, JW requires selected telemetry sites to be equipped with solar power systems to ensure continuous and reliable operation of telemetry equipment and associated instrumentation.

The default solar power system specification applicable to a telemetry outstation category is defined in the table provided below.

Power Supply Philosophy

The solar power system shall function as the primary source of DC power for the telemetry system and all associated instruments.

An automatic DC changeover system shall be designed and installed to ensure uninterrupted operation at all times.

Automatic Changeover and Power Continuity
The contractor shall design, supply and install an automatic DC changeover circuit that operates as follows:

- Under normal conditions, the telemetry system shall be powered from the solar PV system and associated battery storage.
- When the solar battery capacity is depleted beyond a predefined safe threshold, the system shall instantaneously and seamlessly transfer to mains-derived DC power.
- The mains supply shall provide 12 V DC via the RTU power supply unit (PSU) and its associated battery system.
- Once adequate solar power and battery capacity are restored, the system shall automatically revert to solar operation.
- At no point shall the telemetry system experience interruption, reset, or loss of power during changeover.

Battery Storage and Management
The solar power system shall include appropriately sized battery storage to sustain continuous operation during periods of low or zero solar generation. The system design shall incorporate battery charging, protection, monitoring, and low-voltage disconnect functionality in accordance with best engineering practice and applicable standards.

Site Security and Installation Conditions
Solar power systems shall only be installed as the primary DC power source at telemetry sites that are:

- Assessed to be secure against vandalism and theft, or
- Equipped with adequate physical and/or electronic security measures to protect the solar installation.

- The contractor shall ensure that all solar PV panels, mounting structures, cabling, control equipment, and enclosures are adequately protected against theft, vandalism, and environmental exposure. Where required, security measures such as tamper-resistant mounting systems, secure enclosures, fencing, or alarms shall be incorporated.

Default System Specification and Scope Limitation

The solar power system specifications listed in the table below constitute the default and maximum scope of the contractor's obligations under this tender.

If a telemetry site is determined to require a solar power system of greater capacity or capability than the default specification indicated in the table, such requirement shall:

- Be deemed outside the scope of this tender, and
- Be separately designed, procured, and supplied in accordance with JW's approved supply chain and procurement policies.

The contractor shall not be responsible for the design, supply, installation, commissioning, or pricing of any solar power system exceeding the default specifications defined in the table.

Item	Quantity
Victron Smart Solar MPPT 100/30 (or equivalent)	1
100Ah LiFePO4 Battery	2
500W Solar Panel	1
Wiring & Connectors	1
Fuses & Isolators	1
Surge Protection	1
Steel Battery Cabinet	1
Stainless Hasp + 70mm Discus Lock	1
Security Mounting Bracket	1
Micro-Switch Tamper Alarm	1
Factory Acceptance Test (FAT)	1
Installation & Commissioning	1
Certificate of Compliance (COC)	1
Integration signals into SCADA (Hrs)	3

All solar stations shall be equipped with a high quality correctly rated MPPT Solar regulators.

The solar designs shall include the correctly rated Lithium-Ion phosphate batteries to enable un-interruptible power for 48 hours. The battery size calculations shall be included to the tender proposals.

Each station sizes shall have its own designs, and all the designs shall be included in the tenderer's proposal.

12. MAINTENANCE – ROUTINE & CALL-OUTS

Site Testing

The system shall be maintained all over the Greater Johannesburg region and localised maintenance facilities shall be of utmost importance.

Tenderers shall state what facilities (hardware and or software) can be provided within the Gauteng for regular servicing and maintenance. The name and address of the nearest service depot and supplier of such components should be made available to JW on request. The contractor shall be required to ensure appropriate response times are achievable during 24/7 365 days per year (refer to Response Times).

During the maintenance period, the contractor shall visit the various sites throughout JW (over and above such visits as may become necessary due to system breakdowns), at predetermined intervals by the client to ascertain that the system is working well. Within five (5) working days of each such visit the Contractor shall submit a short report to JW management, which shall include details of all faults that were found as well as a statement that such faults were rectified.

At the end of the maintenance period, the Contractor shall analyse these findings in a report to JW management, in which they shall include any recommendations regarding the augmenting of the system, procuring of additional facilities / equipment, suggested modifications, etc.

The following activities are associated with the continued operation of the telemetry outstation and associated peripheral devices at Johannesburg Water (also referred to as JW):

IO Signal Testing

- Test all IO digitals and repair any faulty components related directly to the telemetry and access system.
- Test all IO analogues by injecting pre-set values of 8mA, 12mA and 16mA. The readings should confirm with the values recorded on the telemetry and Control Room. (Accuracy of less than 0.1% is required between the injected signal and telemetry reading).

- Ensure all wiring/cabling termination is correct.
- Calibrate all the analogue isolator inputs and outputs. Actual readings and or faulty isolators to be recorded on the site maintenance report.
- Conduct physical readings of all the reservoir/tower levels and compare them with the actual site mA readings and the polled readings of the Telemetry Control Room. If any of the readings deviate greater than 150mm H_2O, then re-calibrate if possible or replace the level transducer. Actual readings and or faulty units to be recorded on the site maintenance report.
- Physical readings of the sanitation levels will be done as and when required by JW.
- Compare all the flow meter readings (mA) with the control room and report faulty flow meters in writing to the nominated JW representative within two (2) working days.

Power Supply Testing

- Inspect the power supply components including the load testing of the backup battery, as per JW's operating procedure. Replace any faulty components.
- Ensure that the load shed relay is calibrated to disconnect the battery at 10.5V and reconnect the battery at 12V once the battery is recharged.

Access Control Testing

- Test the access control system and repair all related components that are faulty.

RF / Communication Testing

- Fully test the antennae installation and radio according to RF industry standards. (Testing procedure to be forwarded to JW for approval before commencement of the contract).
- Check the communication path via the OPC and correct where necessary the repeater paths. Any amendments should be reported directly to the nominated JW representative.

Earthing Testing

- Test the earthing / surge protection of the telemetry installation and level transducers according to appropriate industry standards. The overall earthing resistance must be less than five (5) ohms.

Record Keeping

- Compile a Site Maintenance report of the outstation and record all faulty and or replaced equipment in the comments field. There are existing Site Maintenance Report Books that will be issued to the Contractor.
- Log equipment types and serial numbers of present and new components, including all level transducers, on the existing JW Asset tracking spreadsheet.
- Log RTU Firmware version on a site maintenance report.
- Check IO list, wire labels and wiring diagrams and amend accordingly. The IO lists should be amended twice a year if there are changes.
- Complete the on-site logbook, recording the date and type of work carried out.

Additional Activities

- Ensure the level transducers physical position is according to the site marker. Ensure the base (where applicable) is correctly placed on the floor of the storage vessel.
- A digital photograph should be taken of each outstation on completion of the site.
- Compare all site readings with the operator in the control room and ensure the site is fully operational before leaving.

All telemetry sites – including master and standby station sites - must be visited once a year for scheduled routine maintenance and each site may not be re-visited for routine maintenance until the period of 150 days has expired from date of the last site maintenance visit.

13. STANDBY SUPPORT - 24/7/365

The Contractor will provide a 24 hour, 7 days a week, 365 days a year support function as per the response and escalation times as detailed in the contract.

14. MEETINGS / REQUEST FOR QUOTATIONS (RFQs)

This contract allows for one formal management meeting per month. Discussions pertaining to development work and subsequent quoting outside of this management meeting is not deemed as a meeting and therefore cannot be billed for. This means that the producing of business requirement specifications (BRS) and or quotations cannot be billed for, but the development and submission of functional design specifications (FDS) may be billed for under the respective hourly rates if clearly priced for in the BRS / RFQ and written acceptance by JW management is given prior to the commencement of the scope / deliverables.

15. PROJECT TEAM

Only approved individuals will be allowed to work on this contract. Unqualified individuals and unvetted contractor personnel must work with appropriate supervision on JW sites and with the consent of JW.

The Contractor must ensure that they will have enough qualified personnel at all times to attend to JW's contractual needs. This also refers to after hours. The technical personnel, and not only the company, of the Contractor must be certified and ensure retain their relevant certifications throughout the duration of the contract.

16. ASSIST WITH CONTROL ROOM DUTIES

It will be required from the telemetry contractor to provide control room assistance at as and when required by the client. The control room assistance will consist of an 8-hour shift to man the control room and follow the Standard Operating procedure for control room duties.

The telemetry technician required for this support shall be a well experienced technician level, well experienced in the Johannesburg water comprehensive system. Telemetry Technician to work an 8-hour shift. Rate to include all travel and subsistence. Physical location for duty will either be Helderkruin or Ffennell Road depots.

17. PRICING

Item	Description	Units	Unit Rate (Excl. VAT)
G	GENERAL		
G.1	Preliminary & General for the upgrading of the existing telemetry system	Sum	R
G.2	Producing a detailed Work Plan within 21 days of tender award for the upgrading of the existing Telemetry System with new DNP3 Telemetry System within 12 months.	Sum	R
G.3	Monthly progress meetings. (Telemetry Engineer required to be present with Project Administrator / Key Account Manager) including minutes.	Monthly	R
G.4	Assist in Control Room Duties - Telemetry Technician to work an 8-hour shift. Rate to include all travel and subsistence. Physical location for duty will either be Helderkruin or Ffennell Road depots.	Per shift	R
G.5	Compilation, Revision and Implementation of OHS plan according to JW requirements.	Sum	R
G.6	4-20 mA Calibrator.	Item	R
G.7	Precision True-RMS Digital Multimeter.	Item	R
G.8	Digital VSWR 125-525 MHz Digital VHF/UHF Antenna (RF) Power meter.	Item	R
G.9	Calibrated digital Precision Pressure Gauge (0-40 Bar) with accuracy of 0.1% FS or better to check pressure sensors in-situ (Wika type or equivalent).	Item	R
G.10	Pressure simulator to check and test pressure and level sensors. (Wika CPH8000-P1 type or equivalent).	Item	R
G.11	2x Measuring tape (1 sanitation & 1 potable water per team).	Item	R
G.12	RTU and associated configuration software loaded on Technicians / Engineers laptops.	Item	R
G.13	Data Communications (Radio, GSM, etc.) programming and configuration software.	Item	R
G.14	Programming software for RF Cable (virtual-wire) replacer units.	Item	R
G.15	Provisional Sum - Miscellaneous Hardware, Equipment, Field Instruments, Primary Devices and Services as required and as instructed in writing by the client to Build, Repair or Maintain the Telemetry System. Maximum permissible mark-up is 15%. Original VAT invoices from the supplier shall be provided during invoicing.	Sum	R

Item	Description	Units	Unit Rate (Excl. VAT)
G.16	Contractor to appoint a specialist to do an extensive Communications propagation study annually. (CV of such specialist to be included). This shall include radio path profiling of all remote sites. Identification of primary and secondary UHF radio store & forward sites. Profiling, identification, planning of primary, and secondary communication mediums. This shall include the planning and use of licenced UHF radio, Fibre, Microwave as well as GSM, frequencies, bandwidths, routing, cybersecurity, etc. The contractor shall take full responsibility for this propagation and radio network plan.	Sum	R
G.17	ICASA - Contractor to apply for all required radio frequency licences. This includes gathering all technical and other data, completion of application forms as well as meetings.	Sum	R
G.18	Payment of Radio licences to ICASA on behalf of JW.	Per Radio	R
G.19	Compile a Complete Technical & Programming manual for the new Telemetry System. (To be provided in 7 colour hard copies and 2 editable electronic version (USB.3.0 Flash drives).	Sum	R
PART A	MIGRATION OF EXISTING SSE SYSTEM TO DNP3 TELEMETRY SYSTEM AND MAINTENANCE Only experienced companies and trained telemetry engineers and technicians shall be allowed to migrate / upgrade / integrate and or repair & maintain the telemetry infrastructure. The contractor must ensure the full functionality of the site once the migration / integration installation has occurred. The number of sites listed below can be adjusted up or down by the client on a month-to-month basis. MIGRATION OF BASE STATIONS AND OUTSTATIONS		
A.1	Master and Slave Control Stations Tested & Verified with SCADA control rooms Supply and Install 6x DNP3 RTUs (CPU), PSUs and IO modules for hot-standby system. Supply and Install 6x Digital Radios - each radio UHF 66Kbps in 12.5KHz bandwidth, 2x ethernet ports, 2x comms ports, 4G GSM modem, 1x USB port, firewall, route, terminal server (MDS Orbit MCR or equivalent). Supply and Install 2x GSM 4G LTE modems fully compatible with DNP3 RTU powered off Rack. Programme / Migrate 6x Digital Radios. Migrate existing surge protection and outstation hardware to new DNP3 RTU station.	Sum	R

Item	Description	Units	Unit Rate (Excl. VAT)
	Install 6x Meanwell DRC-100 100W 12V Single Output with Battery Charger (UPS Function) or equivalent. Supply and Install 6x 12V 8Ah LiFePO4 Battery. ???? Migrate GSM modems & associated routers to work with new DNP3 configuration. Integrate or Replace Tag Reader / Biometric Access Control to work with DNP3 RTU. Test all IOs in RTU / Junction Box cabinets. Test Antenna systems. Test Station Earthing system. Reconfigure all IOs with SCADA. On-site Sundries. Recording of installation, testing, site photos and the compilation of documentation pack. Update As-built drawings and IO lists (2x A3 colour hard copies and editable electronic copy) Issuing of Completion Certificate and commencement of 1-year warranty period on newly installed hardware.		
A.2	Radio Repeater (Digipeater) Sites Tested & Verified with SCADA control rooms Supply and Install DNP3 RTU (CPU), PSU and IO modules. Supply and Install Digital Radio - UHF 66Kbps in 12.5KHz bandwidth, 2x ethernet ports, 2x comms ports, 4G GSM modem, 1x USB port, firewall, route, terminal server (MDS Orbit MCR or equivalent). Programme Digital Radio. Migrate existing surge protection and outstation hardware to new DNP3 Repeater station. Supply and Install Meanwell AD-155 155W 12V Single Output with Battery Charger (UPS Function) or equivalent. Supply and Install 12V 100Ah LiFePO4 Battery. Test IOs. Test Antenna system. Test Earthing system. Reconfigure all IOs with SCADA. On-site Sundries. Recording of installation, testing, site photos and the compilation of documentation pack. Update As-built drawings and IO lists (2x A3 colour hard copies and editable electronic copy) Issuing of Completion Certificate and commencement of 1-year warranty period on new installation.	Sum	R

Item	Description	Units	Unit Rate (Excl. VAT)
A.3	Small Outstations (Max 8 AIN, 8 DIN, 8 DOT) - GSM Sites Tested & Verified with SCADA control rooms Supply and Install DNP3 RTU (CPU), PSU and IO modules. Supply and Install GSM 4G LTE modem fully compatible with DNP3 RTU and powered off rack. Migrate existing surge protection, battery backup and outstation hardware and instrumentation to new DNP3 RTU outstation. Install Meanwell DRC-100 100W 12V Single Output with Battery Charger (UPS Function) or equivalent. Migrate GSM modem & associated hardware to work with DNP3 configuration. Integrate or Replace Tag Reader / Biometric Access Control to work with DNP3 RTU. Test all IOs in RTU / Junction Box cabinets. Test Antenna systems. Test Station Earthing system. Reconfigure all IOs with SCADA On-site Sundries. Recording of installation, testing, site photos and the compilation of documentation pack. Issuing of Completion Certificate and commencement of 1-year warranty period on newly installed hardware.	Sum	R
A.4	Small Outstations (Max 8 AIN, 8 DIN, 8 DOT) - Radio Sites Tested & Verified with SCADA control rooms Supply and Install DNP3 RTU (CPU), PSU and IO modules, Programme / Migrate Digital Radio, Migrate existing surge protection, battery backup and outstation hardware and instrumentation to new DNP3 RTU outstation. Install Meanwell AD-155 155W 12V Single Output with Battery Charger (UPS Function) or equivalent. Integrate or Replace Tag Reader / Biometric Access Control to work with DNP3 RTU. Test all IOs in RTU / Junction Box cabinets. Test Antenna system. Test Station Earthing system. Reconfigure all IOs with SCADA. On-site Sundries. Recording of installation, testing, site photos and the compilation of documentation pack. Issuing of Completion Certificate and commencement of 1-year warranty period on newly installed hardware.	Sum	R
A.5	Medium Outstations (Max 16 AIN 16 DIN, 8 DOT) - Radio Sites	Sum	R

Item	Description	Units	Unit Rate (Excl. VAT)
	Tested & Verified with SCADA control rooms Supply and Install DNP3 RTU (CPU), PSU and IO modules. Programme / Migrate Digital Radio. Migrate existing surge protection, battery backup and outstation hardware and instrumentation to new DNP3 RTU outstation. Install Meanwell AD-155 155W 12V Single Output with Battery Charger (UPS Function) or equivalent. Integrate or Replace Tag Reader / Biometric Access Control to work with DNP3 RTU. Test all IOs in RTU / Junction Box cabinets. Test Antenna system. Test Station Earthing system. Reconfigure all IOs with SCADA. On-site Sundries. Recording of installation, testing, site photos and the compilation of documentation pack. Issuing of Completion Certificate and commencement of 1-year warranty period on newly installed hardware.		
A.6	Medium Outstations (Max 16 AIN 16 DIN, 8 DOT) - GSM Tested & Verified with SCADA control rooms Supply and Install DNP3 RTU (CPU), PSU and IO modules. Supply and Install GSM 4G LTE modem fully compatible with DNP3 RTU and powered off rack. Migrate existing surge protection, battery backup and outstation hardware and instrumentation to new DNP3 RTU outstation. Install Meanwell DRC-100 100W 12V Single Output with Battery Charger (UPS Function) or equivalent. Migrate GSM modem & associated hardware to work with DNP3 configuration. Integrate or Replace Tag Reader / Biometric Access Control to work with DNP3 RTU. Test all IOs in RTU / Junction Box cabinets. Test Antenna systems. Test Station Earthing system. Reconfigure all IOs with SCADA On-site Sundries. Recording of installation, testing, site photos and the compilation of documentation pack. Issuing of Completion Certificate and commencement of 1-year warranty period on newly installed hardware.	Sum	R
A.7	Large Outstations (Max 32 AIN, 32 DIN, 8 DOT) - Radio Sites Tested & Verified with SCADA control rooms	Sum	R

Item	Description	Units	Unit Rate (Excl. VAT)
	Supply and Install DNP3 RTU (CPU), PSU and IO modules. Programme / Migrate Digital Radio. Migrate existing surge protection, battery backup and outstation hardware and instrumentation to new DNP3 RTU outstation. Install Meanwell AD-155 155W 12V Single Output with Battery Charger (UPS Function) or equivalent Integrate or Replace Tag Reader / Biometric Access Control to work with DNP3 RTU Test all IOs in RTU / Junction Box cabinets Test Antenna systems Test Station Earthing system Reconfigure all IOs with SCADA On-site Sundries. Recording of installation, testing, site photos and the compilation of documentation pack. Issuing of Completion Certificate and commencement of 1-year warranty period on newly installed hardware.		
A.8	X-Large Outstations (Max 32 AIN, 64 DIN, 8 DOT) - Radio Sites Tested & Verified with SCADA control rooms Supply and Install DNP3 RTU (CPU), PSU and IO modules. Programme / Migrate Digital Radio. Migrate existing surge protection, battery backup and outstation hardware and instrumentation to new DNP3 RTU outstation. Install Meanwell AD-155 155W 12V Single Output with Battery Charger (UPS Function) or equivalent. Integrate or Replace Tag Reader / Biometric Access Control to work with DNP3 RTU. Test all IOs in RTU / Junction Box cabinets. Test Antenna systems. Test Station Earthing system. Reconfigure all IOs with SCADA. On-site Sundries. Recording of installation, testing, site photos and the compilation of documentation pack. Issuing of Completion Certificate and commencement of 1-year warranty period on newly installed hardware.	Sum	R
M	MAINTENANCE OF BASE STATIONS AND OUTSTATIONS		
M.1	Master and Slave Stations Tested & Verified with SCADA control rooms Test DNP3 RTUs (CPU), PSUs and IO modules. Test all Digital Radios and GSM Modems.	Per Visit	R

Item	Description	Units	Unit Rate (Excl. VAT)
	Test/Check surge protection, loop isolators and outstation hardware. Verify loadshedding settings on 12V Single Output with Battery Charger and Test battery. Verify operation of GSM modems & associated routers work. Test Tag Reader / Biometric Access Control. Test all IOs in RTU / Junction Box cabinets. Test Antenna systems. Test Station Earthing system. Verify all IOs with SCADA and accuracy of as-built drawings and IO lists . Recording of installation, testing, site photos and the compilation of documentation pack. Complete site maintenance sheet and update asset register.		
M.2	Radio Repeater (Digipeater) Sites Tested & Verified with SCADA control rooms Test DNP3 RTU (CPU), PSU and IO modules. Test Digital Radio. Test/Check surge protection and outstation hardware. Verify loadshedding settings on 12V Single Output with Battery Charger and Test battery. Test all IOs. Test Antenna system. Test/Check Antenna Lightning Protection. Test Station Earthing system. Verify all IOs with SCADA and accuracy of as-built drawings and IO lists. Recording of installation, testing, site photos and the compilation of documentation pack. Complete site maintenance sheet and update asset register.	Per Visit	R
M.3	Small Outstations (Max 8 AIN, 8 DIN, 8 DOT) - GSM Sites Tested & Verified with SCADA control rooms Test surge protection, loop isolators, battery backup, outstation hardware, IEDs and field instrumentation. Verify loadshedding settings on 12V Single Output with Battery Charger and Test battery. Test GSM modem & associated hardware. Test Tag Reader / Biometric Access Control. Test all IOs in RTU / Junction Box cabinets. Test Antenna system. Test Station Earthing system.	Per Visit	R

Item	Description	Units	Unit Rate (Excl. VAT)
	Verify all IOs with SCADA and verify accuracy of as-built drawings and IO lists. Recording of installation, testing, site photos and the compilation of documentation pack. Complete site maintenance sheet and update asset register.		
M.4	Small Outstations (Max 8 AIN, 8 DIN, 8 DOT) - Radio Sites Tested & Verified with SCADA control rooms Test surge protection, loop isolators, battery backup, outstation hardware, IEDs and field instrumentation. Verify loadshedding settings on 12V Single Output with Battery Charger and Test battery. Test Digital Radio & associated hardware. Test Tag Reader / Biometric Access Control. Test all IOs in RTU / Junction Box cabinets. Test Antenna system. Test Station Earthing system. Verify all IOs with SCADA and verify accuracy of as-built drawings and IO lists . Recording of installation, testing, site photos and the compilation of documentation pack. Complete site maintenance sheet and update asset register.	Per Visit	R
M.5	Medium Outstations (Max 16 AIN, 16 DIN, 8 DOT) - GSM Sites Tested & Verified with SCADA control rooms Test surge protection, loop isolators, battery backup, outstation hardware, IEDs and field instrumentation. Verify loadshedding settings on 12V Single Output with Battery Charger and Test battery. Test GSM modem & associated hardware. Test Tag Reader / Biometric Access Control. Test all IOs in RTU / Junction Box cabinets. Test Antenna system. Test Station Earthing system. Verify all IOs with SCADA and verify accuracy of as-built drawings and IO lists. Recording of installation, testing, site photos and the compilation of documentation pack. Complete site maintenance sheet and update asset register.	Per Visit	R
M.6	Medium Outstations (Max 16 AIN 16 DIN, 8 DOT) - Radio Sites Tested & Verified with SCADA control rooms Test surge protection, loop isolators, battery backup, outstation hardware, IEDs and field instrumentation.	Per Visit	R

Item	Description	Units	Unit Rate (Excl. VAT)
	Verify loadshedding settings on 12V Single Output with Battery Charger and Test battery. Test Digital Radio & associated hardware. Test Tag Reader / Biometric Access Control. Test all IOs in RTU / Junction Box cabinets. Test Antenna system. Test Station Earthing system. Verify all IOs with SCADA and verify accuracy of as-built drawings and IO lists . Recording of installation, testing, site photos and the compilation of documentation pack. Complete site maintenance sheet and update asset register.		
M.7	Large Outstations (Max 32 AIN, 32 DIN, 8 DOT) - Radio sites Tested & Verified with SCADA control rooms Test surge protection, loop isolators, battery backup, outstation hardware, IEDs and field instrumentation. Verify loadshedding settings on 12V Single Output with Battery Charger and Test battery. Test Digital Radio & associated hardware. Test Tag Reader / Biometric Access Control. Test all IOs in RTU / Junction Box cabinets. Test Antenna system. Test Station Earthing system. Verify all IOs with SCADA and verify accuracy of as-built drawings and IO lists . Recording of installation, testing, site photos and the compilation of documentation pack. Complete site maintenance sheet and update asset register.	Per Visit	R
M.8	X-Large Outstations (Max 32 AIN, 64 DIN, 8 DOT) - Radio Sites Tested & Verified with SCADA control rooms Test surge protection, loop isolators, battery backup, outstation hardware, IEDs and field instrumentation. Verify loadshedding settings on 12V Single Output with Battery Charger and Test battery. Test Digital Radio & associated hardware. Test Tag Reader / Biometric Access Control. Test all IOs in RTU / Junction Box cabinets. Test Antenna system. Test Station Earthing system. Verify all IOs with SCADA and verify accuracy of as-built drawings and IO lists .	Per Visit	R

Item	Description	Units	Unit Rate (Excl. VAT)
	Recording of installation, testing, site photos and the compilation of documentation pack. Complete site maintenance sheet and update asset register.		
PART B	NEW INSTALLATIONS All new installations to fully comply with the Technical Specification of tender and to be installed according to existing JW site standards and specifications. SPECIAL NOTE: Field Instrumentation (Primary Devices), Travel, Power cables, Signal cables and Trenching excluded in SUM Amounts as separate billable items in Pricing Schedule at Tender Stage		
B.1	Master and Slave Stations Tested & Verified with SCADA control rooms Supply and Install 6x DNP3 RTUs (CPU), PSUs and IO modules for hot-standby system. Supply and Install 2x GSM 4G LTE modems fully compatible with DNP3 RTU powered off Rack Supply and Install 6x Digital Radios - each radio UHF 66Kbps in 12.5KHz bandwidth, 2x ethernet ports, 2x comms ports, 4G GSM modem, 1x USB port, firewall, route, terminal server. Power output adjustable 0.1-10W. (MDS Orbit MCR or equivalent) Programme 6x Digital Radios Supply and Install surge protection and base station hardware Supply and Install 6x Meanwell DRC-100 100W 12V Single Output with Battery Charger (UPS Function) or equivalent Supply and Install 6x 12V 8Ah LiFePO4 Battery (One per Radio) Supply and Install 12-24V 5A Converter Supply and Install GSM modems & associated routers to work with new DNP3 configuration Supply and Install Outdoor Tag Reader / Biometric, Access Control with sound bomb, PIR and door / cabinet contacts Supply and Install correctly sized Lockable Outstation and Environmental boxes (enclosures). Powered Coated with gland plate (RAL7032 Grey) Rated: IP65 Install all IOs Supply & Install Antenna systems Supply and Install Antenna Lightning Protection Supply and Install Station Earthing system Install free-issued field (environmental monitoring) Primary Devices Configure all IOs with SCADA FAT Base stations Installation Sundries - Large Outstation Testing and Final Commissioning of Base Stations (Master & Slave)	Sum	R

Item	Description	Units	Unit Rate (Excl. VAT)
	Recording of installation, testing, site photos and the compilation of documentation pack. As-built drawings and IO lists (2x A3 colour hard copies and editable electronic copy) Issuing of Completion Certificate and commencement of 1-year warranty period on new installation.		
B.2	Radio Repeater (Digipeater) Sites Tested & Verified with SCADA control rooms Supply and Install DNP3 RTU (CPU), PSU and IO modules Supply and Install Digital Radio - UHF 66Kbps in 12.5KHz bandwidth, 2x ethernet ports, 2x comms ports, 4G GSM modem, 1x USB port, firewall, router, terminal server. Power output adjustable 0.1-10W. (MDS Orbit MCR or equivalent) Programme Digital Radio Supply and Install surge protection and outstation hardware Supply and Install Meanwell AD-155 155W 12V Single Output with Battery Charger (UPS Function) or equivalent Supply and Install 12V 100Ah LiFePO4 Battery Supply and Install correctly sized Lockable Outstation and Battery boxes (enclosures). Powered Coated with gland plate (RAL7032 Grey) Rated: IP65 Install all IOs Supply & Install Antenna systems Supply and Install Antenna Lightning Protection Supply and Install Station Earthing system Configure all IOs with SCADA FAT Outstations Installation Sundries Testing and Final Commissioning of Outstation Recording of installation, testing, site photos and the compilation of documentation pack. As-built drawings and IO lists (2x A3 colour hard copies and editable electronic copy) Issuing of Completion Certificate and commencement of 1-year warranty period on new installation.	Sum	R
B.3	Small Outstations (Max 8 AIN, 8 DIN, 8 DOT) - GSM Sites Tested & Verified with SCADA Control Room Supply and Install DNP3 RTU (CPU), PSU and IO modules Supply and Install GSM 4G LTE modem fully compatible with DNP3 RTU powered off Rack Configure GSM 4G LTE modem and associated components Supply & Installation surge protection and outstation hardware	Sum	R

Item	Description	Units	Unit Rate (Excl. VAT)
	Supply and Install Meanwell DRC-100 100W 12V Single Output with Battery Charger (UPS Function) or equivalent Supply and Install LiFeP04 12V-30Ah battery Supply and Install 12-24V 5A Converter Supply and Install Outdoor Tag Reader / Biometric, Access Control with sound bomb, PIR and door / cabinet contacts Supply and Install Vandal Resistant Enclosure (VRE) with integrated high security lock and no hinges (Powder Coated - colour Grey) for Outstation Install all IOs in VRE Supply & Install Antenna system Supply & Install Antenna Lightning Protection Supply and Install Station Earthing system Install free-issued field instruments Configure all IOs with SCADA Factory Build - Assembly Sundries Factory Build - Outstation FAT of Outstation Site Installation Material - Small Outstation Sundries (including Site Labelling) Testing and Final Commissioning of Outstation Recording of installation, testing, site photos and the compilation of documentation pack. As-built drawings and IO lists (2x A3 colour hard copies and editable electronic copy) Issuing of Completion Certificate and commencement of 1-year warranty period on new installation.		
B.4	Small Outstations (Max 8 AIN, 8 DIN, 8 DOT) - Radio Sites Tested & Verified with SCADA control rooms Supply and Install DNP3 RTU (CPU), PSU and IO modules Supply and Install Digital Radio - UHF 66Kbps in 12.5KHz bandwidth, ethernet port, comms ports, USB port, firewall, router, terminal server. Power output adjustable 0.1-10W. (MDS Orbit ECR or equivalent) Programme Digital Radio Supply & Installation surge protection and outstation hardware Supply and Install Meanwell DRC-100 100W 12V Single Output with Battery Charger (UPS Function) or equivalent Supply and Install LiFeP04 12V-30Ah battery Supply and Install 12-24V 5A Converter	Sum	R

Item	Description	Units	Unit Rate (Excl. VAT)
	Supply and Install Outdoor Tag Reader / Biometric, Access Control with sound bomb, PIR and door / cabinet contacts Supply and Install Vandal Resistant Enclosure (VRE) with integrated high security lock and no hinges (Powder Coated - colour Grey) for Outstation Install all IOs Supply & Install Antenna system Supply & Install Antenna Lightning Protection Supply and Install Station Earthing system Install free-issued field instruments Configure all IOs with SCADA Factory Build - Assembly Sundries Factory Build - Outstation FAT of Outstation Site Installation Material - Small Outstation Sundries (including Site Labelling) Testing and Final Commissioning of Outstation Recording of installation, testing, site photos and the compilation of documentation pack. As-built drawings and IO lists (2x A3 colour hard copies and editable electronic copy) Issuing of Completion Certificate and commencement of 1-year warranty period on new installation.		
B.5	Medium Outstations (Max 16 AIN 16 DIN, 8 DOT) - GSM Sites Tested & Verified with SCADA Control Room Supply and Install DNP3 RTU (CPU), PSU and IO modules Supply and Install GSM 4G LTE modem fully compatible with DNP3 RTU powered off Rack Configure GSM 4G LTE modem and associated components Supply & Installation surge protection and outstation hardware Supply and Install Meanwell DRC-100 100W 12V Single Output with Battery Charger (UPS Function) or equivalent Supply and Install LiFeP04 12V-30Ah battery Supply and Install 12-24V 5A Converter Supply and Install Outdoor Tag Reader / Biometric, Access Control with sound bomb, PIR and door / cabinet contacts Supply and Install Vandal Resistant Enclosure (VRE) with integrated high security lock and no hinges (Powder Coated - colour Grey) for Outstation Install all IOs in VRE Supply & Install Antenna system Supply & Install Antenna Lightning Protection	Sum	R

Item	Description	Units	Unit Rate (Excl. VAT)
	Supply and Install Station Earthing system Install free-issued field instruments Configure all IOs with SCADA Factory Build - Assembly Sundries Factory Build - Outstation FAT of Outstation Site Installation Material - Small Outstation Sundries (including Site Labelling) Testing and Final Commissioning of Outstation Recording of installation, testing, site photos and the compilation of documentation pack. As-built drawings and IO lists (2x A3 colour hard copies and editable electronic copy) Issuing of Completion Certificate and commencement of 1-year warranty period on new installation.		
B.6	Medium Outstations (Max 16 AIN 16 DIN, 8 DOT) - Radio Sites Tested & Verified with SCADA control rooms Supply and Install DNP3 RTU (CPU), PSU and IO modules Supply and Install Digital Radio - UHF 66Kbps in 12.5KHz bandwidth, ethernet port, comms ports, USB port, firewall, router, terminal server. Power output adjustable 0.1-10W. (MDS Orbit ECR or equivalent) Programme Digital Radio Supply & Installation surge protection and outstation hardware Supply and Install Meanwell AD-155 155W 12V Single Output with Battery Charger (UPS Function) or equivalent Supply and Install 12V 100Ah LiFePO4 Battery Supply and Install 12-24V 5A Converter Supply and Install Outdoor Tag Reader / Biometric, Access Control with sound bomb, PIR and door / cabinet contacts Supply and Install suitably sized Outstation, Battery and Junction boxes (enclosures). Powered Coated with gland plate (RAL7032 Grey) Rated: IP65 Install all IOs in Outstation and Junction Box Supply & Install Antenna system Supply & Install Antenna Lightning Protection Supply and Install Station Earthing system Install free-issued field instruments Configure all IOs with SCADA Factory Build - Assembly Sundries Factory Build - Outstation	Sum	R

Item	Description	Units	Unit Rate (Excl. VAT)
	FAT of Outstation Site Installation Material - Small Outstation Sundries (including Site Labelling) Testing and Final Commissioning of Outstation Recording of installation, testing, site photos and the compilation of documentation pack. As-built drawings and IO lists (2x A3 colour hard copies and editable electronic copy) Issuing of Completion Certificate and commencement of 1-year warranty period on new installation.		
B.7	Large Outstations (Max 32 AIN 32 DIN, 8 DOT) - Radio Sites Tested & Verified with SCADA control rooms Supply and Install DNP3 RTU (CPU), PSU and IO modules Supply and Install Digital Radio - UHF 66Kbps in 12.5KHz bandwidth, ethernet port, comms ports, USB port, firewall, router, terminal server. Power output adjustable 0.1-10W. (MDS Orbit ECR or equivalent) Programme Digital Radio Supply & Installation surge protection and outstation hardware Supply and Install Meanwell AD-155 155W 12V Single Output with Battery Charger (UPS Function) or equivalent Supply and Install 12V 100Ah LiFePO4 Battery Supply and Install 12-24V 5A Converter Supply and Install Outdoor Tag Reader / Biometric, Access Control with sound bomb, PIR and door / cabinet contacts Supply and Install correctly sized Outstation, Battery and Junction boxes (enclosures). Powered Coated with gland plate (RAL7032 Grey) Rated: IP65 Install all IOs in Outstation and Junction Box Supply & Install Antenna system Supply & Install Antenna Lightning Protection Supply and Install Station Earthing system Install free-issued field instruments Configure all IOs with SCADA Factory Build - Assembly Sundries Factory Build - Outstation FAT of Outstation Site Installation Material - Small Outstation Sundries (including Site Labelling) Testing and Final Commissioning of Outstation Recording of installation, testing, site photos and the compilation of documentation pack.	Sum	R

Item	Description	Units	Unit Rate (Excl. VAT)
	As-built drawings and IO lists (2x A3 colour hard copies and editable electronic copy) Issuing of Completion Certificate and commencement of 1-year warranty period on new installation.		
B.8	X-Large Outstations (Max 32 AIN, 64 DIN, 8 DOT) - Radio Sites Tested & Verified with SCADA control rooms Supply and Install DNP3 RTU (CPU), PSU and IO modules Supply and Install Digital Radio - UHF 66Kbps in 12.5KHz bandwidth, ethernet port, comms ports, USB port, firewall, router, terminal server. Power output adjustable 0.1-10W. (MDS Orbit ECR or equivalent) Programme Digital Radio Supply & Installation surge protection and outstation hardware Supply and Install Meanwell AD-155 155W 12V Single Output with Battery Charger (UPS Function) or equivalent Supply and Install 12V 100Ah LiFePO4 Battery Supply and Install 12-24V 5A Converter Supply and Install Outdoor Tag Reader / Biometric, Access Control with sound bomb, PIR and door / cabinet contacts Supply and Install correctly sized Outstation, Battery and Junction boxes (enclosures). Powered Coated with gland plate (RAL7032 Grey) Rated: IP65 Supply & Install all IOs in VRE Supply & Install Antenna system Supply & Install Antenna Lightning Protection Supply and Install Station Earthing system Install free-issued field instruments Configure all IOs with SCADA Factory Build - Assembly Sundries Factory Build - Outstation FAT of Outstation Site Installation Material - Small Outstation Sundries (including Site Labelling) Testing and Final Commissioning of Outstation Recording of installation, testing, site photos and the compilation of documentation pack. As-built drawings and IO lists (2x A3 colour hard copies and editable electronic copy) Issuing of Completion Certificate and commencement of 1-year warranty period on new installation.	Sum	R
T	TRAINING		

Item	Description	Units	Unit Rate (Excl. VAT)
	Training to be done by a fully approved trainer of OEM equipment supplier / agent. All training courses as listed below shall be all individual courses each designed as a standalone training course.		
T.1	Comprehensive (160 Hours) of Training on Entire Telemetry System That covers Introductory & intermediate Telemetry Communication Client & Server (DNP3). This shall include theoretical as well as extensive practical training and exercises. Advanced Telemetry Communication Client & Server (DNP3) to such a level that client will be totally self sufficient. This shall include theoretical as well as extensive practical training and exercises. Introductory and intermediate Telemetry (RTU) Configuration & Programming tools. This shall include theoretical as well as extensive practical training and exercises. Advanced Telemetry (RTU) Configuration & Programming tools. This shall include theoretical as well as extensive practical training and exercises. Training on RF cable replacer. Theoretical as well as practical. Training on Communications Platform (Digital Radios, GSM modems, etc.) (Introductory and intermediate). Theoretical as well as practical. Advance training on Communications Platform. This shall include routing, switching, redundancy, antennas, RF theory, cyber security, etc. This shall be to such a level that the client will be self sufficient. Theoretical as well as practical training exercises. RTU, IO modules & Surge Protection (Introductory & Intermediate). This shall include hardware, firmware, fault finding, etc. RTU, IO modules & Surge Protection (Advanced) to such a level that the client shall be able to be self sufficient in designing and engineering of complete stations.	Per Seat	R
D	PRV SOLAR POWER All new installations to fully comply with the Technical Specification of tender and to be installed according to existing JW site standards and specifications.		
D.1	Victron Smart Solar MPPT 100/30 (or equivalent)	item	R
D.2	100Ah LiFePO4 Battery	item	R
D.3	300W / 330W Solar Panel	item	R
D.4	Wiring & Connectors	item	R
D.5	Fuses & Isolators	item	R
D.6	Surge Protection	item	R
D.7	Steel Battery Cabinet	item	R
D.8	Stainless Hasp + 70mm Discus Lock	item	R

Item	Description	Units	Unit Rate (Excl. VAT)
D.9	Security Mounting Bracket	item	R
D.10	Micro-Switch Tamper Alarm	item	R
D.11	Factory Acceptance Test (FAT)	item	R
D.12	Installation & Commissioning	item	R
D.13	Certificate of Compliance (COC)	item	R
D.14	Integration signals into SCADA (Hrs)	Hours	R
D.15	Project Management - FDS - As-Built Drawings - O&M Manuals	item	R
	Spares (Telemetry main components)		
S.1	RTU main processor Unit (Maestro or equivalent) with Ribbon cable interface	item	R
S.2	RTU Power Supply unit (Maestro or equivalent) with Ribbon cable interface	item	R
S.3	Multi I/O 8 x Din : 8 * Ain : 8* Dot with Ribbon cable interface	item	R
S.4	8 Chan Analogues Output Units with Ribbon cable interface	item	R
S.5	8 Chan Digital Control Outputs with Ribbon cable interface	item	R
S.6	24 Chan Digital Input Units with Ribbon cable interface	item	R
S.7	24 Chan Analogues Input Units with Ribbon cable interface	item	R
S.8	2 Chan Input Surge Protection Units with Ribbon cable interface	item	R
S.9	8 Chan Digital Input Surge Protection Units with Ribbon cable interface	item	R
S.10	8 Chan Analogue Input Surge Protection Units with Ribbon cable interface	item	R
S.11	8 Chan Relay Output units with Ribbon cable interface	item	R
S.12	8 Chan RS232 Multiplexer Unit with Ribbon cable interface	item	R
S.13	RTU Tag Reader (Maestro or equivalent)	item	R
S.14	Virtual Wire - Remote unit (1CIN, 2 AIN)	item	R
S.15	Virtual Wire - RX Unit with Modbus-RTU interface	item	R
S.16	GE Orbit MCR with Router – 2 Ethernet ports 1 Serial port, UHF radio 4G cell module (or fully compatible / equivalent) to work on encrypted telemetry radio network	item	R
S.17	GE Orbit ECR with Router – 1 Ethernet ports 1 Serial port, UHF radio (or fully compatible / equivalent) to work on existing encrypted telemetry radio network	item	R
S.18	Digital Radio Communication Network Monitoring and Management Software (as per JW Specification)	Unit	R

Item	Description	Units	Unit Rate (Excl. VAT)
	Card Convertors & Surge Protection		
S.19	Analogue Input Surge protection 4 Channel with Ribbon cable interface	Unit	R
S.20	Digital input Surge protection - 4 Channel with Ribbon cable interface	Unit	R
S.21	Surge protection - 2 Channel	Unit	R
S.22	Relay Output Module - 4 Channel with Ribbon cable interface	Unit	R
	Power Supplies, Load Shedding etc.		
S.23	Fused Power Distribution Board	Unit	R
S.24	12 to 24 Volt Converter Unit 5 A	Unit	R
	Cell Phone Equipment		
S.25	Cell Antenna (Panel Mount)	Unit	R
S.26	Cell Antenna (Magnetic Mount)	Unit	R
S.27	Cell Signal Booster Plus PSU.	Unit	R
	Tag Readers		
S.28	Tag Reader	Unit	R
S.29	Tags (Dallas)	Unit	R
	Communication Server Software		
S.30	Telemetry OPC Communication Server	Unit	R
S.31	RTU Programming and Configuration software	Unit	R
	Media Converters		
S.32	RS 232 to RS 485 converter	Unit	R
S.33	USB to RS 485 Converter	Unit	R
S.34	Ethernet Modbus-TCP to RS232/485 Modbus-RTU Converter	Unit	R
S.35	Ethernet to RS232 converter	Unit	R
S.36	Ethernet to RS485 converter	Unit	R
S.37	Ethernet to Ethernet/Wi-Fi Gateway	Unit	R
	Wi-Fi Radios Link radios		
S.38	2.4 Gig Wi-Fi radio (Minimum 54 MB/sec) with POE	Unit	R
S.39	5.8 Gig Wi-Fi radio (Minimum 54 MB/sec) with POE	Unit	R
S.40	Grounding Kits	Unit	R
S.41	Ethernet Surge protection	Unit	R
S.42	POE Power Supply	Unit	R
	Radio Ancillary Equipment		
S.44	Folded Dipole UHF 440MHz	Unit	R
S.45	Yagi 3 Element 400MHz TRA-Y3E/400	Unit	R
S.46	Yagi 7 element 400MHz TRA-Y6E/400	Unit	R
S.47	Corner Reflector UHF - CR400 TRA-CR400	Unit	R
S.48	Predator 400MHz	Unit	R
S.49	Coax 5mm 50 Ohm – RG-58 (100 metre Roll)	Unit	R

Item	Description	Units	Unit Rate (Excl. VAT)
S.50	Coax 10mm 50 Ohm- RG213 (100 metre Roll)	Unit	R
S.51	Low Loss - LMR400 (100 metre Roll)	Unit	R
S.52	Foam Helix Low Loss Cable ½" (50 metre Roll)	Unit	R
S.53	RG-58 RF Connectors	Unit	R
S.54	RG-213 RF Connectors	Unit	R
S.55	LMR-400 RF Connectors	Unit	R
S.56	Foam Helix Low Loss Cable ½" Connectors	Unit	R
S.57	Polyphaser Bulkhead N-type Female (IS-50NX-C1)	Unit	R
S.58	Quarter Wave Short Circuit Protection	Unit	R
S.59	Wall mount bracket 450 mm - (HBW-WM450)	Unit	R
S.60	Galvanized Pipe 50mm x 2mm x 6m	Unit	R
S.61	Mains Lightning Protection Unit	Unit	R
S.62	RTU Programming Devices with diagnostic/programming software	Unit	R
	Enclosures & Enclosure Brackets		
S.63	Powered Coated Cabinet P 101	Unit	R
S.64	Back plate for 101 cabinet	Unit	R
S.65	Powered Coated Cabinet P 102	Unit	R
S.66	Back plate for 102 cabinet	Unit	R
S.67	Powered Coated Cabinet P 103	Unit	R
S.68	Back plate for 103 cabinet	Unit	R
S.69	Powered Coated Cabinet P 104	Unit	R
S.70	Back plate for 104 cabinet	Unit	R
S.71	Powered Coated Cabinet P 105	Unit	R
S.72	Back plate for 105 cabinet	Unit	R
S.73	Powered Coated Cabinet P 106	Unit	R
S.74	Back plate for 106 cabinet	Unit	R
S.75	Powered Coated Cabinet P 107	Unit	R
S.76	Back plate for 107 cabinet	Unit	R
S.77	Locks of the above enclosure, including brackets	Unit	R
S.78	Hardened Enclosure(Vandal Resistant)	Unit	R
S.79	Backplate for Hardened Enclosure	Unit	R
S.80	Hardened Enclosure(Vandal Resistant) for Pump Stations (PS) with VSD's	Unit	R
S.81	Backplate for PS hardened enclosure	Unit	R
S.82	Lock for Hardened Enclosure	Unit	R
	Other Equipment		
S.83	Fuses For RTU Equipment Short Glass (1 A , 2 A , 5 A, 10A)	Unit	R
S.84	Mains Isolator 2 A , 6A , 10 A	Unit	R
S.85	Instrumentation Cable 4 Core Mylar Screened / 100 metre drum	Unit	R

Item	Description	Units	Unit Rate (Excl. VAT)
S.86	Instrumentation Cable 8 Core Mylar Screened / 100 metre drum	Unit	R
S.87	Instrumentation Cable 12 Core (Twisted Pair) Mylar Screened / 100 metre drum	Unit	R
S.88	CAT 5 Cable (50 metre rolls)	Unit	R
S.89	CAT 6 Cable (50 metre rolls)	Unit	R
S.90	CAT 7 Cable (50 metre rolls)	Unit	R
S.91	CAT 7 Cable Connectors (Indoor - IP20) ea.	Unit	R
S.92	CAT 7 Cable Connectors (Outdoor - IP67) ea.	Unit	R
S.93	Decabond Instrument Cable – 4 Core 1 mm sq. /m	metre	R
S.94	Decabond Instrument Cable – 6 Core 1 mm sq. /m	metre	R
S.95	PVC SWA PVC Cable 3 Core 1.5 mm sq. /m	metre	R
S.96	PVC SWA PVC Cable 4 Core 1.5 mm sq. /m	metre	R
S.97	PVC SWA PVC Cable 7 Core 1.5 mm sq. /m	metre	R
S.98	PVC SWA PVC Cable 3 Core 2.5 mm sq. /m	metre	R
S.99	PVC SWA PVC Cable 3 Core 4 mm sq. /m	metre	R
S.100	1.5mm sq. Surfix Cable – 2 Core plus Earth /m	metre	R
S.101	1.5mm sq. Surfix Cable – 3 Core plus Earth /m	metre	R
S.102	1.5mm sq. Surfix Cable – 4 Core plus Earth /m	metre	R
S.103	1.5mm sq. Cabtyre – 3 Core /m	metre	R
S.104	2.5mm sq. Cabtyre – 3 Core /m	metre	R
S.105	10 sq. mm Yel/Grn Earth Cable /m	metre	R
S.106	35 sq. mm Yel/Grn Earth Cable /m	metre	R
S.107	10 sq. mm Bare Copper Earth Cable /m	metre	R
S.108	35 sq. mm bare copper earth cable /m	metre	R
S.109	70 sq. mm bare copper earth cable /m	metre	R
S.110	1.2 metre earth spikes with clamps	Unit	R
S.111	Splicing Kits for Instrumentation cable	Unit	R
S.112	Bootlace Ferrell's Red , Grey , Black	Unit	R
S.113	Self-Galvanizing Waterproofing Tape	Unit	R
S.114	Nominal Earth Kit	Unit	R
S.115	Comprehensive Earth Kit	Unit	R
S.116	Earth Bar	Unit	R
S.117	Outstation Security Bracket	Unit	R
S.118	Galvanized Conduit 20mm x 6m	Unit	R
S.119	Radio / RTU Fly leads	Unit	R
S.120	Installation Sundries	Unit	R
S.121	Passive Alarm Detectors (Pet Friendly) Indoor – Wired - 525DM (PA1090)	Unit	R
S.122	Passive Alarm Detectors (Pet Friendly) Outdoor – Wired - DG58 (PA1084)	Unit	R

Item	Description	Units	Unit Rate (Excl. VAT)
S.123	Passive Alarm Detectors (Pet Friendly) Indoor - Wireless - PMD75 (PA3407)	Unit	R
S.124	Passive Alarm Detectors (Pet Friendly) Outdoor - Wireless - PMD85 (PA3730)	Unit	R
S.125	6 Zone Alarm panel	Unit	R
S.126	Wireless receiver panel with keypad and remote	Unit	R
S.127	Industrial Heavy Duty Magnetic door Switches	Unit	R
S.128	Magnetic Door lock	Unit	R
S.129	Mechanical electronic control door lock.	Unit	R
S.130	220 V Interposing relay with base	Unit	R
S.131	12 V Interposing Relay with base	Unit	R
S.132	24 V Interposing relay with base	Unit	R
S.133	8 Pin Relay	Unit	R
S.134	11 Pin Relay	Unit	R
S.135	8 Pin Base	Unit	R
S.136	11 Pin Base	Unit	R
S.137	11 Pin 3 Phase Failure Relay	Unit	R
S.138	Plastic Glands No's 00, 0, 1, 2	Unit	R
S.139	Steel Compression Glands No's 0	Unit	R
S.140	Steel Compression Glands No's 1	Unit	R
S.141	Steel Compression Glands No's 2	Unit	R
S.142	Steel SWA Gland No. 0	Unit	R
S.143	Steel SWA Gland No. 1	Unit	R
S.144	Steel SWA Gland No. 2	Unit	R
S.145	Shroud No's 0, 1, 2	Unit	R
S.146	Keyswitch Body - SACDC (ECX1410)	Unit	R
S.147	Keyswitch Support Base and Contact 1 x N/O, 1 x N/C - SACDC (ECX1035)	Unit	R
S.148	Add on Contact Blocks N/C – SACDC (ECX1030)	Unit	R
S.149	Add on Contact Blocks N/O – SACDC (ECX1040)	Unit	R
S.150	Fuse Holder – 10 x 35mm	Unit	R
S.151	Fuse 2A – 10 x 35mm	Unit	R
S.152	Neutral Link – 10 x 35mm	Unit	R
S.153	8 Ahr LiFePo4 Battery	Unit	R
S.154	40AHr LiFePo4 Battery	Unit	R
S.155	100AHr LiFePo4 Battery	Unit	R
S.156	150 Ahr LiFePo4 Battery	Unit	R
S.157	500 Watt Solar Panel	Unit	R
S.158	Victron Smart Solar MPPT 100/30 (or equivalent)	Unit	R
S.159	Victron Smart Solar MPPT 100/50 (or equivalent)	Unit	R

Item	Description	Units	Unit Rate (Excl. VAT)
S.160	500 Watt Solar Panel Bracket	Unit	R
S.161	Pratley Klink-Lok Junction Box No.1	Unit	R
S.162	Pratley Klink-Lok Junction Box No.2	Unit	R
S.163	35W Siren	Unit	R
S.164	2 Hole Sound Bomb	Unit	R
S.165	4 Hole Sound Bomb	Unit	R
S.166	20 mm PVC Conduit (6 metre)	Unit	R
S.167	20 mm Galvanized conduit (6 metre)	Unit	R
S.168	PVC Trunking 16x25 mm per m	Unit	R
S.169	PVC Trunking 50x50 mm per m	Unit	R
S.170	Ultrasonic Wall mount Swing Arm Assembly	Unit	R
S.171	Ultrasonic Level offset Chimney	Unit	R
S.172	Pipeline Pressure Drilling including one ½“ socket	Unit	R
S.173	100mm Core Drilling through concrete slab excluding travel	Unit	R
S.174	Unistrut	per metre	R
S.175	Unistrut Spring Nuts – M8	Unit	R
S.176	Cable Tray 50mm galvanised light	Unit	R
S.177	Cable Tray 100mm galvanised light	Unit	R
S.178	Cable Tray 200mm galvanised light	Unit	R
	Instrumentation		
S.199	Differential Submersible Pressure Sensor – 5 metre (loop powered)	Unit	R
S.200	Differential Submersible Pressure Sensor – 10 metre (Loop Powered)	Unit	R
S.201	Differential Submersible Pressure Sensor – 15 metre (Loop Powered)	Unit	R
S.202	Loop power 4-20 mA Pressure Transducers with a 5 meter cablet	Unit	R
S.203	Pressure Switches	Unit	R
S.204	Ultrasonic Clamp-on Flow Meter with Modbus RTU Comms	Unit	R
S.205	Flow Switches	Unit	R
S.206	Radar Level Sensor (complete) with 4-20 mAmp. Also RS485 MODBUS-RTU interface.	Unit	R
	Stainless steel Pressure Sensor Couplings		
S.207	Swagelok Fittings – SS-8-TA-7-4RG	Unit	R
S.208	Swagelok Fittings – SS-810-3-8TMT	Unit	R
S.209	Swagelok Fittings – SS-QC8-B-810	Unit	R
S.210	Swagelok Fittings – SS-811-PC	Unit	R
S.211	CP Ball Cock 15 mm F–F (PN25)	Unit	R
S.212	Nylon decoupler 15mm M-M (PN25)	Unit	R
S.213	Nylon decoupler 15mm M-F (PN25)	Unit	R

Item	Description	Units	Unit Rate (Excl. VAT)
S.214	Nylon decoupler 15mm F-F (PN25)	Unit	R
S.215	Instrumentation T with quick release (Stainless Steel 304)	Unit	R
	Galvanised Pressure Sensor Couplings		
S.216	MC Equal Tee	Unit	R
S.217	WS Barrel Nipple	Unit	R
S.218	MC Red Bush 1/2 - 1/4 "	Unit	R
S.219	WS Barrel Nipple	Unit	R
S.220	Water Pressure Coupler Quick release	Unit	R
S.221	Water Connector	Unit	R
S.222	Water Reducing Manifold	Unit	R
S.223	Nylon decoupler 1" (25mm) F-F (PN25)	Unit	R
S.224	Nylon decoupler 1" (25mm) M-M (PN25)	Unit	R
S.225	Nylon decoupler 1" (25mm) M-F (PN25)	Unit	R
S.226	Instrumentation T with quick release (Galvanised)	Unit	R
S.227	1" (25mm) bronze material ball valve	Unit	R
S.228	Instrumentation T with quick release (Brass)	Unit	R
	UPS Equipment		
S.229	1 KVA UPS with 4-hour LiFePO4 backup @ 80% load (Online Double-Conversion)	Unit	R
S.230	2 KVA UPS with 4-hour LiFePO4 backup @ 80% load (Online Double-Conversion)	Unit	R
S.231	10 KVA UPS 19" rack mounted with 4-hour LiFePO4 backup @ 80% load (Online Double-Conversion)	Unit	R
	LABOUR RATES		
	Normal working Hours		
S.232	Technical Assistant	Per Hour	R
S.233	Telemetry Technician	Per Hour	R
S.234	Radio Specialist	Per Hour	R
S.235	Telemetry Engineer	Per Hour	R
S.236	SCADA System Integrator	Per Hour	R
	After Hours / Public Holidays		
S.237	Technical Assistant	Per Hour	R
S.238	Telemetry Technician	Per Hour	R

Item	Description	Units	Unit Rate (Excl. VAT)
S.239	Radio Specialist	Per Hour	R
S.240	Telemetry Engineer	Per Hour	R
S.241	SCADA System Integrator	Per Hour	R

Prices Firm / Non-Firm?

Suppliers to complete the below according to their company details.

INFORMATION FOR SPECIFIC GOALS ANALYSIS	
BUSINESS OWNED BY 51% OR MORE -BLACK PEOPLE	
1. Percentage (%) of Black Ownership)	
2. Is Black Ownership 51% or more? **(Yes or No)**	
BUSINESS OWNED BY 51% OR MORE – BLACK YOUTH	
1. Percentage (%) of Ownership by Black Youth	
2. Is the percentage of Black Youth Ownership 51 % or more? **(Yes or No)**	
BUSINESS OWNED BY 51% OR MORE-WOMEN	
1. Percentage (%) of Ownership by People who are Women	
2. Is the percentage of People who are Women 51 % or more? **(Yes or No)**	
BUSINESSES LOCATED WITHIN THE BOUNDARIES OF A REGION IN COJ, COJ MUNICIPALITY OR IN GAUTENG PROVINCE	
1. Is your business located in the Gauteng Province? **(Yes or No)**	
2. Is your business located in the COJ Municipality? **(Yes or No)**	
3. Is your business located within the region of the COJ? **(Yes or No)**	
BUSINESS OWNED BY 51% OR MORE - BLACK PEOPLE WHO ARE MILITARY VETERANS	
1. Percentage (%) of Ownership by Black People Who Are Military Veterans	
2. Is the percentage of Ownership by Black People Who Are Military Veterans 51% or more? **(Yes or No)**	
BUSINESS OWNED BY 51% OR MORE-BLACK PEOPLE WITH DISABILITIES	
1. Percentage (%) of Ownership by Black People With Disabilities	
2. Is the percentage of Ownership by Black People with Disabilities 51% or more? **(Yes or No)**	
SMME (AN EME OR QSE) OWNED BY 51% OR MORE - BLACK PEOPLE	
1. What is the Enterprise Type? EME – turnover is less than R10m QSE – Turnover between R10m and R50m Generic – Turnover is R50M of more	

JOINT VENTURE (JV), CONSORTIUM OR EQUIVALENT	
1. What is the percentage (%) of ownership for each party?	
SUBCONTRACTING WITH COMPANIES AT LEAST 51% OWNED BY HISTORICALLY DISADVANTAGED INDIVIDUAL (HDI) GROUPS MENTIONED ABOVE	
1. What is the percentage (%) that will be sub-contracted to companies that are at least 51% owned by Historically Disadvantaged Individual (HDI) groups mentioned above?	

INFORMATION PRICE BREAKDOWN			
DESCRIPTION	**BREAKDOWN IN PERCENTAGE**	**APPLICABLE INDEX**	**IMPACTED BY ROE (YES/NO)**
Raw materials			
Direct Labour			
Direct Overheads			
Transport			
Indirect Labour			
Indirect Overheads			

Total	**100%**		

provide the following information (if Applicable)

TYPICAL PRICE ADJUSTMENT FORMULA INCLUDING INTERVALS

SUBMITTED DOCUMENTATION IN SUPPORT OF A REQUEST FOR A PRICE ADJUSTMENT

SOURCE OF RAW MATERIAL	
DESCRIPTION	**COUNTRY OF ORGIN**
Raw materials	

ASSOCIATED RISKS	
RISK CATEGORY	**RISK MITIGATION**
Economic:	
Security of Supply	
Supply and Demand	
Rate of Exchange	
Operational:	
Capacity	
Logistics	