PART C3: SCOPE OF WORK

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C3.1 *EMPLOYER'S* WORKS INFORMATION

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SECTION 1

1 Description of the *works*

1.1 Executive overview

Transnet National Ports Authority (TNPA) owns, manages, controls and administers the South African Ports. TNPA's responsibility is to ensure that the Ports are efficient and economical. In doing so, TNPA is on a journey to a world-class port system thus introducing a new Operating Model, focusing on effective oversight, utilities management (water & electricity) and enabling platform which supports and monitors all operational activities across the entire ports system.

Utilities management assist in ensuring that the appropriate revenue is recovered against consumption of utilities for TNPA properties, other Transnet Operational Divisions' (Port Terminals and Freight Rail) and Tenants. Ultimately, this aids in identifying utilities constraints and ensure that these are addressed timeously and efficiently.

The management of utilities differs in all eight commercial Ports. As a result, the business is faced with under recoveries that emanates from various attributing factors which are:

Table 1: Under-recoveries and attributing factors.

No:	Utilities	Attributing factors
1.	Water	**Infrastructure**
		• Ageing and reaching the end of its useful life. • The increasing incidents of failures; leading to losses due to undetected leaks and unaccounted water (UAW). • Illegal connections and usage.
		Metering
		• Unregistered and unmetered connection points. • Manual capturing of readings. • Inadequate metering of usage at the connecting points for private tenants and other Transnet OD's.
		Billing and Recoveries
		• High cost paid to municipalities versus recoveries. • Improper tariff application and billing (surcharge, connection costs and maintenance costs). • Under-recoveries result from UAW and outstanding water bills where TNPA supplies water and the End-user does not pay for the service.

No:	Utilities	Attributing factors
2.	Electricity	**Infrastructure**
		• Capacity to identify Poor power quality due to the lack of Power Factor Correction equipment (PFC) in some Ports. • Absence of PFCs resulting in high energy consumption, high municipality bills and penalties.
		Metering
		• Outdated meters (analog) - not compatible with Automatic Meter Reading/Advanced Metering Infrastructure (AMR/AMI). • Unmetered supply points.
		Billing and Recoveries
		• Inconsistent tariff structure across the port system. • Manual recording of readings resulting in human errors (inaccurate billing).

TNPA is in search of a utility management software solution to assist the business in better management of utilities across Transnet. The software solution shall have the capability to monitor, perform analysis, retrieve water and electricity data from various software and be able to store TNPA's metering data in one central point.

In conclusion, leveraging on best practices will result in accurate billing as well as the reviewing and implementation of the following:

- The processes related to utilities management (water, electricity, rates and taxes) as far as:
    - Asset class, municipal account and expense validation.
    - Expense and accounts processing (capture, process, payment and reconciliation).
    - Recovery process (billing, collections and annual escalations).
- Development and embedment of a utilities management (smart metering system) which will detail how the entire process will be managed.

The scope to be carried out under this Contract includes but is not limited to the following items of work as summarised below which covers supply, installation, configuration, integration, design of communication networks [Local Area Network (LAN) & Private Wireless Network e.g. Radio Frequency (RF)], testing and commissioning of a utilities management solution across all ports:

- Supply, install, configure, test and commission smart electricity meters for measurement of different electrical parameters listed elsewhere in the document including Active Energy (kWh/MWh), Reactive Energy (kVArh/MVArh), Apparent Energy (kVAh/MVAh) etc.
- Supply, install, configure, test and commission smart water meters for measurement of water consumption (KL), alarm notification for high flow set points and trigger night flow analysis.
- Supply, install, configure, test and commission all necessary AMR/AMI communication modules, transceivers, repeaters, gateways etc. All equipment to be supplied shall be of the latest AMR/AMI technologies.
- Design, develop, install, integrate (with existing systems in each port or lack thereof), test and commission a new utilities management software solution across all ports.
- Perform all the works, procurement, installation, testing and supervision to ensure compliance with the Employer's Works Information and all applicable standards.
- Design, supply and installation of networks (i.e. LAN and Wireless) including trenching, manholes, sleeves etc..
- Updating of as-builts, operating and maintenance manuals,
- Maintenance and Technical Support post implementation for a period of 12 months:
- In conjunction with the Defects Liability Period the Contractor shall undertake all system repairs, service and maintenance requirements including provision of manpower and consumables.
- Provision of the critical spares where required.
- Provision of training on the AMR and Utilities Management Software Solution.

1.2 Interpretation and terminology

Table 2: Abbreviations used in this Works Information

Abbreviation	Meaning given to the abbreviation
AIA	Authorised Inspection Authority
AMR	Automatic Meter Reading
BBBEE	Broad Based Black Economic Empowerment
CEMP	Construction Environmental Management Plan
CD	Compact Disc
CDR	*Contractor* Documentation Register
CSHEO	*Contractor's* Safety, Health and Environmental Officer
CM	Construction Manager
DWG	Drawings
EO	Environmental Officer
GIS	Geographic Information System
HAZOP	Hazard and Operability Study
HSSP	Health and Safety Surveillance Plan
JSA	Job Safety Analysis

Abbreviation	Meaning given to the abbreviation
Native	Original electronic file format of documentation
PES	Project Environmental Specifications
PHA	Preliminary Hazard Assessment
PSSM	Project Site Safety Manager
QA	Quality Assurance
SANS	South African National Standards
SASRIA	South African Special Risks Insurance Association
SES	Standard Environmental Specification
SHE	Safety, Health and Environment
SIP	Site Induction Programme
SMP	Safety Management Plan
uPVC	Unplasticized Poly Vinyl Chloride
TNPA	Transnet National Port Authority
OEM	Original Equipment Manufactures
K/L	Kilolitre
kWh	Kilo Watt hour
KVA	Kilovolts-Ampere
kVAR	Kilovolts-Ampere Reactive
R	Rands
AMR	Automatic Meter Reading
IoT	Internet of Things

2 Engineering and the *Contractor's* Design

2.1 *Employer's* design

2.1.1 No designs have been performed. However, the *Employer* shall supply the following information:

- Works Information
- Required Software Dashboards
- Project Specifications for Fiber Cable Installation

2.1.2 The *Employer* grants the *Contractor* authority to use existing copyrighted data presented for the purpose of the *works* only.

2.2 Parts of the *Works* which the *Contractor* is to design

2.2.1 The *Contractor* designs the parts of the *works* as outlined in this section for each port listed below:

a. Port of Richards Bay.
b. Port of Durban.
c. Port of East London.
d. Port of Ngqura.
e. Port of Port Elizabeth.
f. Port of Mossel Bay.
g. Port of Cape Town.
h. Port of Saldanha.

- Design, develop, install, test and commission a utilities management software solution.
- Design all graphic displays, dashboards, tabs (Water, Electricity, Financial etc.) and report templates on the utilities management system as per the required Software Dashboards.
- Design, supply, install, test and commission Fibre Optic (LAN) and Wireless Communication Networks in all 8 ports (in compliance with Annexures C, E & L). This includes the required Civil works for fibre routing such as trenching, sleeves, manholes, road cutting backfilling etc in accordance with Project Specifications for Fiber Cable Installation.
- Develop and design all communication and instrumentation required for AMR including linking all smart meters to the billing servers and setting up management workstations.
- Program and integrate the software solution to the new and existing systems as well as the billing server(s).
- Billing Software: Create accounts, link them to the meters and setup the tariffs.

- Install a Central Server at HQ and link all data servers from all ports to the one central repository and allow retrieval of information across the system.
- Backup data locally and all ports' centrally to Head Quarters (HQ).
- Should a server fail or malfunction at a particular port, the data shall failover (Backup) to HQ.
- Design all the changes required to suit existing equipment or software.

The final design and installation drawings must be based upon site confirmed dimensions and conditions. It is the responsibility of the *Contractor* to confirm all site conditions and produce these drawings to suit the actual conditions per port.

The *Contractor* is responsible for the design and overall integration of the *works* with the existing installations and software systems. All AMR gateways are to be linked through the LAN to upload data from the field devices to the billing servers.

The *Contractor* is required to submit all system designs and associated information to the *Employer* for review prior to procuring the systems equipment, this includes but is not limited to the following deliverables:

a. Technical specification of the AMR system
b. AMR system drawings including architectural layout and physical equipment and cable routing layout
c. Software Design document e.g. Functional design specification (FDS) and/or detailed design specification (DDS)
d. Network (wired and wireless) design documents e.g. technical specification and network architecture drawings
e. Equipment lists
f. Equipment data sheets
g. Cable Schedules
h. Schematic drawings
i. Hook-up drawings (where applicable)
j. Execution strategy report/ method statement
k. Drawing Register
l. Document Register

2.3 Procedure for submission and acceptance of *Contractor's* designs/ documentation

2.3.1 The *Contractor's* documentation shall be issued to the *Employer* under the cover of the *Contractor's* Transmittal Note indicating all Contract references (i.e., Project No, Package No, etc.) as well as the *Contractor's* Project Document Number, Revision Number, Title and chronological listing of transmitted documentation. Formats of *Contractor* data submitted is dependent on the project procedure and shall be specified by the *Employer*, upon the notified request of the *Contractor*.

2.3.2 The *Contractor* shall deliver both hard copies and electronic media copies (USB) to the *Employer* either at the address stated within the Contract Data or at the Project site office.

2.3.3 All electronic documentation shall be submitted by the *Contractor* in Adobe Acrobat (.PDF) and native file format.

2.3.4 The *Contractor* shall submit design drawings and other technical documentation for review and acceptance by the *Project Manager*.

2.3.5 No manufacturing or installation work is to commence until the drawings have been accepted.

2.4 Review and Acceptance of *Contractor's* Documentation

2.4.1 The *Contractor* submits documentation as required by the '*Works* Information' to the *Project Manager* for review and acceptance.

2.4.2 Acceptance of documentation by the *Employer* will in no way relieve the *Contractor* of their responsibility for the correctness of information, or conformance with their obligation to Provide the Services. This obligation rests solely with the *Contractor*.

2.4.3 After review, a copy of the original reviewed/marked-up drawing/document, with the *Employer's* consolidated comments and document status marked on the Squad Check Form, is scanned and the copy shall be returned to the *Contractor* under cover of the project's Transmittal Note for revision or re-submittal as instructed.

2.4.4 The *Contractor* shall allow the *Employer'* two weeks (unless otherwise stated and agreed) to review and respond to the *Contractor's* submission of their documentation, i.e., from time of receipt by the project to the time of despatch.

2.4.5 On receipt of the reviewed documentation the *Contractor* shall make any modifications requested/marked-up and resubmit the revised documentation to the *Employer* within two weeks. Queries regarding comments/changes should be addressed with the *Employer* prior to re-submittal.

2.4.6 Any re-submittals, which have not included the changes/comments identified, will be returned to the *Contractor* to be corrected. The *Contractor* shall re-issue the revised documentation incorporating all comments and other specified details not included in the previous issue.

2.5 Other requirements of the *Contractor's* designs

2.5.1 The *Contractor's* designs shall comply with all the SABS/IEC specifications, Codes of practice and all Engineering standards required for the works to be performed.

2.6 Use of *Contractor's* design

2.6.1 The *Contractor* grants the *Employer* a licence to use the copyright in all design data presented to the *Employer* in relation to the *works* for any purpose in connection with the construction, re-construction, refurbishment, repair, maintenance and extension of the *works* with such licence being capable of transfer to any third Party without the consent of the *Contractor*.

2.6.2 The *Contractor* vests in the *Employer* full title to the intellectual property and copyright in the design data created in relation to the Works, irrespective of where or what those Works may be.

2.6.3 The *Contractor* grants the *Employer* a non-exclusive license, in accordance with the provisions of Section 22 of the Copyright Act 1978, to copy any document/calculation compiled/done by the *Contractor* in connection with the Works, to make free and unrestricted use thereof for his own purposes, modify some or having it modified by a third party for any reasons, to provide copies thereof to a third party (*Contractor*s or Consultants) of the *Employer* to be used by them for the purposes of tendering or consultancy.

2.6.4 Furthermore, if any such document/calculation by any principal *Contractor* or Sub*Contractor* is used for the Works, the *Contractor* requests such principal *Contractor* or Sub*Contractor* to grant to the *Employer* a similar non-exclusive license for the purposes set out herein. The provisions of this clause do not apply to documents made in connection with the manufacturing process of Plant but only to the Plant itself.

2.7 As-built drawings, operating manuals and maintenance schedules

The *Contractor* shall provide, monthly, throughout the duration of the contract, redline marked-up drawings, including all changes to the drawings for the entire site, with accurate information pertaining to all constructed installations and infrastructure, irrespective of whether the equipment and infrastructure is underground or above ground. Final as-built drawings shall be submitted in 'rvt', 'dgn', 'dxf', 'dwg' and .PDF formats as applicable.

The *Contractor* provides the following:

2.7.1 As-Built/Final Documentation

2.7.1.1 In Providing the Services (including all incidental services required), the *Contractor* shall conform and adhere to the requirements of the *Employer's* Document Submission.

2.7.1.2 As-Built drawings to be signed off by the Construction Manager and a TNPA representative.

2.7.1.3 The *Contractor* will prepare the final As-Built drawings within 14 days of receiving the accepted red line drawings from the *Employer*.

2.7.1.4 Though stated below, the scope and format, including the required indexing of the as-built information shall still be discussed and agreed with the *Employer* prior to compilation and submission of the final documentation.

2.7.1.5 All as-built documents shall be signed off by the *Contractor* and submitted to the *Employer* for approval, as these are developed and at completion of the *Works*.

2.7.1.6 All as-built documents shall be furnished to the *Employer* in both hard and soft copy formats.

The *Contractor* is required to deliver, but not limited to the following documentation as part of the *Works*:

2.7.1.7 All design information in 2.2.1 and As-Built drawings in hard and soft copies.

2.7.1.8 Equipment data sheets and OEM Manuals (Configuration, installation, support and user manuals, etc.)

2.7.1.9 Applicable systems software and licenses, including all final programming of equipment on CD-ROMs/ USB.

2.7.1.10 SAT Procedures & reports including equipment certificates, which at minimum includes the following,

a) System execution strategy/ method statement

b) LAN execution strategy/ method statement

c) SAT certificates

d) Optic fibre cables test results (where required)

e) Ethernet cables test results (where required)

f) Wireless network coverage test results

g) Network bandwidth report

h) Network and software security test report

2.7.1.11 Device Configuration Records that accurately captures the system and software configuration of each configurable device (e.g., switches, meters, etc.)

2.7.1.12 Equipment list complete with serial numbers or part numbers, etc.

2.7.1.13 Cable schedules

2.7.1.14 Patching Schedule and IP Address schedule including used switch ports

2.7.1.15 Operating and Maintenance procedures

2.7.1.16 End of life software, firmware, and hardware support information

2.7.1.17 Equipment guarantees/warrantees.

2.7.1.18 Certificate of Compliance where applicable

2.7.1.19 Any other as-built documentation as required by the *Employer.*

2.7.1.20 Critical and routine spare part lists

2.7.1.21 Documents and Drawings registers

2.7.2 As-Built Drawings

2.7.2.1 The *Contractor* shall keep a separate set of project drawings for marking up changes to the original design as the Works progress. Marked-up red lined hard copies of drawings shall be maintained by the *Contractor* during installation of the equipment and shall be included in the handover documentation.

2.7.2.2 As-built drawings shall include the drawings issued by the *Employer* (if any) as well as any drawings compiled by the *Contractor*.

2.7.2.3 Software copies of the "as-constructed" drawings shall be provided in 'rvt', 'dgn', 'dwg', 'dxf' and 'PDF' formats as applicable and requested by the *Employer*.

The final, as-built drawings shall be signed off by the *Contractor* and submitted to the *Employer* for approval at completion of the Works.

2.7.3 Data Books

Data packs for all equipment and materials shall be provided by the *Contractor* in electronic and hard-copy format and shall be neatly indexed and referenced to facilitate easy navigation by the *Employer* between documents. This shall include, but not be limited to, the following:

2.7.3.1 Final design documentation as stated in 2.7.1, including native software files.

2.7.3.2 As-built drawings including but not limited to as stated in2.7.2.

2.7.3.3 The *Contractor* prepares two (2) marked up hard copies of the latest revision of the *Employer* documents/drawings to represent the As-Built/Final status.

2.7.3.4 The mark-ups shall be in RED pencil or pen and be complete and accurate. The *Contractor* submits same to the *Project Manager* under cover of a *Contractor's* Transmittal Note.

2.7.3.5 Drawings and charts larger than A4 are folded and those greater than A3 are enclosed in an A4 plastic pocket of adequate strength.

2.7.3.6 The *Contractor* submits the draft Table of Contents to the *Project Manager* for acceptance prior to the compilation and official submittal of the manuals.

2.7.3.7 The originals of all brochures shall be issued to the *Project Manager*. When a general brochure is applicable to a range of equipment, then the specific item, catalogue number or model number

shall be stated, which is best achieved by introducing a separate index page, which cross-references the specific item to a tag number.

2.7.3.8 Where manuals include drawings that still need to be revised to "As-Built" status, and such manuals are required prior to 'As-Built' status, the manual will not be considered to be in its final form until the "As-Built" version of each such drawing has been incorporated. The required number of copies of the manual (s) shall be as specified by the *Project Manager* and submitted per type or model number of equipment included in the contract, or as specified by the *Project Manager*. A typical example of what the binder/file (s) shall be marked with on the spine and the front cover is as follows:

- Project No./Name
- Manual Title, e.g. Installation, Maintenance and Operating Manual
- Manual Numbering (e.g. Volume 1 of 2, etc.)
- Contract Number
- Contractor Name

2.7.3.9 Unless otherwise stated, the required number of copies of all As-Built/Final/Data Packs shall be:

- 3 x hard copies (Full size)
- 3 x USB drives Adobe Acrobat (.pdf) and "Native" formats

2.7.3.10 The physical and postal address, phone, website, email and reference numbers of all Sub-*Contractors* is provided.

2.7.4 Installation, Maintenance and Operating Manuals

2.7.4.1 Operating and maintenance manuals for all installations are to be provided by the *Contractor*. The *Employer* may request, and the *Contractor* shall provide, additional details for specific items or components, or further information for Works done by other disciplines.

2.7.4.2 The operating and maintenance manuals shall be neatly bound in a single A4 or A3 format book or file. As a minimum, three paper copies as well as an electronic PDF version will be required. Reference shall be made to the specifications and bill of quantities for additional requirements.

2.7.4.3 The *Contractor* provides manuals in an A4 hard covered, red, grease and waterproof binder, using 2 ring type binders. The manuals are well indexed and user friendly and include a summarized Table of Contents.

2.7.4.4 The required number of copies of the manual(s) shall be as specified by the *Employer* and submitted per type or model number of equipment included in the contract, or as specified by the *Project Manager*.

2.8 Plant and Material

2.8.1 Schedule of spares and consumables

The *Contractor* provides a schedule of recommended spare parts for the complete system. The following data is to be listed for item:

- Part description.
- Positional assembly indication.
- Part/drawing number.
- Quantity used.
- Quantity recommended.
- Delivery time and price.

2.8.2 Provision of spare parts and consumables

The *Contractor* provides all spare parts and consumables as allowed for in the Pricing Schedule.

3 Construction

3.1 Execution Plan

3.1.1 Sequence of Construction or Installation

All construction activities and sequencing of the works shall be planned as per the programming and method of construction outlined in this document.

This document contains the engineering and construction activities for all eight ports. The ports have been organized into three main regions: Eastern, Central and Western, each with its own distinct characteristics and specialized services. The Eastern region includes Durban and Richards Bay. The Central region consists of East London, Ngqura and Port Elizabeth. The Western region is composed of Mossel Bay, Cape Town and Saldanha.

The *Contractor* is required to have construction/ installation Teams per region (Eastern, Central and Western) and the Teams are to be subdivided into two i.e., one for the supply and installation of water meters and one for the supply and installation of electricity meters. These installations shall take place simultaneously. The *Contractor* is required to provide all necessary resources, tools and equipment to support this strategy. These requirements shall be included in the C*ontractor's* schedule by the *Contractor*.

Eastern Region		
a.	Port of Richards Bay	Team One - Water Team Two - Electricity
b.	Port of Durban	Team Two - Electricity
Central Region		
c.	Port of Port Elizabeth	Team One - Water Team Two - Electricity
d.	Port of East London	Team One - Water Team Two - Electricity
e.	Port of Ngqura	Team One - Water Team Two - Electricity
Western Region		
f.	Port of Cape Town	Team One - Water Team Two - Electricity
g.	Port of Saldanha	Team One - Water Team Two - Electricity
h.	Port of Mossel Bay	Team One - Water Team Two - Electricity

3.2 Temporary *works*, site services & construction constraints

3.2.1 *Employer*'s Site entry and security control, permits and Site regulations

3.2.1.1 The *Contractor* complies with the *Employer's* site entry, security control, permits, site regulations and Port rules.

3.2.1.2 The *Contractor* shall take out temporary entry permits for all personnel working within the harbour. All costs incurred shall be borne by the *Contractor.*

3.2.1.3 The *Contractor* complies with the following requirements of the *Employer*:

a) All *Contractor's* personnel who will be working on this project shall undergo a safety induction conducted by *Employer's* representative before occupying the *Employer's* premises.

b) All Contractor's personnel shall always wear their uniform bearing their Employer's name or colour code to be easily identifiable as being employed by the company concerned.

c) The Contractor personnel shall adhere to all the standard operating procedures for the Employer's security to ensure compliance to the applicable standards and regulations [e.g., International Ship and Port Facility Security (ISPS) Code].

d) The Contractor personnel shall ensure compliance with National Ports Act and Port Rules.

e) The Contractor shall adhere to the stipulated speed limits.

3.2.2 Restrictions to access on Site, roads, walkways and barricades

3.2.2.1 The *Contractor* is specifically excluded from entering the *Employer's* operational areas which are adjacent to the site and Working Areas unless authorized by the *Project Manager*. The Contractor plans and organises his work in such a manner to cause least possible disruptions to the *Employer's* operations.

3.2.2.2 The *Contractor* ensures the safe passage of traffic to and around the Site and Working Areas at all times, this includes providing flagmen, protective barriers, signage etc. for protection, direction and control of traffic.

3.2.3 People restrictions on Site; Hours of Work, Conduct and Records

3.2.3.1 The *Contractor's* normal hours of work for his people employed on the Site shall be in accordance with the requirements of the Department of Labour or with the agreement of the relevant trade unions. The Contractor shall advise the *Project Manager* of his intended working hours at the first Project Kick-off meeting.

3.2.3.2 The *Project Manager's* office hours are 08h00 to 16h30 Monday to Friday. The offices are closed on Saturdays, Sundays and Public Holidays.

3.2.3.3 The *Contractor* keeps daily records of his people, Plant and Equipment engaged on Site and Working Areas (including Sub-*Contractors*) with access to such daily records available for inspection by the *Project Manager* at all reasonable times.

3.2.4 Health and Safety facilities on Site

3.2.4.1 All health and safety matters associated with the works shall be dealt with in accordance with Occupational Health & Safety Act, 1993 (Act No. 85 of 1993) and the Transnet National Ports Authority Health and Safety Specifications which will be attached to the Works Information.

3.2.4.2 The *Contractor* shall prepare, implement and administer the *Contractor's* Health and Safety Management Plan (CHSMP). The Health and Safety Management Plan must provide a systematic method of managing hazards and implementing control measures.

3.2.4.3 The *Contractor* must prepare and submit the occupational health & safety file to the *Project Manager* for acceptance. The *Project Manager* will then submit the Occupational Health & Safety File to the *Employer's* Legal & Compliance Department for approval before the commencement of the *works*.

3.2.4.4 Pre-employment medical examinations as well as exit medicals will be required and must further include for chest X-rays. These medical examinations must be carried out by a registered Occupational Health practitioner. All costs associated will be for the *Contractor's* account.

3.2.4.5 The *Contractor* ensures that its Sub-*Contractors* comply with the requirements of the Occupational Health & Safety Act, 1993 (Act No. 85 of 1993).

3.2.4.6 The *Contractor* performs the works and all construction activities within the site and Working Areas in accordance with the *Contractor's* Health and Safety Management Plan (CHSMP).

3.2.4.8 The Contractor complies with the requirements stated under clauses 3.1.2 and 3.1.4 of C3.1 *Employer's* Works Information.

3.2.5 Title to Materials from stripping, demolition and excavation

The *Contractor* has no title to Materials arising from removal of redundant equipment in the performance of the *works*. Redundant meters (water and electricity) are to be temporary stored at the *Contractor's* site camp; this will then be later transported to TNPA maintenance depots. However, all waste material shall be cleared from site by the *Contractor* and disposed in a designated disposal area or suitable waste container to avoid pollution. The *Project Manager* shall instruct the *Contractor* how to label, mark, set aside and/or dispose of such Materials for the benefit of the *Employer* in accordance with ECC Clause 73.1.

3.2.6 Cooperating with and obtaining acceptance of Others

3.2.6.1 The *Contractor* performs the work and co-operates with the *Employer* (including the agents of the *Employer*) who operates on site during the entire duration of the contract period. The *works* will be performed in an operational environment.

3.2.6.2 The *Contractor* performs the *works* and co-operates with Others, of whom the *Contractor* is to be notified once appointed by the *Employer*, who operates on site during the entire duration of the contract period.

3.2.7 Publicity and progress photographs

3.2.7.1 The *Contractor* does not advertise the Contract or the project to any third Party, nor communicate directly with the media (in any jurisdiction) whatsoever without the express written notification and consent of the *Project Manager*.

3.2.7.2 The *Contractor* obtains the permission and approval of the *Project Manager* before erecting any notice boards or using the details of the contract in any advertising media.

3.2.8 *Contractor's* Equipment

3.2.8.1 The *Contractor* keeps daily records of his Equipment used on Site and the Working Areas (distinguishing between owned and hired Equipment) with access to such daily records available for inspection by the *Project Manager* at all reasonable times.

3.2.8.2 All Equipment used by the *Contractor* on Site shall be properly maintained and operated. All vehicles on public roads shall be roadworthy, with the necessary licences and safety requirements. A checklist/register shall be implemented which lists the operator's qualifications and medical records.

3.2.8.3 The *Contractor* complies with the following:

a) The *Contractor* shall supply all necessary Materials, labour, tools, Equipment, PPE, demarcating signage as per the latest construction regulation and transport required for the proper Completion of the *works*.
b) The Contractor shall submit a comprehensive list of Equipment, intended for use on this contract.
c) The use of all such Equipment shall be subject to approval by the Project Manager, though such approval shall not relieve the Contractor of any of their responsibilities under the contract.
d) Equipment and Materials to be used, shall be of high quality, and shall comply with all relevant specifications, codes as mentioned in the previous clause as well as Occupational Health and Safety Act of 1993(Act 85 of 1993).

3.2.9 Equipment provided by the *Employer*

3.2.9.1 No Equipment will be provided by the *Employer.*

3.2.10 Site services and facilities

3.2.10.1 The *Employer* provides the following facilities for the *Contractor*:

At each port, the *Employer* will provide a laydown area for the *Contractor* to establish his site camp. However, all preparation, fencing and security shall be provided by the *Contractor*.

The *Employer* will also provide the following metered connections to services within the site and lay down area for the *Contractor's* use and the cost shall be for the *Contractor's* account:

- Water supply point.
- Electrical connection point.

3.2.10.2 Facilities provided by the *Contractor:*

At each port, the *Contractor* provides at his cost all required facilities for his own use to provide the *works*, including offices, toilets and ablutions, stores, change rooms etc.

The *Contractor* submits a layout drawing of the proposed facilities to the *Project Manager* for acceptance before commencing with the establishment of each port site facilities.

3.2.11 Existing premises, inspection of adjoining properties and checking work of Others

The *Contractor* will be held responsible for any damage to existing structures and surfacing caused by the *Contractor* during the execution of the contract; fair wear and tear excluded and shall repair it to the satisfaction of the *Supervisor* on conclusion of the *works*. For this purpose, a joint inspection with the *Supervisor* will be carried out prior to occupation of the Site(s) and any existing damage noted.

3.2.12 Excavations and associated water control

3.2.12.1 If there is any excavation, the purpose will be to expose the main water line and laying of the fibre optic cable.

3.2.12.2 The *Contractor* protects all excavations against any water ingress whether by seepage, rain, storms, floods or any other means (i.e. highwater table etc.).

3.2.12.3 All trenching and work area is to be barricaded.

3.2.12.4 The excavated area is to be re-instated to original state upon completion of works.

3.2.13 Existing underground services

3.2.13.1 Due to the potentially high density of underground services in the ports, the uncertainty regarding their exact locations and sensitivity of the products, the *Contractor* will be required to search for existing services by using appropriate probing equipment before excavating.

3.2.13.2 The Contractor exercises due care and attention in carrying out any excavation work to avoid damage or disruption to existing services.

3.2.13.3 Where the Contractor encounters existing underground services, the Contractor undertakes the following:

The *Contractor* shall immediately notify the *Project Manager* of such service encountered who will then arrange for testing and verification if it is a "live" or "dead" service.

3.2.13.4 Should the *Contractor* fail to exercise the requisite care and attention in carrying out the excavation work, the *Contractor* will be-held liable for any claims arising out of damage caused by such excavations.

3.2.14 Control of noise, dust, water and waste

Before the *Contractor* commences with any *works* that will produce noise, dust, water and waste, the *Contractor* submits his proposed methods of construction which demonstrate the measures taken to avoid and or reduce any nuisance arising from dust, noise and vibration for acceptance by the *Project Manager*.

3.3 Completion, testing, commissioning and correction of Defects

3.3.1 The *work* to be done by the Completion Date

On or before the Completion Date the *Contractor* shall have done everything required to Provide the *works* including the work listed below which is to be done before the Completion Date and in any case before the dates stated. The *Project Manager* cannot certify Completion until all the work listed below has been done and is also free of Defects, which would have, in his opinion, prevented the *Employer* from using the *works* and Others from doing their work.

Item of work	To be completed by

• As-built drawings
• Valid calibration certificates
• Data Books
• Configuration Files including Usernames and Password
• Configuration Software
• Operating manuals
• Maintenance Plans with:
  ○ Schedules in both hard copy
  ○ Electronic Format
	Completion

Performance testing of the *works*	Completion

3.3.2 The *Contractor* is permitted to carry out the following works after Completion

Repair Defects identified within the guarantee/ Defects period.

3.3.3 Commissioning

3.3.3.1 The installation including the software part shall be comprehensibly tested and commissioned as individual and integrated system prior to completion.

3.3.3.2 The *Contractor* provides the following commissioning activities to bring the works in use in liaison with the *Employer*:

- The *Contractor* shall submit a planned commissioning procedure to the *Project Manager* at least two weeks before commissioning commences.
- The Contractor shall provide all relevant test equipment required to test and commission the complete works.
- The Contractor shall provide adequate and competent personnel for testing and commissioning.

3.3.4 Take over procedures

3.3.4.1 The *Employer* may take over the completed section of the works before the Completion Date. The *Employer* shall take over the works once the works has been tested and commissioned.

3.3.4.2 The Contractor ensures that the documentation as described under paragraph 3.2.1 is presented to the Project Manager by the Completion Date.

3.3.4.3 The Contractor ensures that the Project Manager has a full and accurate dossier of As-built documents that represent the status of the completed works to present to the Employer.

3.3.5 Access given by the *Employer* for correction of Defects

3.3.5.1 Access shall be given as stated under clauses 3.1.1 and 3.1.2 of this document.

3.3.5.2 The *Contractor* complies with the following constraints and procedures of the *Employer* where the *Project Manager* arranges access for the *Contractor* after Completion as stated under clauses 3.1.3 and 3.1.4.

3.3.6 Training and technology transfer for the Owner's personnel

3.3.6.1 The installation of the new automatic metering infrastructure and related systems, especially the AMR and software solution, will make a significant change in the operation and maintenance requirement for the *Employer*. The *Employer's* maintenance personnel will be exposed to new technology.

3.3.6.2 It is therefore essential that the Contractor provides an Accredited Facilitator in rendering the theoretical and practical training to the Employer's personnel. On completion of the training, it is expected that the Employer's personnel will be able to competently address any breakdown (both hardware and software) that may arise.

3.3.6.3 The Contractor compiles a Training Manual containing easy-to-understand notes on all subject matters critical for troubleshooting and resolving issues that may arise. Each Learner must receive a copy of the Training Manual for the course that he/she has attended. In addition, three copies of each Training Manual must be provided for the Project Manager to deliver to the Employer for reference purposes.

3.3.6.4 All training must be completed prior to the commencement of each port's commissioning (i.e., before Completion). The Employer will not accept responsibility for the Operation and Maintenance of any of the works in use until the training has been satisfactorily completed.

3.3.6.5 The Contractor is required to submit a Training Plan to the Project Manager for review no later than eight weeks before the commencement of commissioning per port.

3.3.6.6 The Contractor maintains an accurate record of the training given and is to submit a report on completion of the training. The report will include, details of the Trainer, the scope of the training, the duration of training and the Employer's personnel who received training.

3.3.6.7 Each port's training shall accommodate a minimum of seven (07) *Employer* attendees however not exceeding 15 for both theoretical classroom and practical session on site with equipment (Maintenance/ Communication/ Troubleshooting/ Q&A). Training shall be conducted per port and shall cover the following:

(a) Maintenance and Operation of the system i.e., LAN, WAN, AMR and Billing Software

(b) Administrator Training

(c) Software and Hardware

	E*mployer's* Delegates
Each Port	2x Electrical Engineer(s)/ Technicians 2x Civil Engineer(s)/ Technicians 2x Supervisors 1x IT Specialist and etc.

3.3.7 Maintenance and Technical Support Post Implementation

During the Defects Liability Period the *Contractor* shall undertake all system repairs, service and maintenance requirements including provision of manpower and consumables.

3.3.8 CIDB BUILD Requirements

3.3.8.1 The Socio-economic objectives of the project are:

- To train occupational qualifications, trade qualifications, work integrated learners – P1 and P2 learners, professional candidates.
- To develop targeted enterprises who are either JV partners to the successful bidder or sub-contractors. Development will be undertaken in identified areas following a Needs Analysis.

Standard for Skills Development

3.3.8.2 The *Contractor* further submit to the *Employer's* representative:

- An interim contract compliance training report in the specific format (Form A3 Project Interim Report) at intervals which do not exceed 3 months; and
- A final contract compliance training report, in the specific format (Form A5 Project Completion Report). This report shall, respectively, be submitted within 15 days of; reaching completion, end of the service, the delivery date for all work required or practical completion (in the case of professional service), service, design and construct contracts, and engineering and construction works contracts.

3.3.8.3 For Structured Workplace Learning for Candidates (Method 3 and Method 4) The *Contractor* shall:

a) Appoint a supervisor who is actively engaged in work directly associated with the contract to issue tasks,

b) Appoint a suitable mentor as required by the professional body statutory council.

c) Management Meetings

d) The Contractor shall report to the Employer's Representative on the implementation and progress of the CSDG.

e) The Forms for contract administration

f) The Contractor shall submit to the Employer's Representative the following proformas:

- Form A2 Baseline Training Plan
- Form A3 Project Interim Report
- Form A5 Project Completion Report

3.3.8.4 Records

The *Contractor* shall:

- Keep records for learners and candidates of the hours worked and registration with the CISB SDA, Sector Education Training Authorities SETA's (where required) and professional statutory councils (where required) particulars towards compliance with this Standard.
- Ensure all the documentation required in terms of clause 4 in the Standard is provided in a timely manner and according to a prescribed format where applicable.
- Upon termination of the opportunities provided to satisfy the CSDG, certify the quantum and nature of the opportunity and submit the certificate and counter-certified by the relevant individual, to the Employer's Representative for record-keeping purposes.

3.3.8.5 Payment Certificates

The *Contractor* shall:

- Achieve the measurable CSDG as agreed by providing opportunities to learners requiring structured workplace learning using one or a combination of any of the Skills Methods as per the Standard in relation to work directly related to the contract or order as indicated under clause 4.2 and 4.3 in the Standard.
- Submit payment certificates to the Employer's Representative at intervals determined in the Contract.

Standard for Indirect Targeting

3.3.8.6 *Employer's* Objective:

- The objective of the project is to provide a minimum Contract Participation Goal (CPG) of 30% of the total project value and to develop targeted enterprises by the main or lead partner contractors.
- The successful Contractor shall:

I. Subcontract a minimum of 5% of the total project value to targeted enterprises;

II. Develop the targeted enterprise/s in two development areas as specified in the Standard, and agreed by both the Main Contractor and the targeted enterprise/s;

III. Perform needs analysis on the target enterprise to identify development goals;

IV. Provide internal mentorship support to improve the targeted enterprise/s performance,

V. Develop a project specific enterprise development plan to improve the targeted enterprise/s performance in the identified development areas;

VI. Monitor and report the progress of the agreed development areas with the targeted enterprise/s; and

VII. Submit a project completion report to the Employer's Representative for each targeted enterprise.

3.3.8.7 The development of the Targeted Enterprise shall be guided by the CIDB Competence Standard for Contractors Gazette No. 41237, 10 November 2017. Table 2.

3.3.8.8 The *Contractor* shall appoint an Enterprise Development Coordinator who shall:

- Develop a project specific Enterprise Development Plan to improve the targeted enterprise's performance in the identified development areas and shall allocate resources to monitor progress in relation to improved performance; and
- Shall submit to the Employer's Representative a monthly enterprise development report (Performa – ED105P) which documents all mentoring activities that have taken place during that month, and the progress made in improving the targeted enterprise's performance in the agreed development areas, countersigned by the targeted enterprise.

3.3.8.9 Competence Criteria for an Enterprise Development Coordinator

The enterprise development coordinator shall have the following competencies:

a) Minimum experience of 5 years in the construction industry at Managerial level as a Site Agent, Contracts Manager, Site Manager, Construction Manager, Business Development Manager or Enterprise Development Manager.

b) Minimum experience of 2 years in training and development in Building or Construction; and

c) National Diploma or B Degree in the Built Environment or Business Management.

3.3.8.10 Management

The *Contractor* shall provide a competent person/s to provide internal mentorship to the Targeted Enterprise/s in the two agreed development areas.

3.3.8.11 The Format of Communications

The *Contractor* shall submit to the *Employer's* Representative:

I. Project interim reports in the specified format (ED105P) detailing interim value of the CPG that was achieved. Such a report shall also contain a monthly progress report, compiled by the *Employer's* Representative and the *Contractor*, detailing an assessment of the enterprise development support provided.

II. Project completion report, in the specified format (ED101P), to the Employer's Representative for acceptance within 15 days of achieving practical completion. The report shall include the value of the CPG that was certified in accordance with the contract, CIBD registration numbers of each and every targeted enterprise and the value of the subcontracted works or the participation parameter of the joint venture entered into; and

III. Enterprise development declaration (ED104P).

3.3.8.12 The Key Personnel

The *Contractor* shall appoint an Enterprise Development Coordinator and a competent person/s to provide internal mentorship.

3.3.8.13 Management Meetings

The *Contractor* shall report to the *Employer's* Representative on the implementation and progress of the targeted enterprise development and CPG.

3.3.8.14 The Forms for contract administration

The *Contractor* shall submit to the *Employer's* Representative the following proformas:

- Form ED 105P Project Interim Report
- Form ED 104P Enterprise Development Declaration
- Form ED 101P Project Completion Report

3.3.8.15 Records

The *Contractor* shall:

- Keep records of the targeted enterprise development,
- Keep records of the payments made to the targeted enterprises in relation to the CPG,

- Ensure all the documentation required in terms of the Standard is provided in a timely manner and according to a prescribed format where applicable.

3.3.8.16 Payment Certificates

The *Contractor* shall:

- Achieve the measurable CPG and providing enterprise development support to the targeted enterprise/s as per the Standard,
- Submit payment certificates to the Employer's Representative at intervals determined in the Contract.

4 Plant and Materials Standards and Workmanship

4.1 Standards and Specifications Applicable to the *Works*

4.1.1 The latest SABS publications for specifications and codes will be used in the execution of this contract.

IEC 62052-11	Electricity metering equipment (AC) – General requirements, tests and test conditions – Part 11: Metering equipment.
IEC 62053-22	Electricity metering equipment (AC) – Particular requirements - Part-22: Static Meters for Active Energy (Class 0.5S).
IEC 62053-23	Electricity metering equipment (AC) – Particular requirements - Part-23: Static Meters for Reactive Energy.
IEC 62056-21	Electricity metering: Data exchange for meter reading, tariff and load control - Part 21: Direct local data exchange.
SANS 241	Water for domestic supplies.
SANS 1529-1:2006	Metrological characteristics of mechanical water meters of nominal bore not exceeding 100mm.
SANS 1529-3:2006	Physical dimensions.
SANS 1529-4:2006	Mechanical meters of nominal bore exceeding 100mm but not exceeding 800mm.
Trade Metrology Act, 1973 (Act 77 of 1973).	

4.2 Plant, Material and Workmanship

4.2.1 All Plant and Material used in the installations shall be of high quality and the work be of a high standard of workmanship carried out by qualified personnel under proper supervision by experienced and competent officers.

4.2.2 All materials and products shall be used in strict accordance with manufacturer's instructions and specifications.

4.2.3 The Contractor shall supply all necessary Materials, labor, tools, Plant, PPE, demarcating signage and transport required for the proper Completion of the works.

4.2.4 All Plant and Material shall comply with the relevant SANS or International standard specifications.

4.3 Investigation, and Site Assessment

The *Contractor* carries out the following investigations at the sites:

4.3.1 The *Contractor* validates the information provided by the *Project Manager* and records all existing and level of accuracy on drawings and presents this to the *Project Manager* for acceptance.

4.3.2 Perform assessment and collaborate with the Employer on the best possible route for the fiber optic cable. The Contactor records the route on drawings and presents this to the Project Manager for acceptance.

4.3.3 Survey and perform Ground-Penetrating Radar (GRP) scans on the route for any potential underground services and overlay on the fiber optic cable route.

4.3.4 Perform assessment and collaborate with the Employer on the best possible location for the AMR Gateways and other communication equipment. The Contactor records the route on drawings and presents this to the Project Manager for acceptance

4.3.5 Perform assessment and collaborate with the Employer on the possible workstations and server rooms to install the servers and workstation computers and their power supply points.

4.3.6 Perform assessment and collaborate with the Employer on the conditions and storage of the existing water and electricity meters to be replaced.

4.3.7 Where required, the Contractor will make the new infrastructure available for a logical software, hardware and outside penetration security audit by consultants nominated by the Employer, during or after the commissioning.

5 Works Information

The *Contractor* shall be responsible for the design, supply, delivery, installation, configuration, software integration, testing, and commissioning of all the AMR meters as well as the software solution in all ports.

The scope to be carried out by the *Contractor* includes but not limited to the following items of work as summarized below:

- Supply, install, configure, test and commission smart electricity meters for measurement of different electrical parameters listed elsewhere in the document including Active Energy (kWh/MWh), Reactive Energy (kVArh/MVArh), Apparent Energy (kVAh/MVAh) etc.
- Supply, install, configure, test and commission smart water meters for measurement of water consumption (KL), alarm notification for high flow set points and trigger night flow analysis.
- Supply, installation and configuration of transmitters, data loggers/ recorder/ pulse and counters.
- Design, develop, install, test and commission a smart utility management software solution including all graphic displays, dashboards, tabs, report templates etc.
- Design, install, test and commission Fibre Optic Local Area Network and Private Wireless Communication Network in each port.
- Selection of all communication and instrumentation required for Automatic Meter Reading (AMR) including linking the meters to the billing servers.
- Billing Software: Create accounts, link them to the meters and setup the tariffs. The billing software should also allow for capturing manual readings for Shipping water and small water meters.
- Program and integrate the software solution to new and existing systems as well as the billing servers.
- Link all the data servers from the eight ports to one central repository and allow retrieval of information across the system.
- Testing and commissioning of the installations as individual and integrated system.
- Issuing of Valid calibration certificates, Data Books, Operating manuals, Maintenance plans and schedules in both hard copy and electronic format.
- Supplying all necessary Materials, labour, tools, Plant, PPE, demarcating signage and transport required for the proper Completion of the works.

5.1 Port of Richard Bay

Site Conditions

All Plants and Materials offered shall be rated for continuous operation under the following service conditions: (Port to inputs data)

Altitude	Sea level to + 50m
Ambient air temperature	Max. 40 degrees Celsius; Min. – 5 degrees Celsius
Humidity	As high as 86%
Lightning conditions	10 strikes per year as listed in SABS codes
Atmosphere	Highly saline with heavy corrosive industrial, chemical and dust-laden nature. Frequent heavy rains driven by winds reaching speeds of 100km/h and above.
Water supply pressure	between 2.0 – 6.0bar

NEW SMART ELECTRICITY METERS

5.1.1 Replacement of smart Power Quality Meters

5.1.1.1 The *Contractor* shall perform the following activities during installation of power quality meters (Listed in Table 1):

5.1.1.2 Supply, install and configure new power quality meters.

5.1.1.3 Supply and install the I/O Modules.

5.1.1.4 Establish connectivity; Register the meters on the billing server, existing SCADA and the new Central Utility Management System with appropriate tagging.

5.1.1.5 Create accounts and link to the meter and apply the appropriate tariffs.

5.1.1.6 If the GSM network is used, the data sim cards will be free issued to the Contractor.

5.1.1.7 Test and commission the installation.

5.1.1.8 Reinstate power.

Table 1: Shows the areas where power quality meters are located and quantities to be replaced

Item No.	Location	Meter Type	Meter QTY	I/O Module QTY
1	Harbour West	Power Quality	28	28
2	Workshop Substation	Power Quality	7	7
3	Office Substation	Power Quality	5	5

Item No.	Location	Meter Type	Meter QTY	I/O Module QTY
4	Departure Yard Sub	Power Quality	6	6
5	Sort Yard Sub	Power Quality	6	6
6	Liquid Pitch Sub	Power Quality	7	7
7	Arrivals Yard Sub	Power Quality	6	6
8	Eastern Intake Sub	Power Quality	6	6
9	Admin Quay	Power Quality	7	7
10	Hydra Yard	Power Quality	7	7
11	Berth 209	Power Quality	8	8
12	South Dunes	Power Quality	8	8

5.1.2 Replacement of Old Electricity Meters

5.1.2.1 The *Contractor* shall perform the following activities on all the meters listed in Table 2:

5.1.2.2 Decommission and remove the existing electricity meter.

5.1.2.3 Supply, install and configure a new smart electricity meter with all the necessary comms required (communication module, GSM antenna etc.).

5.1.2.4 Establish connectivity; Register the meters on both the billing server and the new Utilities Management System with appropriate tagging.

5.1.2.5 Create accounts and Link them to the relevant meter and apply the appropriate tariffs.

5.1.2.6 If the GSM network is used, the data sim cards will be free issued to the Contractor.

5.1.2.7 Test and commission the installation.

5.1.2.8 Reinstate power.

Table 2: Shows the areas where the new smart electricity meters are to be installed.

Item No.	Meter Location	Type of Circuit	Meter Quantity
TNPA Meters			
1	Arrivals Yard New Ark Lights	3 Phase	01
2	Bayvue Yard High Mast Lights	3 Phase	01
3	Berthing Master Northmoore Road	3 Phase	01
4	Berth 208 Lights (Medium Masts)	3 Phase	01
5	Berth 300 Lights	3 Phase	01
6	Departure Yard High Mast Lights	3 Phase	01
7	Departure Yard Silver Ocean Lights	3 Phase	01
8	Eastern Sub Silver Ocean Lights	3 Phase	01
9	Ferro High Mast Lights	3 Phase	01

Item No.	Meter Location	Type of Circuit	Meter Quantity
10	Heli Pad Complex	3 Phase	01
11	CCTV Technical (Harbour Café)	3 Phase	01
12	Maritime Complex	3 Phase	01
13	Mini Sub–South Break Water	3 Phase	01
14	Osizweni	3 Phase	01
15	Pioneer Centre	3 Phase	01
16	Port Control	3 Phase	01
17	Sorting Yard High Mast Lights	3 Phase	01
18	Sorting Yard New Ark Road	3 Phase	01
19	Sorting Yard Wayfearers Road	3 Phase	01
20	Truck Staging Area	3 Phase	01
21	Western Intake Urania & San Road Thom Kiosk	3 Phase	01
22	Workshop New Ark & Ventura Roads	3 Phase	01
23	Workshop Generator (Vikela Security/Clinic and Fire dept.)	3 Phase	01
Clients			
24	Alusaf 1	3 Phase	01
25	John Wilson	3 Phase	01
26	Sael (Bollore)	3 Phase	01
27	Alusaf 2	3 Phase	01
28	Loco Depot	3 Phase	01
29	RME/Civils CEW (Site Camp RME)	3 Phase	01
30	Bay Stevedores	3 Phase	01
31	Marine Bulk Services	3 Phase	01
32	Seafearers	3 Phase	01
33	Berthing Master Northmoore Road	3 Phase	01
34	Marine Park	3 Phase	01
35	SGS	3 Phase	01
36	Canteen	3 Phase	01
37	Mitra SA (Biblia)	3 Phase	01
38	Smith Bogani (Kiosk B)	3 Phase	01
39	Engen Berth 209	3 Phase	01
40	Neptune 132KV	3 Phase	01
41	Best Cut Butchery	3 Phase	01
42	Fermentech	3 Phase	01
43	Omni	3 Phase	01

Item No.	Meter Location	Type of Circuit	Meter Quantity
44	Strang Rennie	3 Phase	01
45	Ferro's	3 Phase	01
46	Osizweni	3 Phase	01
47	Tisand	3 Phase	01
48	FFS	3 Phase	01
49	Port Control Contractors	3 Phase	01
50	Transtel	3 Phase	01
51	Fosfert Marine	3 Phase	01
52	Radds	3 Phase	01
53	Truck Staging Canteen	3 Phase	01
54	Freight Rail (2279 Offices)	3 Phase	01
55	RBBS Berth 209 (BTT)	3 Phase	01
56	Umhlatuze Water	3 Phase	01
57	Freight Rail (Departure Yard)	3 Phase	01
58	RBCT	3 Phase	01
59	Yskor	3 Phase	01
60	Freight Rail (Sorting yard YM Offices)	3 Phase	01
61	Road Scale Heavy Haulage	3 Phase	01
62	Back Stage	3 Phase	01
63	CCTV (Harbour Café)	3 Phase	01
64	Marine Cargo Verification (MCV)	3 Phase	01
65	Induna	3 Phase	01
66	SA Stevedores	3 Phase	01
Single Phase Meters			
67	Bureau Viritas	Single Phase	01
68	KNK Curries 3 (new)	Single Phase	01
69	Police Boat	Single Phase	01
70	Bid Freight (Coal Quay)-Kiosk Berth. Master	Single Phase	01
71	Spoornet Trunk Counter	Single Phase	01
72	(M & L) TFR Automatic Signals	Single Phase	01
73	CCTV TPT	Single Phase	01
74	TFR Automated Signals	Single Phase	01
75	KNK Curries (1)	Single Phase	01
76	Bidfreight (New container)	Single Phase	01
77	BTT Mess and Ablution	Single Phase	01

Item No.	Meter Location	Type of Circuit	Meter Quantity
78	KNK Curries (2)	Single Phase	01

NEW SMART WATER METERS

5.1.3 Replacement of Old Water Meters

The *Contractor* shall perform the following activities on all the meters listed in Table 3:

5.1.3.1 Decommission and remove the existing water meter.

5.1.3.2 Supply and install flange stub HDPE to flange stub AC to exterior of the chamber

5.1.3.3 Supply and install a new water meter compatible with AMR technology including all necessary couplings, bolts, sealants etc.

5.1.3.4 Supply, install, mount and configure a smart IP68 automatic data logger and meter-reading device and establish connectivity for wireless communication.

5.1.3.5 The Contractor shall ensure the water meter chamber is watertight after completion of the work.

5.1.3.6 Register the meter on both the billing server and the new Utilities Management System with appropriate tagging.

5.1.3.7 Create accounts and Link them to the relevant meter and apply the appropriate tariffs.

5.1.3.8 Test and commission the installation.

Table 3: Shows the areas where the new smart water meters are to be installed.

Meter No.	Meter Location	Existing Pipe Size (mm)	Existing Pipe Material	Installation Type	Meter Size (mm)
1	Harbour Main Meter	320	HDPE	Inside a Manhole	300
2	Bayview Main Meter	180	HDPE	Inside a Manhole	150
3	Die Duine Main Meter	280	HDPE	Inside a Manhole	250
4	Government House	110	HDPE	Inside a Manhole	100
5	Water Gantry	50	HDPE	Inside a Manhole	50
6	Silver Ocean: Main	200	HDPE	Inside a Manhole	150
7	Newark: Main	200	HDPE	Inside a Manhole	150
8	Action Cricket	170	HDPE	Inside a Manhole	150
9	Tidal Gates (Two Meters)	270	HDPE	Inside a Manhole	250
10	Chemical Berth Main	160	HDPE	Inside a Manhole	150
11	300 Series Meter	230	HDPE	Inside a Manhole	200
12	Baermer	150	HDPE	Inside a Manhole	150

Meter No.	Meter Location	Existing Pipe Size (mm)	Existing Pipe Material	Installation Type	Meter Size (mm)
13	Liquid Pitch	90	HDPE	Inside a Manhole	75
14	Fedmis Main Meter	180	HDPE	Inside a Manhole	150
15	Fedmis Fire	22	HDPE	Inside a Manhole	20
16	Shincell Fire	63	HDPE	Inside a Manhole	50
17	Shincell Ring Feed	110	HDPE	Inside a Manhole	100
18	Fermentech	110	HDPE	Inside a Manhole	100
19	Coaking Coal	90	HDPE	Inside a Manhole	75
20	IVS: Administration: Small	63	HDPE	Inside a Manhole	50
21	IVS: Administration: Large	270	HDPE	Inside a Manhole	250
22	IVS: Gate	50	HDPE	Inside a Manhole	50
23	IVS: Fire Main	150	HDPE	Inside a Manhole	100
24	Richards Bay Bunker Terminal	35	HDPE	Inside a Manhole	25
25	RBCT Main (Hydra substation)	200	HDPE	Inside a Manhole	200
26	Carriage & Wagon – Departure Yard	50	HDPE	Inside a Manhole	50
27	Shunters Cabin 124 & 138 – Silver Ocean Road	50	HDPE	Inside a Manhole	50
28	Shunter's Cabin 139 – Bottom Discharger	25	HDPE	Inside a Manhole	20
29	Shunter's Cabin 229 – Arrivals Yard	28	HDPE	Inside a Manhole	20
30	Shunter's Cabin – CoalLink	22	HDPE	Inside a Manhole	20
31	Shunter's Cabin – Duine Area	22	HDPE	Inside a Manhole	20
32	Carriage and Wagon – Duine Area	110	HDPE	Inside a Manhole	100
33	DBT Storage – Mechanical	50	HDPE	Inside a Manhole	50
34	DBT Storage – Electrical	50	HDPE	Inside a Manhole	50
35	DBT Storage – Administration	50	HDPE	Inside a Manhole	50
36	Dry Bulk Terminal Main Meter	160	HDPE	Inside a Manhole	150
37	DBT – Saxon Road	150	HDPE	Inside a Manhole	150
38	Mhlathuze Building	180	HDPE	Inside a Manhole	150
39	Office 2279	110	HDPE	Inside a Manhole	100
40	CoalLink Locomotive Depot	90	HDPE	Inside a Manhole	75

EXISTING SYSTEMS AND INTEGRATION

5.1.4 The Port of Richards Bay currently makes use of Adroit SCADA system, ION Setup Vista and ECWIN for monitoring and management of utilities with TCP/IP & Modbus communication protocols. The new Utility Management System shall integrate seamlessly with existing systems.

5.1.5 The *Contractor* must develop an Application Programming Interface (APIs) to integrate the software with existing systems including linking the Utility Management Software to both Transnet Integrated Port Management System (IPMS) and SAP ERP (Enterprise Resource Planning) to transfer billing data (kilo Liters & Rand Value, kilowatts hours & Rand Value) on 15th of each month.

COMMUNICATION INFRASTRUCTURE

5.1.6 Communication Infrastructure Requirements (LAN & Wireless Network)

5.1.6.1 Design a fibre optic Local Area Network within the port boundary.

5.1.6.2 Trench to lay the fibre optic sleeves, trenching to minimum depth of 600mm and a width of 300mm.

5.1.6.3 Supply and install 110mm PVC pipe and chamber system for the fibre.

5.1.6.4 Supply and install fibre optic manholes where required.

5.1.6.5 The trenching for complete installation shall not exceed a total length of 25km. Backfill and reinstate existing surface and make good.

5.1.6.6 Supply and install 25 patch panels fully populated 48 pair with LC patch leads.

5.1.6.7 Supply, install and patch a total of 25km of 48 pair single mode fibre optic cable (652D).

5.1.6.8 Supply, install and configure 25 by 24 ports managed enterprise network switches.

5.1.6.9 Supply and install a 9U swing frame cabinet 900mm deep.

5.1.6.10 Link all electricity meters through the LAN to transmit data to the billing server for processing via the Utilities Management Software.

5.1.7 Wireless Communication Network for the water meters

5.1.7.1 All waters are to be fitted with an AMR interface (IoT devices) for logging of data and communicate to the closest gateway. The AMR interface shall have long range transmission and operate on low power.

5.1.7.2 Supply and install metering gateways including civil and structural works and all appurtenances.

5.1.7.3 Configure and integrate the gateways onto the LAN to transfer data to the server and Utilities Management Software.

5.1.7.4 Supply and install a server (Network & Application) to manage and control the network. The network server shall receive data and control messages from the gateways and process the data. The application server shall interface with the network server and shall store the data, perform analytics and enable integration with other systems.

5.1.7.5 Develop an Application Programming Interface (API) to allow the network to transmit relevant billing data to the billing server and Utilities Management Software.

5.1.8 Servers

5.1.8.1 Supply, install and configure two 8-core (2.10GHz), 16GB, 8 x Hot plug 2.5in, smart array P408ia, 2 x 500W, rack mount billing servers.

5.1.8.2 Each server shall be supplied with four 1.2TB Hard Drives.

5.1.8.3 Supply and install the latest Microsoft SQL server (permanent license) for the management of data, storage and perform analytics via the Utilities Management Software.

5.1.9 Firewall

5.1.9.1 Supply, install, configure, and commission a Firewall for LAN. The *Contractor* shall ensure that old and new services going through the Firewall are reinstated.

5.1.9.2 Setup DMZ and position a management workstation within DMZ.

5.1.10 Management Workstation

5.1.10.1 Supply, install and setup a Management Workstation [(31.5 inch USB Hub Monitor, QHD, 60Hz, support Display Port Alt Mode with up to 90W Power Delivery, 1xHDMI, 1xRJ-45 (Ethernet 1 GbE), 4x Superspeed USB (5Gbps)].

5.1.10.2 Setup rules for management workstation to control SCADA and provide dashboards whilst second LAN on machine connects to Transnet Data Network. Management station needs to be on Transnet domain and have relative Transnet Policies applied to it.

5.1.10.3 Test and commission entire installation.

5.2 Port of Durban

Site Conditions

All Plants and Materials offered shall be rated for continuous operation under the following service conditions:

Altitude	Sea level to +50m
Ambient air temperature	Max. 40 degrees Celsius; Min. – 5 degrees Celsius
Humidity	As high as 86%
Lightning conditions	10 strikes per year as listed in SABS codes
Atmosphere	Highly saline with heavy corrosive industrial, chemical and dust-laden nature. Frequent heavy rains driven by winds reaching speeds of 100km/h and above.
Water supply pressure	between 2.0 – 6.0bar

NEW SMART ELECTRICITY METERS

5.2.1 Building & Marine Depot (Berth 100)

5.2.1.1 Re-wire the existing electrical circuits.

5.2.1.2 Supply, install and configure two smart electricity meters with all the necessary comms module as per the standard specification.

5.2.1.3 Supply and install ±300m single mode fibre optic between Building & Marine and Berth 100 Substation.

5.2.1.4 Supply and install a media converter.

5.2.1.5 Establish connectivity on the existing Local Area Network and integrate the meters onto the existing Switch (Admin Console) Meter Data Management System (MDMS) with appropriate tagging.

5.2.1.6 Create an account and link with the meter and apply the appropriate tariffs.

5.2.1.7 Test and commission the installations.

5.2.2 Shameisher Langerberg (Building & Marine)

5.2.2.1 Re-wire the existing electrical circuits.

5.2.2.2 Supply, install and configure two (02) smart electricity meters with all the necessary comms module as per the standard specification.

5.2.2.3 Supply and install ±300m single mode fibre optic between Building & Marine and Berth 100 Substation.

5.2.2.4 Supply and install a media converter.

5.2.2.5 Establish connectivity on the existing Local Area Network and integrate the meters onto the existing Switch (Admin Console) Meter Data Management System (MDMS) with appropriate tagging.

5.2.2.6 Create an account and link with the meter and apply the appropriate tariffs.

5.2.2.7 Test and commission the installations.

5.2.3 Power Supplies and Services Depot

5.2.3.1 There are already existing electricity meters with comms module installed already.

5.2.3.2 The Contractor shall re-wire the electrical circuits, configure and register the smart electricity meters to the billing server and the existing Switch (Admin Console) Meter Data Management System (MDMS) with appropriate tagging.

5.2.3.3 Create an account and link with the meter and apply the appropriate tariffs.

5.2.3.4 Test and commission the installations.

5.2.4 Pollution Control Depot

5.2.4.1 Supply, install and configure four (04) smart electricity meters with all the necessary comms module as per the standard specification.

5.2.4.2 Establish connectivity on the existing Local Area Network; register the meters on the billing server and integrate the meters onto the existing Switch (Admin Console) Meter Data Management System (MDMS) with appropriate tagging.

5.2.4.3 Create an account and link with the meter and apply the appropriate tariffs.

5.2.4.4 Test and commission the installations.

5.2.5 Lighthouse Department

5.2.5.1 Re-wire the existing electrical circuits.

5.2.5.2 Supply, install and configure two (02) smart electricity meters with all the necessary comms module as per the standard specification.

5.2.5.3 Supply and install ±300m single mode fibre optic between Light House and Durban Harbour Intake (DHI) Substation.

5.2.5.4 Supply and install a media converter.

5.2.5.5 Establish connectivity on the existing Local Area Network; register the meters on the billing server and integrate the meters onto the existing Switch (Admin Console) Meter Data Management System (MDMS) with appropriate tagging.

5.2.5.6 Create an account and link with the meter and apply the appropriate tariffs.

5.2.5.7 Test and commission the installations.

5.2.6 Workshop 24

5.2.6.1 Re-wire the existing electrical circuits.

5.2.6.2 Supply, install and configure six (06) smart electricity meters with all the necessary comms module as per the standard specification.

5.2.6.3 Supply and install ±100m single mode fibre optic between Workshop 24 and Short Blast Shop Substation.

5.2.6.4 Supply and install two (02) media converters.

5.2.6.5 Establish connectivity on the existing Local Area Network; register the meters on the billing server and integrate the meters onto the existing Switch (Admin Console) Meter Data Management System (MDMS) with appropriate tagging.

5.2.6.6 Create an account and link with the meter and apply the appropriate tariffs.

5.2.6.7 Test and commission the installations.

5.2.7 Graving Dock

5.2.7.1 Re-wire the existing electrical circuits.

5.2.7.2 Supply, install and configure three (03) smart electricity meters with all the necessary comms module as per the standard specification.

5.2.7.3 Supply and install ±30m single mode fibre optic to the Graving Dock Substation.

5.2.7.4 Supply and install one (01) media converters.

5.2.7.5 Establish connectivity on the existing Local Area Network; register the meters on the billing server and integrate the meters onto the existing Switch (Admin Console) Meter Data Management System (MDMS) with appropriate tagging.

5.2.7.6 Create an account and link with the meter and apply the appropriate tariffs.

5.2.7.7 Test and commission the installations.

5.2.8 Crane Supply Mini Substation

5.2.8.1 Re-wire the existing electrical circuits.

5.2.8.2 Supply, install and configure three (03) smart electricity meters with all the necessary comms module as per the standard specification.

5.2.8.3 Supply and install ±5m single mode fibre optic between Graving Dock Substation and Crane Supply Mini Substation.

5.2.8.4 Supply and install one (01) media converter.

5.2.8.5 Establish connectivity on the existing Local Area Network; register the meters on the billing server and integrate the meters onto the existing Switch (Admin Console) Meter Data Management System (MDMS).

5.2.8.6 Create an accounts and link with the meter and apply the appropriate tariffs.

5.2.8.7 Test and commission the installations.

5.2.9 Building & Marine Depot (Methven Road)

5.2.9.1 Re-wire the existing electrical circuits.

5.2.9.2 Supply, install and configure four (04) smart electricity meters with all the necessary comms module as per the standard specification.

5.2.9.3 Supply and install ±400m single mode fibre optic between Building & Marine Depot and Congella No.1 Mini Substation.

5.2.9.4 Supply and install one (01) media converter.

5.2.9.5 Establish connectivity on the existing Local Area Network; register the meters on the billing server and integrate the meters onto the existing Switch (Admin Console) Meter Data Management System (MDMS) with appropriate tagging.

5.2.9.6 Create an account and link with the meter and apply the appropriate tariffs.

5.2.9.7 Test and commission the installations.

5.2.10 Point Clinic

5.2.10.1 Re-wire the existing electrical circuits.

5.2.10.2 Supply, install and configure two (02) smart electricity meters with all the necessary comms module as per the standard specification.

5.2.10.3 Supply and install ±50m single mode fibre optic between Point Clinic and R Berth Mini Substation.

5.2.10.4 Supply and install one (01) media converter.

5.2.10.5 Establish connectivity on the existing Local Area Network; register the meters on the billing server and integrate the meters onto the existing Switch (Admin Console) Meter Data Management System (MDMS) with appropriate tagging.

5.2.10.6 Create an account and link with meter and apply the appropriate tariffs.

5.2.10.7 Test and commission the installations.

5.2.11 Bay Terrace Building

5.2.11.1 Re-wire the existing electrical circuits.

5.2.11.2 Supply, install and configure five (05) smart electricity meters with all the necessary comms module as per the standard specification.

5.2.11.3 Supply and install ±500m single mode fibre optic between Bay Terrace and Stanger Street Substation.

5.2.11.4 Supply and install one (01) media converter.

5.2.11.5 Establish connectivity on the existing Local Area Network; register the meters on the billing server and integrate the meters onto the existing Switch (Admin Console) Meter Data Management System (MDMS) with appropriate tagging.

5.2.11.6 Create an account and link with the meter and apply the appropriate tariffs.

5.2.11.7 Test and commission the installations.

5.2.12 Queens Warehouse Building

5.2.12.1 Re-wire the existing electrical circuits.

5.2.12.2 Supply, install and configure five (05) smart electricity meters with all the necessary comms module as per the standard specification.

5.2.12.3 Supply and install ±500m single mode fibre optic between Queens Warehouse and Sand Bypass Substation.

5.2.12.4 Supply and install two (02) media converters.

5.2.12.5 Establish connectivity on the existing Local Area Network; register the meters on the billing server and integrate the meters onto the existing Switch (Admin Console) Meter Data Management System (MDMS) with appropriate tagging.

5.2.12.6 Create an account and link with the meter and apply the appropriate tariffs.

5.2.12.7 Test and commission the installations.

5.2.13 TNPA Security Maydon Wharf

5.2.13.1 Re-wire the existing electrical circuits.

5.2.13.2 Supply, install and configure two (02) smart electricity meters with all the necessary comms module as per the standard specification.

5.2.13.3 Supply and install ±500m single mode fibre optic between Bay Terrace and R Stanger Street Substation.

5.2.13.4 Supply and install two (02) media converters.

5.2.13.5 Establish connectivity on the existing Local Area Network; register the meters on the billing server and integrate the meters onto the existing Switch (Admin Console) Meter Data Management System (MDMS) with appropriate tagging.

5.2.13.6 Create an account and link with the meter and apply the appropriate tariffs.

5.2.13.7 Test and commission the installations.

5.2.14 Cato Creek Yard

5.2.14.1 Supply, install and configure two (02) smart electricity meters with all the necessary comms module as per the standard specification.

5.2.14.2 Supply and install ±300m single mode fibre optic between Cato Creek Yard and Stanger Street Substation.

5.2.14.3 Supply and install two (02) media converters.

5.2.14.4 Establish connectivity on the existing Local Area Network; register the meters on the billing server and integrate the meters onto the existing Switch (Admin Console) Meter Data Management System (MDMS) with appropriate tagging.

5.2.14.5 Create an account and link with the meter and apply the appropriate tariffs.

5.2.14.6 Test and commission the installations.

5.2.15 Manganese Yard

5.2.15.1 Supply, install and configure one (01) smart electricity meters with all the necessary comms module as per the standard specification.

5.2.15.2 Supply and install ±300m single mode fibre optic between Manganese Yard and Inner Caisson House.

5.2.15.3 Supply and install one (01) media converters.

5.2.15.4 Establish connectivity on the existing Local Area Network; register the meters on the billing server and integrate the meters onto the existing Switch (Admin Console) Meter Data Management System (MDMS) with appropriate tagging.

5.2.15.5 Create an account and link with the meter and apply the appropriate tariffs.

5.2.15.6 Test and commission the installations.

5.2.16 Hokaido Yard

5.2.16.1 Supply, install and configure two (02) smart electricity meters with all the necessary comms module as per the standard specification.

5.2.16.2 Supply and install ±500m single mode fibre optic between Manganese Yard and Inner Caisson House.

5.2.16.3 Supply and install one (01) media converters.

5.2.16.4 Establish connectivity on the existing Local Area Network; register the meters on the billing server and integrate the meters onto existing Switch (Admin Console) Meter Data Management System (MDMS) with appropriate tagging.

5.2.16.5 Create an account and link with the meter and apply the appropriate tariffs.

5.2.16.6 Test and commission the installations.

5.2.17 Fynnland Yard

5.2.17.1 Supply, install and configure two (02) smart electricity meters with all the necessary comms module as per the standard specification.

5.2.17.2 Supply and install ±250m single mode fibre optic between Fynnland Yard and PSS Depot.

5.2.17.3 Supply and install one (01) media converters.

5.2.17.4 Establish connectivity on the existing Local Area Network; register the meters on the billing server and integrate the meters onto the existing Switch (Admin Console) Meter Data Management System (MDMS) with appropriate tagging.

5.2.17.5 Create an account and link with meter and apply the appropriate tariffs.

5.2.17.6 Test and commission the installations.

5.2.18 Tank Washout Yard

5.2.18.1 Supply, install and configure two (02) smart electricity meters with all the necessary comms module as per the standard specification.

5.2.18.2 The nearest existing fibre communication network is inside Tank Washout Mini Substation.

5.2.18.3 Supply and install one (01) media converters.

5.2.18.4 Establish connectivity on the existing Local Area Network; register the meters on the billing server and integrate the meters onto the existing Switch (Admin Console) Meter Data Management System (MDMS) with appropriate tagging.

5.2.18.5 Create accounts and link with meter and apply the appropriate tariffs.

5.2.18.6 Test and commission the installations.

5.2.19 Kingsrest Yard

5.2.19.1 Supply, install and configure three (03) smart electricity meters with all the necessary comms module as per the standard specification.

5.2.19.2 Supply and install ±150m single mode fibre optic between Kingsrest Yard and Kingsrest Mini No.1 & 2.

5.2.19.3 Supply and install two (02) media converters.

5.2.19.4 Establish connectivity on the existing Local Area Network; register the meters on the billing server and integrate the meters onto the existing Switch (Admin Console) Meter Data Management System (MDMS) with appropriate tagging.

5.2.19.5 Create an account and link with the meter and apply the appropriate tariffs.

5.2.19.6 Test and commission the installations.

NEW SMART WATER METERS

5.2.20 Port of Durban Smart Water Meters

All water meters in the Port of Durban are being replaced on the on-going project "Replace Water Pipeline and Billing System".

EXISTING SYSTEMS AND INTEGRATION

5.2.21 TNPA Port of Durban Electrical Department has a standalone backbone fibre optic communication network [i.e., TCP/IP (Transmission Control Protocol/ Internet Protocol) & OPC (Open Platform Communication)] around the port for the SCADA and Electricity Billing system as well as a Long Range (LoRa) Private Wireless network for water meters. The port uses Power Smart Web and Switch (Admin Console) Meter Data Management System (MDMS) for utility management.

5.2.22 The *Contractor* must develop an Application Programming Interface (APIs) to integrate the software with existing systems including linking the Switch (Admin Console) MDMS to Transnets' Integrated Port Management System (IPMS) and SAP ERP (Enterprise Resource Planning) to transfer billing data (kilo Liters & Rand Value, kilowatts hours & Rand Value) on 15th of each month.

5.3 Port of East London

Site Conditions

All Plants and Materials offered shall be rated for continuous operation under the following service conditions: (Port to inputs data)

Altitude	Sea level to + 50m
Ambient air temperature	Max. 40 degrees Celsius; Min. – 5 degrees Celsius
Humidity	As high as 86%
Lightning conditions	10 strikes per year as listed in SABS codes
Atmosphere	Highly saline with heavy corrosive industrial, chemical and dust-laden nature. Frequent heavy rains driven by winds reaching speeds of 100km/h and above.
Water supply pressure	between 2.0 – 6.0bar

NEW SMART ELECTRICITY METERS

5.3.1 Installation of New Smart Electricity Meters

The *Contractor* shall perform the following activities on all the meters listed in Table 4:

5.3.1.1 Decommission and remove the existing electricity meter.

5.3.1.2 Supply, install and configure a new smart electricity meter with all the necessary comms required (communication module, GSM antenna etc.).

5.3.1.3 Establish connectivity; Register the meters on both the billing server and the new Utilities Management System through the LAN.

5.3.1.4 Create accounts and Link them to the relevant meter and apply the appropriate tariffs.

5.3.1.5 If the GSM network is used, the data sim cards will be free issued to the Contractor.

5.3.1.6 Test and commission the installation.

5.3.1.7 Reinstate power.

Table 4: Shows the areas where the new smart electricity meters are to be installed.

Meter No.	Meter Location	Type of Circuit	Meter Quantity
EM1	EL Yacht Club	3 Phase	01
EM2	Port Admin Building	3 Phase	01
EM3	Port Admin Building	3 Phase	01
EM4	Combi Substation	3 Phase	01
EM5	Biblia Building	3 Phase	01
EM6	State Warehouse Sub	3 Phase	01
EM7	State Warehouse Sub	3 Phase	01
EM8	State Warehouse Sub	3 Phase	01
EM9	C-Berth Building	3 Phase	01
EM10	C-Berth Building	3 Phase	01
EM11	C-Berth Building	3 Phase	01
EM12	C-Berth Building	3 Phase	01
EM13	C-Berth Building	3 Phase	01
EM14	Sewage Pit Shop 17	3 Phase	01
EM15	Shipwrights W/shop	3 Phase	01
EM16	STBD Kiosk No.1	3 Phase	01
EM17	STBD Kiosk No.2	3 Phase	01
EM18	STBD Sub	3 Phase	01
EM19	M.G Room STBD	3 Phase	01
EM20	M.G Room STBD	3 Phase	01
EM21	M.G Room STBD	3 Phase	01
EM22	M.G Room STBD	3 Phase	01
EM23	M.G Room STBD	3 Phase	01
EM24	M.G Room STBD	3 Phase	01
EM25	M.G Room STBD	3 Phase	01
EM26	M.G Room STBD	3 Phase	01
EM27	M.G Room STBD	3 Phase	01
EM28	M.G Room STBD	3 Phase	01
EM29	M.G Room STBD	3 Phase	01
EM30	M.G Room STBD	3 Phase	01
EM31	M.G Room STBD	3 Phase	01
EM32	M.G Room STBD	3 Phase	01
EM33	M.G Room STBD	3 Phase	01
EM34	M.G Room STBD	3 Phase	01
EM35	M.G Room STBD	3 Phase	01
EM36	M.G Room STBD	3 Phase	01
EM37	M.G Room STBD	3 Phase	01

Meter No.	Meter Location	Type of Circuit	Meter Quantity
EM38	M.G Room STBD	3 Phase	01
EM39	M.G Room STBD	3 Phase	01
EM40	M.G Room STBD	3 Phase	01
EM41	M.G Room STBD	3 Phase	01
EM42	M.G Room STBD	3 Phase	01
EM43	M.G Room STBD	3 Phase	01
EM44	M.G Room STBD	3 Phase	01
EM45	M.G Room STBD	3 Phase	01
EM46	M.G Room STBD	3 Phase	01
EM47	M.G Room STBD	3 Phase	01
EM48	M.G Room STBD	3 Phase	01
EM49	M.G Room STBD	3 Phase	01
EM50	M.G Room STBD	3 Phase	01
EM51	M.G Room STBD	3 Phase	01
EM52	M.G Room STBD	3 Phase	01
EM53	M.G Room STBD	3 Phase	01
EM54	M.G Room STBD	3 Phase	01
EM55	M.G Room STBD	3 Phase	01
EM56	M.G Room STBD	3 Phase	01
EM57	M.G Room STBD	3 Phase	01
EM58	M.G Room STBD	3 Phase	01
EM59	M.G Room STBD	3 Phase	01
EM60	M.G Room STBD	3 Phase	01
EM61	M.G Room STBD	3 Phase	01
EM62	M.G Room STBD	3 Phase	01
EM63	M.G Room STBD	3 Phase	01
EM64	M.G Room STBD	3 Phase	01
EM65	M.G Room STBD	3 Phase	01
EM66	M.G Room STBD	3 Phase	01
EM67	M.G Room STBD	3 Phase	01
EM68	M.G Room STBD	3 Phase	01
EM69	M.G Room STBD	3 Phase	01
EM70	M.G Room STBD	3 Phase	01
EM71	M.G Room STBD	3 Phase	01
EM72	M.G Room STBD	3 Phase	01
EM73	M.G Room STBD	3 Phase	01
EM74	M.G Room STBD	3 Phase	01
EM75	M.G Room STBD	3 Phase	01

Meter No.	Meter Location	Type of Circuit	Meter Quantity
EM76	M.G Room STBD	3 Phase	01
EM77	M.G Room STBD	3 Phase	01
EM78	M.G Room STBD	3 Phase	01
EM79	M.G Room STBD	3 Phase	01
EM80	M.G Room STBD	3 Phase	01
EM81	M.G Room STBD	3 Phase	01
EM82	M.G Room STBD	3 Phase	01
EM83	M.G Room STBD	3 Phase	01
EM84	M.G Room STBD	3 Phase	01
EM85	M.G Room STBD	3 Phase	01
EM86	M.G Room STBD	3 Phase	01
EM87	M.G Room STBD	3 Phase	01
EM88	M.G Room STBD	3 Phase	01
EM89	M.G Room STBD	3 Phase	01
EM90	M.G Room STBD	3 Phase	01

NEW SMART WATER METERS

5.3.2 Replacement of Existing Water Meters

The *Contractor* shall perform the following activities on all the meters list in Table 5:

5.3.2.1 Decommission and remove the existing water meter.

5.3.2.2 Supply and install a new water meter compatible with AMR technology including all necessary couplings, bolts, sealants etc.

5.3.2.3 Supply, install, mount and configure a smart IP68 meter-reading device (scanner and transceiver) and establish connectivity for wireless communication.

5.3.2.4 Establish Connectivity, Register the meter on both the billing server and the new Utility Management System.

5.3.2.5 Create accounts and link them to the relevant meter and apply the appropriate tariffs.

5.3.2.6 Test and commission the installation.

Table 5: Shows the areas where the new smart water meters are to be installed.

Meter No.	Meter Location	Existing Pipe Size	Existing Pipe Material	Installation Type	New Meter Size (mm)
1	Orient Beach TNPA	Unknown	HDPE	Inside a Manhole	32
2	Orient Beach TNPA	Unknown	HDPE	Inside a Manhole	90
3	Buffalo Street	Unknown	HDPE	Inside a Manhole	32
4	Buffalo Street	Unknown	HDPE	Inside a Manhole	150
5	Pontoon Road	Unknown	HDPE	Inside a Manhole	150
6	Old Guard Post near SA navy	Unknown	GI	Inside a Manhole	150
7	Port Captain	Unknown	HDPE	Inside a Manhole	32
8	Port Captain	Unknown	HDPE	Inside a Manhole	150
9	Latimer's Landing	Unknown	GI	Inside a Manhole	150
10	West Bank near B/R/Y/C	Unknown	AC	Inside a Manhole	150
11	Dale Street	Unknown	AC	Inside a Manhole	150
12	Dale Street TNPA	Unknown	AC	Inside a Manhole	150
13	Strand Street Cabin	Unknown	GI	Inside a Manhole	150
14	Strand Street BCM	Unknown	GI	Inside a Manhole	150
15	Strand Street	Unknown	GI	Inside a Manhole	32
16	Strand Street	Unknown	GI	Inside a Manhole	150
17	Strand Street TNPA	Unknown	GI	Inside a Manhole	150
18	Grey Stones W/B	Unknown	AC	Inside a Manhole	32
19	EMD Horseshoe	Unknown	COPPER	Inside a Manhole	32
20	EMD Horseshoe	Unknown	COPPER	Inside a Manhole	90
21	Old Navy Base	Unknown	GI	Inside a Manhole	150
22	Almega College	Unknown	GI	Inside a Manhole	150
23	Almega College TNPA	Unknown	GI	Inside a Manhole	150
24	Latimer's Complex (Bulk)	Unknown	GI	Inside a Manhole	150
25	Latimer's Complex (Normal)	Unknown	GI	Inside a Manhole	150
26	El Yacht Club, Orient Pier	Unknown	HDPE	Inside a Manhole	150
27	Customs House	Unknown	HDPE	Inside a Manhole	150
28	Latimer's Landing	Unknown	GI	Inside a Manhole	150
29	Shipyard Area	Unknown	AC	Inside a Manhole	150
30	Power Boat Club, MC Arthur	Unknown	GI	Inside a Manhole	150
31	House No. 9	Unknown	GI	Inside a Manhole	150
32	House No. 8	Unknown	GI	Inside a Manhole	150
33	Foot Prints	Unknown	GI	Inside a Manhole	150

Meter No.	Meter Location	Existing Pipe Size	Existing Pipe Material	Installation Type	New Meter Size (mm)
34	Dept Public Works, Saps	Unknown	GI	Inside a Manhole	150
35	Venue	Unknown	GI	Inside a Manhole	150
36	Car Terminal Complex	Unknown	AC	Inside a Manhole	150
37	Terminal Control Bldg.	Unknown	GI	Inside a Manhole	150
38	Straddle Workshop	Unknown	GI	Inside a Manhole	150
39	Mess/Ablution TPT 4 Quay	Unknown	GI	Inside a Manhole	150
40	TPT Admin Building, 3 Quay	Unknown	GI	Inside a Manhole	150
41	G Shed	Unknown	GI	Inside a Manhole	150
42	Elevator EL&P	Unknown	GI	Inside a Manhole	150
43	Elevator Building	Unknown	GI	Inside a Manhole	150
44	TPT Office (Old CPO), 4 QUAY	Unknown	GI	Inside a Manhole	150
45	TPT & IT & Bills Office 4 Quay	Unknown	GI	Inside a Manhole	150
46	SHEQ OFFICE On Bank M/Gate	Unknown	GI	Inside a Manhole	150
47	Dry Dock Pump Room	Unknown	GI	Inside a Manhole	150
48	Repair Quay Area	Unknown	GI	Inside a Manhole	150
49	Shop 17 Workshop	Unknown	GI	Inside a Manhole	150
50	Shop 17 M & A	Unknown	GI	Inside a Manhole	150
51	Procurement/Security	Unknown	HDPE	Inside a Manhole	150
52	MHA Area	Unknown	GI	Inside a Manhole	150

EXISTING SYSTEMS AND INTEGRATION

5.3.3 The *Contractor* must develop an Application Programming Interface (APIs) to integrate the software with existing systems including linking the Utility Management Software to Transnets' Integrated Port Management System (IPMS) and SAP ERP (Enterprise Resource Planning) to transfer billing data (kilo Liters & Rand Value, kilowatts hours & Rand Value) on 15th of each month.

COMMUNICATION INFRASTRUCTURE

5.3.4 Communication Infrastructure Requirements

5.3.4.1 Design a fibre optic Local Area Network within the port boundary.

5.3.4.2 Trench to lay the fibre optic sleeves, trenching to minimum depth of 600mm and a width of 300mm.

5.3.4.3 Supply and install 110mm PVC pipe and chamber system for the fibre.

5.3.4.4 Supply and install fibre optic manholes where required.

5.3.4.5 The trenching for complete installation shall not exceed a total length of 12km. Backfill and reinstate existing surface and make good.

5.3.4.6 Supply and install 15 patch panels fully populated 48 pair with LC patch leads.

5.3.4.7 Supply, install and patch a total of 12km of 48 pair single mode fibre optic cable (652D).

5.3.4.8 Supply, install and configure 15 by 24 ports managed enterprise network switches.

5.3.4.9 Supply and install a 9U swing frame cabinet 900mm deep.

5.3.4.10 Link all electricity meters through the LAN to transmit data to the billing server for processing via the Utilities Management Software.

5.3.5 Wireless Communication Network for the water meters

5.3.5.1 All waters are to be fitted with an AMR interface (IoT devices) for logging of data and communicate to the closest gateway. The AMR interface shall have long range transmission and operate on low power.

5.3.5.2 Supply and install metering gateways including civil and structural works and all appurtenances.

5.3.5.3 Configure and integrate the gateways onto the LAN to transfer data to the server and Utilities Management Software.

5.3.5.4 Supply and install a server (Network & Application) to manage and control the network. The network server shall receive data and control messages from the gateways and process the data. The application server shall interface with the network server and shall store the data, perform analytics and enable integration with other systems.

5.3.5.5 Develop an Application Programming Interface (API) to allow the network to transmit relevant billing data to the billing server and Utilities Management Software.

5.3.6 Server

5.3.6.1 Supply, install and configure two 8-core (2.10GHz), 16GB, 8 x Hot plug 2.5in, smart array P408ia, 2 x 500W, rack mount billing servers.

5.3.6.2 Each server shall be supplied with four 1.2TB Hard Drives.

5.3.6.3 Supply and install the latest Microsoft SQL server (permanent license) for the management of data, storage and perform analytics via the Utilities Management Software.

5.3.7 Firewall

5.3.7.1 Supply, install, configure, and commission a Firewall for LAN. The *Contractor* shall ensure that old and new services going through the Firewall are reinstated.

5.3.7.2 Setup DMZ and position a management workstation within DMZ.

5.3.8 Management Workstation

5.3.8.1 Supply, install and setup a Management Workstation [(31.5 inch USB Hub Monitor, QHD, 60Hz, support Display Port Alt Mode with up to 90W Power Delivery, 1xHDMI, 1xRJ-45 (Ethernet 1 GbE), 4x Superspeed USB (5Gbps)].

5.3.8.2 Setup rules for management workstation to control SCADA and provide dashboards whilst second LAN on machine connects to Transnet Data Network. Management station needs to be on Transnet domain and have relative Transnet Policies applied to it.

5.3.8.3 Test and commission entire installation.

5.4 Port of Port Elizabeth

Site Conditions

All Plants and Materials offered shall be rated for continuous operation under the following service conditions: (Port to inputs data)

Altitude	Sea level to +50m
Ambient air temperature	Max. 40 degrees Celsius; Min. – 5 degrees Celsius
Humidity	As high as 86%
Lightning conditions	10 strikes per year as listed in SABS codes
Atmosphere	Highly saline with heavy corrosive industrial, chemical and dust-laden nature. Frequent heavy rains driven by winds reaching speeds of 100km/h and above.
Water supply pressure	between 2.0 – 6.0bar

NEW SMART ELECTRICITY METERS

5.4.1 Installation of New Smart Electricity Meters

The *Contractor* shall perform the following activities on all the meters listed in Table 6:

5.4.1.1 Decommission and remove the existing electricity meter.

5.4.1.2 Supply, install and configure a new smart electricity meter with all the necessary comms required (communication module, GSM antenna etc.).

5.4.1.3 Establish connectivity; Register the meters on both the billing server and the new Utility Management System with appropriate tagging.

5.4.1.4 Create accounts and Link them to the relevant meter and apply the appropriate tariffs.

5.4.1.5 Test and commission the installation.

5.4.1.6 Reinstate power.

Table 6: Shows the areas where the new smart electricity meters are to be installed.

No.	Meter Location	Type of Circuit	Meter Quantity
1	Talhado	3 Phase	03
2	Live fish tank	3 Phase	01
3	Turntable	3 Phase	01
4	Fire Department (Marine House)	3 Phase	02
5	Ore Berth west Substation	3 Phase	08
6	Oil Site Substation	3 Phase	10
7	Green street	3 Phase	02
8	Rail Substation	3 Phase	02
9	Main Intake Substation (opposite fire dep)	3 Phase	14
10	Kiosk at Jetty entrance	3 Phase	01
11	Metering panels citrus substation (FTP)	3 Phase	04
12	Admin Building Substation	3 Phase	02
13	Charl Malarn Quay Mini Sub	3 Phase	01
14	CAE garage	3 Phase	01
15	Main Intake Substation	3 Phase	02
16	Switch room behind Clinic	3 Phase	01
17	Albatios No 1 Quay	3 Phase	02
18	Malgas Kiosk	3 Phase	01
19	Procurement building	3 Phase	03
20	Admin Building Substation	3 Phase	02
21	Green Street Substation	3 Phase	02
22	Red Ground	3 Phase	02
23	Extreme Project	3 Phase	01
24	Light house Department	3 Phase	01
25	Switch room Behind clinic	3 Phase	05
26	Civil Depot	3 Phase	02
27	Shed 10	3 Phase	01
28	Shed 11	3 Phase	01
29	Shed 12 pump house	3 Phase	01
30	Old Navy (Entrance)	3 Phase	02

No.	Meter Location	Type of Circuit	Meter Quantity
31	Ore berth west substation	3 Phase	07
32	Malgas kiosk	3 Phase	03
33	Dom pedro (Tunnel)	3 Phase	01
34	Ore berth west	3 Phase	01
35	Orange kiosk	3 Phase	04
36	Ship way café	3 Phase	01
37	Siyaloba	3 Phase	01
38	NSRI Building	3 Phase	01
39	PE yatch (Marina)	3 Phase	02
40	Bakkens kiosk	3 Phase	05
41	Slip way	3 Phase	01

NEW SMART WATER METERS

5.4.2 Replacement of Existing Above Ground Water Meters

The *Contractor* shall perform the following activities on all the meters list in Table 7:

5.4.2.1 Decommission and remove the existing water meter.

5.4.2.2 Supply and install a new water meter compatible with AMR technology including all necessary couplings, bolts, sealants etc.

5.4.2.3 Supply, install, mount and configure a smart IP68 automatic data logger and meter-reading device and establish connectivity for wireless communication.

5.4.2.4 Establish Connectivity, Register the meters on both the billing server and the new Utility Management System with appropriate tagging.

5.4.2.5 Create accounts and Link them to the relevant meter and apply the appropriate tariffs.

5.4.2.6 Test and commission the installation.

Table 7: Shows the areas where the new smart water meters are to be installed.

No.	Meter Location	Existing Pipe Size	Existing Pipe Material	New Meter Size (mm)
1	Procurement	15	Polycop/Copper	15
2	Security cabin green street	15	Polycop/ Copper	15
3	Clinic	15	Polycop/ Copper	15
4	SHEQ Building TPT	15	Polycop/ Copper	15

No.	Meter Location	Existing Pipe Size	Existing Pipe Material	New Meter Size (mm)
5	VW Office opposite Shed 101	15	Polycop/ Copper	15
6	Shunters Cabin (TFR)	15	Polycop/ Copper	15
7	Black Impala	15	Polycop/ Copper	15
8	Rennies Group	15	Polycop/ Copper	15
9	Greystone Cargo Systems (PTY) LTD	15	Polycop/ Copper	15
10	Bidfreight Port Operations (PTY) LTD	15	Polycop/ Copper	15
11	Bidfreight Port Operations (PTY) LTD	15	Polycop/ Copper	15
12	J.L Wessels	15	Polycop/ Copper	15
13	Commercial Marine	15	Polycop/ Copper	15
14	CDC Commercial Divers	15	Polycop/ Copper	15
15	Security Foot Bridge	22	Polycop/ Copper	22
16	HR Offices/ Building	22	Polycop/ Copper	22
17	103 Tower	22	Polycop/ Copper	22
18	102 Tower	22	Polycop/ Copper	22
19	Security Container Entrance	22	Polycop/ Copper	22
20	103 Quay Side	22	Polycop/ Copper	22
21	102 Quay Side	22	Polycop/ Copper	22
22	Shed 101	22	Polycop/ Copper	22
23	Car Terminal Admin Office	22	Polycop/ Copper	22
24	Spoornet	22	Polycop/ Copper	22
25	Malgas (TFR)	22	Polycop/ Copper	22
26	National Sea Rescue Institute	22	Polycop/ Copper	22
27	Stormfire Trading 11 CC	22	Polycop/ Copper	22
28	Tabak	22	Polycop/ Copper	22
29	Umsobomvu (No.2)	22	Polycop/ Copper	22
30	Shell South Africa Marketing (PTY)LTD	22	Polycop/ Copper	22
31	Shell SA (PTY) LTD	22	Polycop/ Copper	22
32	Extreme Projects	22	Polycop/ Copper	22
33	DS +CL Sgacace Fishing Farming	22	Polycop/ Copper	22
34	CVC Africa	22	Polycop/ Copper	22
35	Toilet TPM Kepli Petroleum	22	Polycop/ Copper	22
36	Blue Water Fishing	22	Polycop/ Copper	22
37	Van Niekerk/ Zandalee	22	Polycop/ Copper	22
38	Kepu Petroleum	22	Polycop/ Copper	22
39	Algoa Bay Sailing Marina	22	Polycop/ Copper	22

No.	Meter Location	Existing Pipe Size	Existing Pipe Material	New Meter Size (mm)
40	Albatross Offshore Services (PTY)LTD	22	Polycop/ Copper	22
41	Albatross	22	Polycop/ Copper	22
42	Rail to Rail – Red Grouwa (No.1)	22	Polycop/ Copper	22
43	Camanga	22	Polycop/ Copper	22
44	Blue Water Fish Traders	22	Polycop/ Copper	22
45	Bereau Veritus	22	Polycop/ Copper	22
46	Tanker Berth Control Room	22	Polycop/ Copper	22
47	Tanker Berth Security Cabin	22	Polycop/ Copper	22
48	Rail Buildings (3)	22	Polycop/ Copper	22
49	Engen Petroleum Limited	25	Polycop/ Copper	25
50	Shell South Africa (PTY) LTD	25	Polycop/ Copper	25
51	Chevron South Africa (PTY) LTD	25	Polycop/ Copper	25
52	Umsobomvu	25	Polycop/ Copper	25

5.4.3 Replacement of Existing Below Ground Water Meters

The *Contractor* shall perform the following activities on all the meters listed in Table 8:

5.4.3.1 Decommission and remove the existing water meter.

5.4.3.2 Supply and install a new water meter compatible with AMR technology including all necessary couplings, bolts, sealants etc.

5.4.3.3 Supply, install, mount and configure a smart IP68 automatic data logger and meter-reading device and establish connectivity for wireless communication.

5.4.3.4 Establish Connectivity, Register the meter on both the billing server and the new Utility Management System with appropriate tagging.

5.4.3.5 Create accounts and Link them to the relevant meter and apply the appropriate tariffs.

5.4.3.6 Test and commission the installation.

Table 8: Shows the areas where the new smart water meters are to be installed.

No.	Meter Location	Existing Pipe Size	Existing Pipe Material	New Meter Size (mm)
53	Finance Building	32	HDPE/Cement Fibre/ Cast-Iron	32
54	Bus Depot (Clinic)	32	HDPE/Cement Fibre/ Cast-Iron	32
55	Shed 12 TPT Ablutions	32	HDPE/Cement Fibre/ Cast-Iron	32

No.	Meter Location	Existing Pipe Size	Existing Pipe Material	New Meter Size (mm)
56	Shunters T/S Double Storey	32	HDPE/Cement Fibre/ Cast-Iron	32
57	Shell South Africa (PTY) LTD	32	HDPE/Cement Fibre/ Cast-Iron	32
58	Total Oil SA (PTY) LTD	32	HDPE/Cement Fibre/ Cast-Iron	32
59	ABSM Crane	32	HDPE/Cement Fibre/ Cast-Iron	32
60	Eyethu Fishing (PTY) LTD	32	HDPE/Cement Fibre/ Cast-Iron	32
61	Talhado Fishing	32	HDPE/Cement Fibre/ Cast-Iron	32
62	Fingcorp 113 CC	32	HDPE/Cement Fibre/ Cast-Iron	32
63	Vacant Building 1	32	HDPE/Cement Fibre/ Cast-Iron	32
64	Vacant Building 2	32	HDPE/Cement Fibre/ Cast-Iron	32
65	Vacant Building 3	32	HDPE/Cement Fibre/ Cast-Iron	32
66	Vacant Building 4	32	HDPE/Cement Fibre/ Cast-Iron	32
67	CVC Building (Ablution Block)	32	HDPE/Cement Fibre/ Cast-Iron	32
68	Ore Berth (Ablution Block)	32	HDPE/Cement Fibre/ Cast-Iron	32
69	Civil Depot	40	HDPE/Cement Fibre/ Cast-Iron	40
70	Business Manager (MPT)	40	HDPE/Cement Fibre/ Cast-Iron	40
71	ULwandle (Next to Oyster)	40	HDPE/Cement Fibre/ Cast-Iron	40
72	Live Fish Tanks (East Coast)	40	HDPE/Cement Fibre/ Cast-Iron	40
73	Department of Public Works	40	HDPE/Cement Fibre/ Cast-Iron	40
74	Alvodex CC	40	HDPE/Cement Fibre/ Cast-Iron	40
75	Pumpstation House (Seawater)	40	HDPE/Cement Fibre/ Cast-Iron	40
76	Trade Motto (1)	40	HDPE/Cement Fibre/ Cast-Iron	40
77	Trade Motto (2)	40	HDPE/Cement Fibre/ Cast-Iron	40
78	Rail Buildings (1)	40	HDPE/Cement Fibre/ Cast-Iron	40
79	Rail Buildings (2)	40	HDPE/Cement Fibre/ Cast-Iron	40
80	Marine Services	50	HDPE/Cement Fibre/ Cast-Iron	50
81	Marine Services	50	HDPE/Cement Fibre/ Cast-Iron	50
82	Port Admin Building (Port Authority)	50	HDPE/Cement Fibre/ Cast-Iron	50

No.	Meter Location	Existing Pipe Size	Existing Pipe Material	New Meter Size (mm)
83	Port Control Tower (Port Captain)	50	HDPE/Cement Fibre/ Cast-Iron	50
84	Minor Building (Offices)	50	HDPE/Cement Fibre/ Cast-Iron	50
85	Minor Building (Ablutions)	50	HDPE/Cement Fibre/ Cast-Iron	50
86	TPT Offices	50	HDPE/Cement Fibre/ Cast-Iron	50
87	Shell South Africa (PTY) LTD	50	HDPE/Cement Fibre/ Cast-Iron	50
88	Talhado Fishing Enterprise (PTY) LTD	50	HDPE/Cement Fibre/ Cast-Iron	50
89	P.E Deep Sea Angling Club	50	HDPE/Cement Fibre/ Cast-Iron	50
90	Shall South Africa (PTY) LTD	50	HDPE/Cement Fibre/ Cast-Iron	50
91	Biblia Harbour Mission	50	HDPE/Cement Fibre/ Cast-Iron	50
92	Talhado Fishing	50	HDPE/Cement Fibre/ Cast-Iron	50
93	TNPA Lighthouse Services	50	HDPE/Cement Fibre/ Cast-Iron	50
94	Plot No.1 (Shop 17) Breakeven	50	HDPE/Cement Fibre/ Cast-Iron	50
95	Zwembesi Farm	50	HDPE/Cement Fibre/ Cast-Iron	50
96	BPO	50	HDPE/Cement Fibre/ Cast-Iron	50
97	Cargo	50	HDPE/Cement Fibre/ Cast-Iron	50
98	Ore Berth Control Tower	75	HDPE/Cement Fibre/ Cast-Iron	75
99	Eyethu Fishing (PTY) LTD	75	HDPE/Cement Fibre/ Cast-Iron	75
100	Siyaloba Fishing Academy	75	HDPE/Cement Fibre/ Cast-Iron	75
101	FPT Port Leasing	75	HDPE/Cement Fibre/ Cast-Iron	75
102	Technical Manager (Shop 17)	100	HDPE/Cement Fibre/ Cast-Iron	100
103	Technical Manager	100	HDPE/Cement Fibre/ Cast-Iron	100
104	Tipplers	100	HDPE/Cement Fibre/ Cast-Iron	100
105	Shell South Africa (PTY) LTD	100	HDPE/Cement Fibre/ Cast-Iron	100
106	Talhado Fishing Enterprise (PTY) LTD	100	HDPE/Cement Fibre/ Cast-Iron	100
107	Oil Sites main Supply	150	HDPE/Cement Fibre/ Cast-Iron	150
108	Baakens Main Supply	150	HDPE/Cement Fibre/ Cast-Iron	150
109	Jetty Main Supply	150	HDPE/Cement Fibre/ Cast-Iron	150

EXISTING SYSTEMS AND INTEGRATION

5.4.4 The *Contractor* must develop an Application Programming Interface (APIs) to integrate the software with existing systems including linking the Utility Management Software to Transnets' Integrated Port Management System (IPMS) and SAP ERP (Enterprise Resource Planning) to transfer billing data (kilo Liters & Rand Value, kilowatts hours & Rand Value) on 15th of each month.

COMMUNICATION INFRASTRUCTURE

5.4.5 Communication Infrastructure Requirements

5.4.5.1 Design a fibre optic Local Area Network within the port boundary.

5.4.5.2 Trench to lay the fibre optic sleeves, trenching to minimum depth of 600mm and a width of 300mm.

5.4.5.3 Supply and install 110mm PVC pipe and chamber system for the fibre.

5.4.5.4 Supply and install fibre optic manholes where required.

5.4.5.5 The trenching for complete installation shall not exceed a total length of 12km. Backfill and reinstate existing surface and make good.

5.4.5.6 Supply and install 15 patch panels fully populated 48 pair with LC patch leads.

5.4.5.7 Supply, install and patch a total of 12km of 48 pair single mode fibre optic cable (652D).

5.4.5.8 Supply, install and configure 15 by 24 ports managed enterprise network switches.

5.4.5.9 Supply and install a 9U swing frame cabinet 900mm deep.

5.4.5.10 Link all electricity meters through the LAN to transmit data to the billing server for processing via the Utilities Management Software.

5.4.6 Wireless Communication Network for the water meters

5.4.6.1 All waters are to be fitted with an AMR interface (IoT devices) for logging of data and communicate to the closest gateway. The AMR interface shall have long range transmission and operate on low power.

5.4.6.2 Supply and install metering gateways including civil and structural works and all appurtenances.

5.4.6.3 Configure and integrate the gateways onto the LAN to transfer data to the server and Utilities Management Software.

5.4.6.4 Supply and install a server (Network & Application) to manage and control the network. The network server shall receive data and control messages from the gateways and process the data. The application server shall interface with the network server and shall store the data, perform analytics and enable integration with other systems.

5.4.6.5 Develop an Application Programming Interface (API) to allow the network to transmit relevant billing data to the billing server and Utilities Management Software.

5.4.7 Server

5.4.7.1 Supply, install and configure two 8-core (2.10GHz), 16GB, 8 x Hot plug 2.5in, smart array P408ia, 2 x 500W, rack mount billing servers.

5.4.7.2 Each server shall be supplied with four 1.2TB Hard Drives.

5.4.7.3 Supply and install the latest Microsoft SQL server (permanent license) for the management of data, storage and perform analytics via the Utilities Management Software.

5.4.8 Firewall

5.4.8.1 Supply, install, configure, and commission a Firewall for LAN. The *Contractor* shall ensure that old and new services going the Firewall are reinstated.

5.4.8.2 Setup DMZ and position a management workstation within DMZ.

5.4.9 Management Workstation

5.4.9.1 Supply, install and setup a Management Workstation [(31.5 inch USB Hub Monitor, QHD, 60Hz, support Display Port Alt Mode with up to 90W Power Delivery, 1xHDMI, 1xRJ-45 (Ethernet 1 GbE), 4x Superspeed USB (5Gbps)].

5.4.9.2 Setup rules for management workstation to control SCADA and provide dashboards whilst second LAN on machine connects to Transnet Data Network. Management station needs to be on Transnet domain and have relative Transnet Policies applied to it.

5.4.9.3 Test and commission entire installation.

5.5 Port of Ngqura

Site Conditions

All Plants and Materials offered shall be rated for continuous operation under the following service conditions: (Port to inputs data)

Altitude	Sea level to +50m
Ambient air temperature	Max. 40 degrees Celsius; Min. -5 degrees Celsius
Humidity	As high as 86%
Lightning conditions	10 strikes per year as listed in SABS codes
Atmosphere	Highly saline with heavy corrosive industrial, chemical and dust-laden nature. Frequent heavy rains driven by winds reaching speeds of 100km/h and above.
Water supply pressure	between 2.0 – 6.0bar

NEW SMART ELECTRICITY METERS

5.5.1 Installation of New Smart Electricity Meters

The *Contractor* shall perform the following activities on all the meters listed in Table 9:

5.5.1.1 Supply, install and configure a new smart electricity meter with all the necessary comms required (communication module, GSM antenna etc.).

5.5.1.2 Establish connectivity; Register the meters on both the billing server and the new Utilities Management System with appropriate tagging.

5.5.1.3 Create accounts and Link them to the relevant meter and apply the appropriate tariffs.

5.5.1.4 Test and commission the installation.

5.5.1.5 Reinstate power.

Table 9: Shows the areas where the new smart electricity meters are to be installed.

Item No.	Meter Location	Type of Circuit	Meter Quantity
1.	Substation M100 – HV Switch Room Area	3 Phase	01
2.	Administration Building – LV Panel	3 Phase	01
3.	E Mendi Building – LV Distribution Board	3 Phase	02
4.	Substation 001	3 Phase	01
5.	Substation 002	3 Phase	01
6.	Substation ACB - LV Room	3 Phase	01

Item No.	Meter Location	Type of Circuit	Meter Quantity
7.	ACB Building – LV Switch Room	3 Phase	01
8.	Port Control Building – HV Switch Room	3 Phase	01
9.	AMS Substation – LV Switch Room	3 Phase	01
10.	Sand Bypass MPS, BPS 1, and BPS 3 – LV Switch Room	3 Phase	03
11.	Clear Water Intake	3 Phase	01
12.	Finger Jetty Mini-Substation	3 Phase	01
13.	B100 Mini-Substation	3 Phase	01
Proposed New Installations			
14.	Substation M100 – HV Switch Room	3 Phase	01
15.	Administration Building – LV Panel	3 Phase	01
16.	E Mendi Building – LV Distribution Board	3 Phase	02
17.	Substation 001	3 Phase	01
19.	Substation 002	3 Phase	01
20.	Substation ACB – LV Switch Room	3 Phase	01
21.	ACB Building – LV Switch Room	3 Phase	01
22.	Port Control Building – HV Switch Room	3 Phase	01
23.	AMS Substation LV Switch Room	3 Phase	01
24.	Sand Bypass MPS, BPS 1, and BPS 3 – LV Switch Room	3 Phase	03
25.	Clear Water Intake	3 Phase	01
26.	Finger Jetty Mini-Substation	3 Phase	01
27.	B100 Mini-Substation	3 Phase	01

NEW SMART WATER METERS

5.5.2 Replacement of Existing Water Meters

The *Contractor* shall perform the following activities on all the meters listed in Table 10:

5.5.2.1 Decommission and remove the existing water meter.

5.5.2.2 Supply and install a new water meter compatible with AMR technology including all necessary couplings, bolts, sealants etc.

5.5.2.3 Supply, install, mount and configure a smart IP68 automatic data logger and meter-reading device and establish connectivity for wireless communication.

5.5.2.4 Establish Connectivity, Register the meter on both the billing server and the new Utility Management System with appropriate tagging.

5.5.2.5 Create accounts and Link them to the relevant meter and apply the appropriate tariffs.

5.5.2.6 Test and commission the installation.

Table 10: Shows the areas where the new smart water meters are to be installed.

No.	Meter Location	Existing Pipe Size	Existing Pipe Material	New Meter Size (mm)
1	NMBM	450	GRP	450
2	Main Ent. Zone 1 (B1)	315	uPVC, Class 16	315
3	Main Port Entrance (C1)	110	uPVC, Class 16	110
4	Main Port Entrance (C2)	110	uPVC, Class 16	110
5	Main Port Entrance (C3)	110	uPVC, Class 16	110
6	Joorst Park Offices (D)	160	uPVC, Class 16	160
7	NCT Trailer Park (G1)	250	uPVC, Class 16	250
8	NCT Trailer Park (G2)	250	uPVC, Class 16	250
9	NCT Entrance (F)	250	uPVC, Class 16	250
10	NCT Exit (Sec) – (H)	250	uPVC, Class 16	250
11	NCT Entrance (Sec) – (I)	250	uPVC, Class 16	250
12	NCT Help Desk (J)	250	uPVC, Class 16	250
13	NCT Admin Building (K)	250	uPVC, Class 16	250
14	NCT Terminal Supply Nort Rail (L)	250	uPVC, Class 16	250
15	NCT Hauler Zone (N)	250	uPVC, Class 16	250
16	NCT Workshop (S)	50	HDPE, Class 12	50
17	Sand Bypass Main Pump Station (E)	63	HDPE, Class 12	63
18	BP1 (M)	250	uPVC, Class 16	250
19	BP2 (T)	250	uPVC, Class 16	250
20	BP3 (P)	160	uPVC, Class 16	160
21	TNPA Admin Building (V)	110	uPVC, Class 16	110
22	(U)	50	HDPE, Class 12	50
23	(R)	200	uPVC, Class 16	200
24	Port Control (O)	110	uPVC, Class 16	110
25	ACB Admin (Q)	110	uPVC, Class 16	110
26	To be confirmed	25	uPVC, Class 16	25
27	To be confirmed	40	uPVC, Class 16	40

Existing Systems and Integration

5.5.3 The *Contractor* must develop an Application Programming Interface (APIs) to integrate the software with existing systems including linking the Utility Management Software to Transnets' Integrated Port Management System (IPMS) and SAP ERP (Enterprise Resource Planning) to transfer billing data (kilo Liters & Rand Value, kilowatts hours & Rand Value) on 15th of each month.

Communication Infrastructure

5.5.4 Communication Infrastructure Requirements

5.5.4.1 Design a fibre optic Local Area Network within the port boundary.

5.5.4.2 Trench to lay the fibre optic sleeves, trenching to minimum depth of 600mm and a width of 300mm.

5.5.4.3 Supply and install 110mm PVC pipe and chamber system for the fibre.

5.5.4.4 Supply and install fibre optic manholes where required.

5.5.4.5 The trenching for complete installation shall not exceed a total length of 10km. Backfill and reinstate existing surface and make good.

5.5.4.6 Supply and install 12 patch panels fully populated 48 pair with LC patch leads.

5.5.4.7 Supply, install and patch a total of 10km of 48 pair single mode fibre optic cable(652D).

5.5.4.8 Supply, install and configure 12 by 24 ports managed enterprise network switches.

5.5.4.9 Supply and install a 9U swing frame cabinet 900mm deep.

5.5.4.10 Link all electricity meters through the LAN to transmit data to the billing server for processing via the Utilities Management Software.

5.5.5 Wireless Communication Network for the water meters

5.5.5.1 All waters are to be fitted with an AMR interface (IoT devices) for logging of data and communicate to the closest gateway. The AMR interface shall have long range transmission and operate on low power.

5.5.5.2 Supply and install metering gateways including civil and structural works and all appurtenances.

5.5.5.3 Configure and integrate the gateways onto the LAN to transfer data to the server and Utilities Management Software.

5.5.5.4 Supply and install a server (Network & Application) to manage and control the network. The network server shall receive data and control messages from the gateways and process the data. The application server shall interface with the network server and shall store the data, perform analytics and enable integration with other systems.

5.5.5.5 Develop an Application Programming Interface (API) to allow the network to transmit relevant billing data to the billing server and Utilities Management Software.

5.5.6 Server

5.5.6.1 Supply, install and configure two 8-core (2.10GHz), 16GB, 8 x Hot plug 2.5in, smart array P408ia, 2 x 500W, rack mount billing servers.

5.5.6.2 Each server shall be supplied with four 1.2TB Hard Drives.

5.5.6.3 Supply and install the latest Microsoft SQL server (permanent license) for the management of data, storage and perform analytics via the Utilities Management Software.

5.5.7 Firewall

5.5.7.1 Supply, install, configure, and commission a Firewall for LAN. The *Contractor* shall ensure that old and new services going the Firewall are reinstated.

5.5.7.2 Setup DMZ and position a management workstation within DMZ.

5.5.8 Management Workstation

5.5.8.1 Supply, install and setup a Management Workstation.

5.5.8.2 Setup rules for management workstation to control SCADA and provide dashboards whilst second LAN on machine connects to Transnet Data Network. Management station needs to be on Transnet domain and have relative Transnet Policies applied to it.

5.5.8.3 Test and commission entire installation.

5.6 Port of Mossel Bay

Site Conditions

All Plants and Materials offered shall be rated for continuous operation under the following service conditions: (Port to inputs data)

Altitude	Sea level to +50m
Ambient air temperature	Max. 40 degrees Celsius; Min. – 5 degrees Celsius
Humidity	As high as 86%
Lightning conditions	10 strikes per year as listed in SABS codes
Atmosphere	Highly saline with heavy corrosive industrial, chemical and dust-laden nature. Frequent heavy rains driven by winds reaching speeds of 100km/h and above.
Water supply pressure	between 2.0 – 6.0bar

NEW SMART ELECTRICITY METERS

5.6.1 Installation of New Smart Electricity Meters

The *Contractor* shall perform the following activities on all the meters listed in Table 11:

5.6.1.1 Supply, install and configure a new smart electricity meter with all the necessary comms required (communication module, GSM antenna etc.).

5.6.1.2 Establish connectivity; Register the meters on both the billing server and the new Utility Management System with appropriate tagging.

5.6.1.3 Create accounts and Link them to the relevant meter and apply the appropriate tariffs.

5.6.1.4 If the GSM network is used, the data sim cards will be free issued to the Contractor.

5.6.1.5 Test and commission each installation.

5.6.1.6 Reinstate power.

Table 11: Shows the areas where the new smart electricity meters are to be installed.

Item No.	Meter Location	Type of Circuit	Meter Quantity
1	Yatch Club (Municipality Feeder)	3 Phase	01
2	Yatch Club	Single Phase	01
3	Recreational Area	3 Phase	02
4	Recreational Area	Single Phase	01

Item No.	Meter Location	Type of Circuit	Meter Quantity
5	Main Substation LV Switch Room	3 Phase	05
6	Station Area – Kiosk F	3 Phase	01
7	Station Area – Kiosk E	3 Phase	01
8	Petro SA Kiosk	3 Phase	05
9	Ikamva Mini Substation	3 Phase	01
10	MSB Mini Substation - Tenant	3 Phase	01
11	MSB Mini Substation - TNPA	3 Phase	01
12	Seavuna Mini-Substation (LV)	3 Phase	01
13	Seavuna Mini-Substation (Main Feeder)	3 Phase	01
14	Seavuna Mini-Substation B (LV)	3 Phase	01
15	Seavuna Mini-Substation B (Main Feeder)	3 Phase	01
16	Seavuna Shore Supply – Box No.1	3 Phase	01
17	Seavuna Shore Supply – Box No.2	3 Phase	01
19	Vincent Jetty Mini-Substation	3 Phase	01
20	Vincent Jetty Kiosk		
i.	Spinal Road Street Lights	3 Phase	01
ii.	Sewage Pump	3 Phase	01
iii.	Park Homes	3 Phase	01
iv.	Afro Shore Offices	3 Phase	01
21	Vincent Jetty Shore Plugs		
i.	Power Box 1	3 Phase	01
ii.	Power Box 2	3 Phase	02
iii.	Power Box 3	3 Phase	02
iv.	Power Box 4	3 Phase	05
v.	Power Box 5	3 Phase	05
vi.	Power Box 6	3 Phase	02
vii.	Power Box 7	3 Phase	02
viii.	Power Box 8	3 Phase	02
22	Civil Workshop Switch Room	3 Phase	07
23	Slipway Kiosk G	3 Phase	02
24	Municipality Kiosk		
i.	Blue Shed	3 Phase	01
ii.	Security House	3 Phase	01
iii.	Boundary Lights	3 Phase	01

Item No.	Meter Location	Type of Circuit	Meter Quantity
25	Security Gates		
i.	Gate 1	3 Phase	02
ii.	Gate 1	3 Phase	02
iii.	Gate 1	3 Phase	02

NEW SMART WATER METERS

5.6.2 New Below Ground Water Meter Installation

The *Contractor* shall perform the following activities for the 29 new proposed below ground meter installations:

5.6.2.1 Proof trench and verify the pipe material, depth and pipe size before procuring any material for the installation.

5.6.2.2 The existing pipe material is UPVC and the pipe size ranges from 110mm to 160mm.

5.6.2.3 Saw cut approximately 4.7x1m wide in 50mm premix and hack up and remove including layer works and re-instate to match existing once all work is complete.

5.6.2.4 Excavate in earth in varying depths but not exceeding 1.5m deep, approximately 4.7x1m wide to expose existing water pipe including all necessary risk of collapse, backfilling and compaction and cart away of surplus material from site.

5.6.2.5 Cutting off approximately 4.5m of pipe including fitting of flanges on both ends of exposed pipe.

5.6.2.6 Construct a new water meter manhole with overall size 2.66x1.66m and varying depths not exceeding 2.53m deep including all necessary additional excavations, risk of collapse, blinding, manhole base, stone bedding, 230mm brickwork, backfilling, concrete cover slab, including breaking openings on both ends for new pipe and cart away of surplus material all in accordance with drawings and specifications.

5.6.2.7 Supply and install No. 02x steel pipes each approximately 1.4m in length, flanged on both ends and fitted on either end of manhole to existing pipes and in new manholes including sealing off ends of manholes, support/thrust blocks, etc., gaskets, bolts, sealants etc.

5.6.2.8 Supply and install No. 02x spool pieces in varying lengths flanged on both ends and fixed to meter & valves including all necessary, gaskets, bolts, sealants etc.

5.6.2.9 Supply and install a swing check valve flanged on both ends and fixed to new-flanged pipes including all necessary gaskets, bolts, sealants etc.

5.6.2.10 Supply and install an In-line strainer, flanged on both ends and fixed to new-flanged pipes including all necessary gaskets, bolts, sealants etc.

5.6.2.11 Supply and install a 160mm water meter, flanged on both ends and fixed to new-flanged pipes including all necessary gaskets, bolts, sealants etc.

5.6.2.12 Supply, install, mount and configure a smart IP68 automatic data logger and meter-reading device and establish connectivity for wireless communication.

5.6.2.13 Register the meter on both the billing server and the new Utility Management System.

5.6.2.14 Test and commission each installation.

5.6.3 Replacement of Existing Water Meters

The *Contractor* shall perform the following activities on all the meters listed in Table 12:

5.6.3.1 Decommission and remove the existing water meter.

5.6.3.2 Supply and install a new water meter compatible with AMR technology including all necessary couplings, bolts, sealants etc.

5.6.3.3 Supply, install, mount and configure a smart IP68 automatic data logger and meter-reading device and establish connectivity for wireless communication.

5.6.3.4 Register the meter on both the billing server and the new Utility Management System with appropriate tagging.

5.6.3.5 Create accounts and Link them to the relevant meter and apply the appropriate tariffs.

5.6.3.6 Test and commission the installation.

Table 12: Shows the areas where the new smart water meters are to be installed.

No.	Meter Location	Existing Pipe Size	Existing Pipe Material	New Meter Size (mm)
1	MZR 181 Flames Area	80	uPVC	80
2	Flames Restaurant	15	Polypcop	15
3	Car Wash	15	Polypcop	15
4	Station Complex (Check Meter)	80	uPVC	80
5	Bedding Stores	22	Polypcop	22
6	Station 1	22	Polypcop	22
7	Station 2 Laparon	22	Polypcop	22
8	Old Electrical Workshop	22	Polypcop	22
9	Station Platform	22	Polypcop	22
10	GZR 257 Bridge Bulk (Quay 4)	80	uPVC	80
11	Recreational Slipway Office	15	Polypcop	15
12	Recreational Brick Building Ablutions TNPA	15	Polypcop	15
13	Mobile Toilets TNPA	22	Polypcop	22

No.	Meter Location	Existing Pipe Size	Existing Pipe Material	New Meter Size (mm)
14	WAG/Steakhouse	15	Polypcop	15
15	KAAI 4	15	Polypcop	15
16	London Bus/Oyster Bar	22	Polypcop	22
17	Waterfront 1	15	Polypcop	15
18	Waterfront 2	22	Polypcop	22
19	Romonza	22	Polypcop	22
20	Minoli	22	Polypcop	22
21	Gate No 2	15	Polypcop	15
22	Good Shed	80	uPVC	80
23	F/H Supply Bulk meter (Station Platform)	80	uPVC	80
24	Check Meter VJ	80	uPVC	80
25	VJ Security Guardhouse	15	Polypcop	15
26	TNPA Marine Supply Point Artic Turn	15	Polypcop	15
27	TNPA Marine Supply Point Snipe	15	Polypcop	15
28	Smit Amandla	15	Polypcop	15
29	VJ Quay Side Supply Pnt #1	15	Polypcop	15
30	VJ Quay Side Supply Pnt #2	15	Polypcop	15
31	VJ Quay Side Supply Pnt #3	15	Polypcop	15
32	VJ Quay Side Supply Pnt #4	15	Polypcop	15
33	Sliding Door	15	Polypcop	15
34	Store Racks	15	Polypcop	15
35	Wash Bay	15	Polypcop	15
36	Tsisa yama	15	Polypcop	15
37	Sea Gypsey	22	Polypcop	22
38	Biblia	15	Polypcop	15
39	Gate 1 Guard House	15	Polpcop	15
40	Border Management Agency	22	Polypcop	22
41	Luna Moon	22	Polypcop	22
42	PetroSA Office	22	Polypcop	22
43	PetroSA Mess & Ablution	22	Polypcop	22
44	Meg Plant (Tanks)	50	uPVC	50
45	Long Shed (PetroSA) Q4	50	uPVC	50
46	Quay Side Point 1 (Charlie)	90	uPVC	90
47	Quay Side Point 2 (Bravo)	90	uPVC	90

No.	Meter Location	Existing Pipe Size	Existing Pipe Material	New Meter Size (mm)
48	Quay Side Point 3 (Alpha)	90	uPVC	90
49	UZR 752 Viking Area	80	uPVC	80
50	Blue Shed	80	uPVC	80
51	Afro Fishing 2 (Old I & J Site) On quay side	80	uPVC	80
52	Viking Fishing	80	uPVC	80
53	Gate No.3 TNPA	22	Polypcop	22
54	Kepu Site	22	Polypcop	22
55	Quay No.3 TNPA Supply Point	22	Polypcop	22
56	NSRI	22	Polypcop	22
57	Tuck Shop	15	Polypcop	15
58	Slipway	28	Copper	28
59	Administration Building (TNPA)	50	uPVC	50
60	Vincent Jetty Quay Side Supply @ Romonza	15	Polypcop	15
61	Marine Park Home	22	Polypcop	22
62	Pioneer 1	50	uPVC	50
63	Pioneer 2	50	uPVC	50
64	Lucky Star	50	uPVC	50
65	Walk on Moorings (TNPA)	22	Polypcop	22
66	Wash-bay (TNPA)	22	Polpcop	22
67	LBS 185 (Yacht Club) – Bulk Meter	28	Copper	28
68	Blue Door	15	Polypcop	15
69	Mozambiek	15	Polypcop	15
70	Ladies Ablutions (TNPA)	15	Polypcop	15
71	Men's Ablutions (TNPA)	15	Polypcop	15
72	Aquamarine	15	Polypcop	15

Existing Systems and Integration

5.6.4 The *Contractor* must develop an Application Programming Interface (APIs) to integrate the software with existing systems including linking the Utility Management Software to Transnets' Integrated Port Management System (IPMS) and SAP ERP (Enterprise Resource Planning) to transfer billing data (kilo Liters & Rand Value, kilowatts hours & Rand Value) on 15th of each month.

Communication Infrastructure

5.6.5 Communication Infrastructure Requirements

5.6.5.1 Design a fiber optic Local Area Network within the port boundary.

5.6.5.2 Trench to lay the fibre optic sleeves, trenching to minimum depth of 600mm and a width of 300mm.

5.6.5.3 Supply and install 110mm PVC pipe and chamber system for the fibre.

5.6.5.4 Supply and install fibre optic manholes where required.

5.6.5.5 The trenching for complete installation shall not exceed a total length of 5km. Backfill and reinstate existing surface and make good.

5.6.5.6 Supply and install 2 patch panels fully populated 48 pair with LC patch leads and 6 media converters.

5.6.5.7 Supply, install and patch a total of 5km of 48 pair single mode fibre optic cable (652D).

5.6.5.8 Supply, install and configure 2 by 24 ports managed enterprise network switches.

5.6.5.9 Supply and install a 9U swing frame cabinet 900mm deep.

5.6.5.10 Link all electricity meters through the LAN to transmit data to the billing server for processing via the Utilities Management Software.

5.6.6 Wireless Communication Network for the water meters

5.6.6.1 All waters are to be fitted with an AMR interface (IoT devices) for logging of data and communicate to the closest gateway. The AMR interface shall have long range transmission and operate on low power.

5.6.6.2 Supply and install metering gateways including civil and structural works and all appurtenances.

5.6.6.3 Configure and integrate the gateways onto the LAN to transfer data to the server and Utilities Management Software.

5.6.6.4 Supply and install a server (Network & Application) to manage and control the network. The network server shall receive data and control messages from the gateways and process the data. The application server shall interface with the network server and shall store the data, perform analytics and enable integration with other systems.

5.6.6.5 Develop an Application Programming Interface (API) to allow the network to transmit relevant billing data to the billing server and Utilities Management Software.

5.6.7 Server

5.6.7.1 Supply, install and configure two 8-core (2.10GHz), 16GB, 8 x Hot plug 2.5in, smart array P408ia, 2 x 500W, rack mount billing servers.

5.6.7.2 Each server shall be supplied with four 1.2TB Hard Drives.

5.6.7.3 Supply and install the latest Microsoft SQL server database for the management of data, storage and perform analytics via the Utilities Management Software.

5.6.8 Firewall

5.6.8.1 Supply, install, configure, and commission a Firewall for LAN. The *Contractor* shall ensure that old and new services going the Firewall are reinstated.

5.6.8.2 Setup DMZ and position a management workstation within DMZ.

5.6.9 Management Workstation

5.6.9.1 Supply, install and setup a Management Workstation [(31.5 inch USB Hub Monitor, QHD, 60Hz, support Display Port Alt Mode with up to 90W Power Delivery, 1xHDMI, 1xRJ-45 (Ethernet 1 GbE), 4x Superspeed USB (5Gbps)].

5.6.9.2 Setup rules for management workstation to control SCADA and provide dashboards whilst second LAN on machine connects to Transnet Data Network. Management station needs to be on Transnet domain and have relative Transnet Policies applied to it.

5.6.9.3 Test and commission entire installation.

5.7 Port of Cape Town

Site Conditions

All Plants and Materials offered shall be rated for continuous operation under the following service conditions: (Port to inputs data)

Altitude	Sea level to +50m
Ambient air temperature	Max. 40 degrees Celsius; Min. – 5 degrees Celsius
Humidity	As high as 86%
Lightning conditions	10 strikes per year as listed in SABS codes
Atmosphere	Highly saline with heavy corrosive industrial, chemical and dust-laden nature. Frequent heavy rains driven by winds reaching speeds of 100km/h and above.
Water supply pressure	between 2.0 – 6.0bar

NEW SMART ELECTRICITY METERS

5.7.1 Installation of New Smart Electricity Meters

5.7.1.1 Ensure the relevant circuit has been isolated and it is safe to commence with work.

5.7.1.2 Decommission and remove the existing electricity meter.

5.7.1.3 Supply and install 36 metering panels, Metal Cabinet Construction: (LxWxH =1000mm x 330mm x 1420mm, double door, stainless steel 3CR12, powder coated in "Orange") for the substations.

5.7.1.4 Supply, install, mount and configure 160 new three phase smart electricity meters with necessary communication module, including wiring and termination.

5.7.1.5 Establish connectivity; Link the meters to the billing server and the new Utility Management System.

5.7.1.6 Create accounts and Link them to the relevant meter and apply the appropriate tariffs.

5.7.1.7 Test and commission the installation.

5.7.1.8 Reinstate power.

NEW SMART WATER METERS

5.7.2 Meter 1 – Replacement of the Existing Meter

5.7.2.1 Meter 1 is an existing installation inside a manhole located at Marine Drive (X=-50397.798, Y=-3754973.0459).

5.7.2.2 Decommission and remove the existing 200mm water meter.

5.7.2.3 Supply and install a new 200mm water meter compatible with AMR technology including all necessary couplings, bolts, sealants etc.

5.7.2.4 Supply, install, mount and configure an automatic meter reading interface and establish connectivity for wireless communication.

5.7.2.5 Register the meter on both the billing server and the new Utility Management System.

5.7.2.6 Create an account and link to the meter and apply the appropriate tariffs.

5.7.2.7 Test and commission the installation.

5.7.3 Meter 2 – Replacement of the Existing Meter

5.7.3.1 Meter 2 is an existing installation inside a manhole located at Coode Cresecent (X = -53337.09, Y = -3753933.312).

5.7.3.2 Decommission and remove the existing 200mm water meter.

5.7.3.3 Supply and install a new 200mm water meter compatible with AMR technology including all necessary couplings, bolts, sealants etc.

5.7.3.4 Supply, install, mount and configure an automatic meter reading interface and establish connectivity for wireless communication.

5.7.3.5 Register the meter on both the billing server and the new Utility Management System.

5.7.3.6 Create an account and link to the meter and apply the appropriate tariffs.

5.7.3.7 Test and commission the installation.

5.7.4 Meter 3 – Installation of the AMR Interface

5.7.4.1 Meter 3 is an existing installation located at Eastern Mole Rd (X = -50727.224, Y = -3754976.206).

5.7.4.2 Supply, install, mount and configure a smart IP68 automatic data logger and meter-reading device and establish connectivity for wireless communication on the existing Mag Flo meters.

5.7.4.3 Register the meter on both the billing server and the new Utility Management System.

5.7.4.4 Create an account and link to the meter and apply the appropriate tariffs.

5.7.4.5 Test and commission the installation.

5.7.5 Meter 4 – Installation of the AMR Interface

5.7.5.1 Meter 4 is an existing installation located at Sturrock (X = -51040.0072, Y = -3754991.1866).

5.7.5.2 Supply, install, mount and configure a smart IP68 automatic data logger and meter-reading device and establish connectivity for wireless communication on the existing Mag Flo meters.

5.7.5.3 Register the meter on both the billing server and the new Utility Management System.

5.7.5.4 Create an account and link to the meter and apply the appropriate tariffs.

5.7.5.5 Test and commission the installation.

5.7.6 Meter 5 – Installation of the AMR Interface

5.7.6.1 Meter 5 is an existing installation located at L Berth (X = -51761.896, Y = -3754989.813).

5.7.6.2 Supply, install, mount and configure a smart IP68 automatic data logger and meter-reading device and establish connectivity for wireless communication on the existing Mag Flo meters.

5.7.6.3 Register the meter on both the billing server and the new Utility Management System.

5.7.6.4 Create an account and link to the meter and apply the appropriate tariffs.

5.7.6.5 Test and commission the installation.

5.7.7 Meter 6 – Installation of the AMR Interface

5.7.7.1 Meter 6 is an existing installation located at E Berth (X = -53149.662, Y = -3753812.876).

5.7.7.2 Supply, install, mount and configure a smart IP68 automatic data logger and meter-reading device and establish connectivity for wireless communication on the existing Mag Flo meters.

5.7.7.3 Register the meter on both the billing server and the new Utility Management System.

5.7.7.4 Create an account and link to the meter and apply the appropriate tariffs.

5.7.7.5 Test and commission the installation.

5.7.8 Replacement of Existing Water Meters

The *Contractor* shall perform the following activities on all the meters listed in Table 13:

5.7.8.1 Decommission and remove the existing water meter.

5.7.8.2 Supply and install a new water meter compatible with AMR technology including all necessary couplings, bolts, sealants etc.

5.7.8.3 Supply, install, mount and configure a smart IP68 automatic data logger and meter-reading device and establish connectivity for wireless communication.

5.7.8.4 Register the meter on both the billing server and the new Utility Management System.

5.7.8.5 Create accounts and link with the relevant meter and apply the appropriate tariffs.

5.7.8.6 Test and commission the installation.

Table 13: Shows the areas where the new smart water meters are to be installed.

No.	Meter Location	Existing Pipe Size	Existing Pipe Material	New Meter Size (mm)
1	NPA House out building (Plan room & toilet)	15	Polycop	15
2	Security hut - A Berth	20	Polycop	20
3	Corner A & B Berth tunnel.	20	Polycop	20

No.	Meter Location	Existing Pipe Size	Existing Pipe Material	New Meter Size (mm)
4	Ferro-marine - A Berth - Ablution	20	Polycop	20
5	Ferro-marine - A Berth - Admin office	20	Polycop	20
6	NPA House	150	uPVC	150
7	A Berth area.	20	Polycop	20
8	Corporate Affairs - B Berth	15	Polycop	15
9	IT - Opp Corp Affrs - vacant	25	Polycop	25
10	Training Centre	50	uPVC	50
11	Fresh Produce Term. (in manhole on B/C Berth)	25	Copper	25
12	Fresh Produce Term. (in manhole on B/C Berth)	80	uPVC	80
13	Fresh Produce Terminals Cape Town.	150	uPVC	150
14	Fresh Produce Terminals Cape Town. (On balcony)	150	uPVC	150
15	B-C Berth (Tunnel - sprinkler system) - FPT	50	uPVC	50
16	Fresh Produce Term. (Against wall-inside D Shed)	15	Polycop	15
17	Long Line Tuna Corporation (pty) ltd	15	Polycop	15
18	Portside Stevedoring Services offices.	40	uPVC	40
19	SA Police / Dept.of Public Works	80	uPVC	80
20	South Arm Rd Security building	80	uPVC	80
21	CCC Municipal water meter at Dock Road.	15	Polycop	15
22	Transnet Projects RME (Bruce)	25	Copper	25
23	Svitzer Wijsmuller (inside Filing room)	25	Copper	25
24	Svitzer Wijsmuller	25	Copper	25
25	Bid freight.	25	Copper	25
26	SA Stevedores	25	Copper	25
27	SA Stevedores / Lighthouse Martinet Ind.Eng.CC	200	uPVC	200
28	Magmaster (Lighthouse) (INCOMING)	200	uPVC	200
29	Magmaster (Lighthouse) (REVERSE)	200	uPVC	200
30	Magmaster (Lighthouse) (NETT INCOMING)	40	uPVC	40
31	Lighthouse Services	50	uPVC	50
32	SA Stevedores (Melfra)	15	Polycop	15
33	Robben Marine / SA Stevedores	15	Polycop	15
34	Safbulk (pty) ltd	25	Copper	25
35	Atlatech (pty) ltd - offices	15	Polycop	15

No.	Meter Location	Existing Pipe Size	Existing Pipe Material	New Meter Size (mm)
36	Atlatech (pty) ltd - workshop	15	Polycop	15
37	Mission to seamen in SA	15	Polycop	15
38	Electrical workshop	40	uPVC	40
39	Elect. Depot Mess & Ablution.	25	Copper	25
40	Berthing Office	50	uPVC	50
41	P&O Ports Nationwide Cargo Terminal SA (pty) ltd.	50	uPVC	50
42	Cowrie place (MPT) - Bon 1	50	uPVC	50
43	Cowrie place (MPT) - Bon 1	20	Polycop	20
44	Ship Society of SA / Port Services (pty) ltd - Bon 1	15	Polycop	15
45	Christelike Seemans Organisasie - D Mast Bon 1	15	Polycop	15
46	Marine Operations Manager - Dock Master Bon 1	15	Polycop	15
47	Dockland	15	Polycop	15
48	Control Point 26 (Spoornet)	15	Polycop	15
49	Security Hut (Heerengracht Entrance)	25	Polycop	25
50	Maritime Training (Ex Creche)	15	Polycop	15
51	Spoornet (Heerengracht Entrance)	15	Polycop	15
52	Die Evangelie aan die seelui.	50	uPVC	50
53	Training Centre for Seamen.	20	Polycop	20
54	Eastern deli	20	Polycop	20
55	SHEQ building	15	Polycop	15
56	Pirow St. Security building	50	uPVC	50
57	E-Berth Shed (Cold Store)	50	uPVC	50
58	E-Berth Shed (Passenger Terminal)	15	Polycop	15
59	E-Berth Shed (Passenger Terminal)	15	Polycop	15
60	E-Berth Shed (Passenger Terminal)	15	Polycop	15
61	E-Berth Shed (Passenger Terminal)	15	Polycop	15
62	F-Berth Security bldg.	15	Polycop	15
63	Weighbridge (F Berth)	20	Polycop	20
64	Duty Free Shop	20	Polycop	20
65	Heribi House	15	Polycop	15
66	SA Stevedores (Port Services) - ex gardener bldg	15	Polycop	15
67	Combi Terminal bldg.	20	Polycop	20
68	G-Berth Shed (New meter)	15	Polycop	15

No.	Meter Location	Existing Pipe Size	Existing Pipe Material	New Meter Size (mm)
69	G-Berth Shed (Against inside wall)	15	Polycop	15
70	G-Berth mess & ablution.	20	Polycop	20
71	G-Berth Quay office	15	Polycop	15
72	H-Berth Security kiosk	50	uPVC	50
73	H-Berth Shed	25	Copper	25
74	H-Berth Shed	25	Copper	25
75	H-Berth mess & ablution	25	Copper	25
76	J-Berth mess & ablution	50	Steel	50
77	J-Berth Shed	15	Polycop	15
78	J-Berth Shed	15	Polycop	15
79	J-Berth store & Toilets	20	Polycop	20
80	Operations Rail to rail control block offices	25	Copper	25
81	Forklift depot	20	Polycop	20
82	L-Berth Mess & Ablution bldg	20	Polycop	20
83	L-Berth Security bldg.	15	Polycop	15
84	J-Berth Security kiosk	80	uPVC	80
85	Commercial Cold Store (Duncan Dock) (pty) ltd	50	uPVC	50
86	Commercial Cold Store (Duncan Dock) (pty) ltd	50	uPVC	50
87	SAS Unitie M-Berth	15	Polycop	15
88	SAS Unitie M-Berth	15	Polycop	15
89	Security hut (M-Berth)	15	Polycop	15
90	Boss marine	15	Polycop	15
91	Resource Ballast	15	Polycop	15
92	RCYC Water supply to ships.	15	Polycop	15
93	Security hut. - Repair Pier?	100	uPVC	100
94	RCYC (inside repair area)	50	uPVC	50
95	RCYC (inside repair area)	50	uPVC	50
96	RCYC (entrance - inside)	50	uPVC	50
97	RCYC (entrance - outside)	15	Polycop	15
98	RCYC (kitchen area)	25	Copper	25
99	Sailing School (RCYC)	15	Polycop	15
100	International Yacht Brokers Cape (pty) ltd	150	uPVC	150
101	Spoornet (opposite RCYC)	15	Polycop	15
102	Globe Engineering Works (pty) ltd	50	uPVC	50

No.	Meter Location	Existing Pipe Size	Existing Pipe Material	New Meter Size (mm)
103	Misplon bridge Security building	15	Polycop	15
104	JJ van Greunen	15	Polycop	15
105	De Beers	15	Polycop	15
106	Harbour Weld	20	Polycop	20
107	Fusion Hydraulics CC	20	Polycop	20
108	MRH	20	Polycop	20
109	NNA	20	Polycop	20
110	SGB Scaffolding	20	Polycop	20
111	Hazard Marine CC	15	Polycop	15
112	Marine manager CC Propnet	15	Polycop	15
113	Quantum leap	15	Polycop	15
114	Cape Diving (Pty) Ltd	15	Polycop	15
115	NPA Staff SDD ablution (Grant Walker-Dockmaster)	25	Copper	25
116	Dock Master's office	15	Polycop	15
117	ALBATROSS (trevshan)	25	Copper	25
118	Globe Engineering (office block & Ablution).	25	Copper	25
119	Supply pipe for lessees in SSD area.	15	Polycop	15
120	Security hut SSD boom entrance	15	Polycop	15
121	The Pure Cane Molasses Co.	80	uPVC	80
122	The Pure Cane Molasses Co.	80	uPVC	80
123	Elekt. Werkwinkel	15	Polycop	15
124	Taipei Liaison office	50	uPVC	50
125	Taipei Liaison office	50	uPVC	50
126	Taipei Liaison office	50	uPVC	50
127	South East Marine services (pty) ltd	25	Copper	25
128	Nautilus (pty) ltd	15	Polycop	15
129	Nautilus (pty) ltd	15	Polycop	15
130	Nautilus (pty) ltd	15	Polycop	15
131	Marine Slops (pty) ltd	15	Polycop	15
132	Albatross Offshore Services	20	Polycop	20
133	To be confirmed	50	Steel	50
134	Elgin Brown Hamer (pty) ltd	15	Polycop	15
135	Security hut SSDb	100	uPVC	100
136	Watermain feeding Landing Wall.	80	uPVC	80

No.	Meter Location	Existing Pipe Size	Existing Pipe Material	New Meter Size (mm)
137	Crossberth Cold Stores (PTY) LTD	80	uPVC	80
138	Crossberth Cold Stores (PTY) LTD	25	Copper	25
139	Globe Engineering Works (pty) ltd	50	uPVC	50
140	Feedline to Caltex area.	15	Polycop	15
141	Security hut Tanker basin	15	Polycop	15
142	Astron Energy (PTY) LTD	15	Polycop	15
143	BP, Caltex, SA Energy Co, Shell (JBS)	20	Polycop	20
144	Fire Dept. Tanker basin 2 - NPA	50	uPVC	50
145	Fire Dept. (Steel scrap yard - Reclaimed Area).	15	Polycop	15
146	Astron Energy (PTY) LTD	15	Polycop	15
147	Astron Energy (PTY) LTD	15	Polycop	15
148	Pump room on Eastern Mole No.2	15	Polycop	15
149	Mess & Ablution on Eastern Mole No.2.	15	Polycop	15
150	Toilet on Eastern Mole No.2.	150	Steel	150
151	Telkom SA ltd	25	Copper	25
152	Telkom SA ltd	25	Copper	25
153	Standpipe TAP	25	Copper	25
154	FFS	15	Polycop	15
155	FFS	15	Polycop	15
156	Cape Town Bulk Storage (pty) ltd FFS	50	uPVC	50
157	Cape Town Bulk Storage (pty) ltd	15	Polycop	15
158	Elliott Basin security bldg	100	uPVC	100
159	Dorbyl Marine (pty) ltd.	80	uPVC	80
160	Dorbyl Marine (pty) ltd.	80	uPVC	80
161	Dorbyl Marine (pty) ltd (right next to workshop)	80	uPVC	80
162	Dorbyl Marine (pty) ltd (right next to workshop)	80	uPVC	80
163	Dorbyl Marine (pty) ltd (workshop) (inside building)	80	uPVC	80
164	Globe Engineering (fire main)	80	uPVC	80
165	Globe Engineering (domestic main)	25	Copper	25
166	Globe Engineering	100	uPVC	100
167	Elliott Basin ring feed meter	80	uPVC	80
168	Indo Atlantic Fishing (SHIPPING)	15	Polycop	15
169	Theodore Luis Camara	15	Polycop	15

No.	Meter Location	Existing Pipe Size	Existing Pipe Material	New Meter Size (mm)
170	Mechanical workshop	15	Polycop	15
171	Shop 24	15	Polycop	15
172	Shop 24 mess & ablution for general workers.	25	Copper	25
173	Farocean marine (Damen Shipping)	25	Copper	25
174	Bassticks	25	Copper	25
175	Damen Shipping (Back yard).	15	Polycop	15
176	Panama Jacks (pty) ltd	15	Polycop	15
177	Damen	50	uPVC	50
178	Royal Cape Yacht Club (meter that supplies yachts)	15	Polycop	15
179	Royal Cape Yacht Club (meter that supplies yachts)	15	Polycop	15
180	Royal Cape Yacht Club (members public toilet)	15	Polycop	15
181	Security hut Quay 500	15	Polycop	15
182	Quay 500 Polution.	150	uPVC	150
183	Ro-Ro Pier (Quay 500) Mountain side	150	uPVC	150
184	Ro-Ro Pier (Quay 500) Seaside	150	uPVC	150
185	WBHO Work site (Panama Jacks)	20	Polycop	20
186	Damen Shipping (Panama Jacks side)	15	Polycop	15
187	WBHO Container (Medite bldg.)	15	Polycop	15
188	Civil Store under BS bridge	100	uPVC	100
189	Crest Chemicals	100	uPVC	100
190	Crest Chemicals	100	uPVC	100
191	Lusitania Frozen Goods Container Road	25	Copper	25
192	Lusitania Frozen Goods Container Road	25	Copper	25
194	R.J.Sauthey (Scaffolding)	25	Copper	25
195	Old Container link (Grindrod Logistics) (SACD)	50	uPVC	50
196	Caltex service station Marine Drive/Astron Energy (PTY) LTD	15	Polycop	15
197	TCP (Ismail)	15	Polycop	15
198	Security gate NPA Paarden Eiland	25	Copper	25
199	Joint Bunkering Services Container Road	25	Copper	25
200	Shmidthauser	40	uPVC	40
201	Y & L Frozen Fish Enterprises Container Road	50	uPVC	50
202	Y & L Frozen Fish Enterprises Container Road	15	Polycop	15

No.	Meter Location	Existing Pipe Size	Existing Pipe Material	New Meter Size (mm)
203	M.M.Hilario	15	Polycop	15
204	BSD Weigh bridge	15	Polycop	15
205	BSD Weigh bridge	40	uPVC	40
206	Container Terminal drivers mess & ablution. (Reverse)	40	uPVC	40
207	Container Terminal drivers mess & ablution.	15	Polycop	15
208	Security bldg (Quay 700)	15	Polycop	15
209	WBHO Site office (Quay 700)	15	Polycop	15
210	SAPO ski-cabin	50	uPVC	50
211	Vehicle Testing Centre (old) (Kershaw 073 257 1736)	100	uPVC	100
212	Vehicle Repair Centre (Freight Dynamics)	25	Polycop	25
213	Container Fruit Terminal (inside Fire Control room)	80	uPVC	80
214	Helicopter Africa (pty) ltd	80	uPVC	80
215	Makhulu	80	uPVC	80
216	Blastrite (pty) ltd	15	Polycop	15
217	Road to Rail building	20	Polycop	20
218	Spoornet (Bay Road)	20	Polycop	20
219	Tryang Trading Import & Export (Pty) Ltd	20	Polycop	20
220	Optimal Maintenance services CC	15	Polycop	15
221	Raw Engineering CC	15	Polycop	15
222	Helicopter Heli Pad Cold Storage	150	uPVC	150
223	Transea Shipping Services (Pty) Ltd	150	uPVC	150
224	Etlin International (pty) ltd (Cape Cold Storage)	150	uPVC	150
225	Etlin International (pty) ltd (Cape Cold Storage)	150	uPVC	150
226	PIP Site main meter (Entrance)	150	uPVC	150
227	PIP Site main meter (Entrance)	150	uPVC	150
228	SACD PIP Site	50	uPVC	50
229	SACD PIP Site	50	uPVC	50
230	Eskom PIP site	300	uPVC	300
231	East Coast Containers	200	uPVC	200
232	CCC Municipal water meter at Marine Drive.	200	uPVC	200
233	Magmaster (INCOMING)	15	Polycop	15
234	Magmaster (REVERSE)	15	Polycop	15

No.	Meter Location	Existing Pipe Size	Existing Pipe Material	New Meter Size (mm)
235	Magmaster (NETT INCOMING)	15	Polycop	15
236	Two Oceans Boat Sales Marine Drive	15	Polycop	15
237	Province Log Cabins Marine Drive	100	uPVC	100
238	RME is occupying a site next to House of Cabin.	100	uPVC	100
239	Shop 17	100	uPVC	100
240	Shop 17	100	uPVC	100
241	Shop 17	150	uPVC	150
242	Shop 17	150	uPVC	150
243	Civil Depot watermain	150	uPVC	150
244	Civil Depot watermain	150	uPVC	150
245	Roro Control office & abl. BSD	20	Polycop	20
246	Old SACD site (TCP - Bert)	80	uPVC	80
247	New Container Entrance to Terminal	15	Polycop	15
248	Old Mediterranean Shipping building	15	Polycop	15
249	Quay 501 Container control office & abl. BSD	15	Polycop	15
250	TBC	20	Polycop	20
251	Quay 601 Container control office & abl. BSD	20	Polycop	20
252		15	Polycop	15
253	Quay 602 Container control office & abl. BSD	20	Polycop	20
254	TBC	15	Polycop	15
255	Quay 603 Container control office & abl. BSD	20	Polycop	20
256	Quay 604 Container control office & abl. BSD	20	Polycop	20
257	TBC	15	Polycop	15
258	Quay 602 Container control office & abl. BSD seaside	15	Polycop	15
259	Container Terminal building	150	uPVC	150
260	Chevron (Tanker Basin Cross Berth)	150	uPVC	150
261	Joint Bunkering Services (TBXB)	100	uPVC	100
262	Quay 502 Container control office & abl. BSD	15	Polycop	15
263	WBHO (Quay 613).	50	uPVC	50
264	WBHO (PIP Site)	50	uPVC	50
265	PIP Site (S a fence & Gate)	15	Polycop	15
266	WBHO (Area 340 B.S.D.).	50	uPVC	50

No.	Meter Location	Existing Pipe Size	Existing Pipe Material	New Meter Size (mm)
267	PIP site (Christopher Clement)	50	uPVC	50
268	Proticon Containers	20	Polycop	20
269	Q 501 (Security) Robben Eiland	50	uPVC	50
270	PIP SITE NEW SECURITY BLDG	20	Polycop	20
271	DAMEN SPRAY ROOM	20	Polycop	20
272	Etlin International (pty) ltd (Cape Cold Storage) Heli pad	20	Polycop	20
273	CONTAINER X-RAY	20	Polycop	20
274	SJW CIVILS	20	Polycop	20
275	Servest Marine	20	Polycop	20
276	Shounters Kiosk Blue Store	20	Polycop	20
277	Washing Bay TPT	20	Polycop	20
278	De Beers @ L-Berth	20	Polycop	20
279	Construction @ Eastern Mole	20	Polycop	20
280	Construction @ Eastern Mole	20	Polycop	20
281	Construction @ Eastern Mole	20	Polycop	20
282	Construction @ Eastern Mole	20	Polycop	20
283	Next to old Fire	20	Polycop	20
284	FFS New Buildings	50	uPVC	50
285	FFS New Buildings	50	uPVC	50
286	FFS New Buildings	50	uPVC	50
287	Next to bridge @ Eastern Mole	20	Polycop	20
288	Security bldg (Quay 500) new meter	20	Polycop	20
289	TBC	80	uPVC	80
290	Ams Construction (Ocean Road)	50	uPVC	50

EXISTING SYSTEMS AND INTEGRATION

5.7.9 The *Contractor* must develop an Application Programming Interface (APIs) to integrate the software with existing systems including linking the Utility Management Software to Transnets' Integrated Port Management System (IPMS) and SAP ERP (Enterprise Resource Planning) to transfer billing data (kilo Liters & Rand Value, kilowatts hours & Rand Value) on 15th of each month.

COMMUNICATION INFRASTRUCTURE

5.7.10 Communication Infrastructure Requirements

5.7.10.1 Design a fibre optic Local Area Network within the port boundary.

5.7.10.2 Trench to lay the fibre optic sleeves, trenching to minimum depth of 600mm and a width of 300mm.

5.7.10.3 Supply and install 110mm PVC pipe and chamber system for the fibre.

5.7.10.4 Supply and install fibre optic manholes where required.

5.7.10.5 The trenching for complete installation shall not exceed a total length of 13km. Backfill and reinstate existing surface and make good.

5.7.10.6 Supply and install 15 patch panels fully populated 48 pair with LC patch leads.

5.7.10.7 Supply, install and patch a total of 13km of 48 pair single mode fibre optic cable (652D).

5.7.10.8 Supply, install and configure 15 by 24 ports managed enterprise network switches.

5.7.10.9 Supply and install a 9U swing frame cabinet 900mm deep.

5.7.10.10 Link all electricity meters through the LAN to transmit data to the billing server for processing via the Utilities Management Software.

5.7.11 Wireless Communication Network for the water meters

5.7.11.1 All waters are to be fitted with an AMR interface (IoT devices) for logging of data and communicate to the closest gateway. The AMR interface shall have long range transmission and operate on low power.

5.7.11.2 Supply and install metering gateways including civil and structural works and all appurtenances.

5.7.11.3 Configure and integrate the gateways onto the LAN to transfer data to the server and Utilities Management Software.

5.7.11.4 Supply and install a server (Network & Application) to manage and control the network. The network server shall receive data and control messages from the gateways and process the data. The application server shall interface with the network server and shall store the data, perform analytics and enable integration with other systems.

5.7.11.5 Develop an Application Programming Interface (API) to allow the network to transmit relevant billing data to the billing server and Utilities Management Software.

5.7.12 Server

5.7.12.1 Supply, install and configure two 8-core (2.10GHz), 16GB, 8 x Hot plug 2.5in, smart array P408ia, 2 x 500W, rack mount billing servers.

5.7.12.2 Each server shall be supplied with four 1.2TB Hard Drives.

5.7.12.3 Supply and install the latest Microsoft SQL server (permanent license) for the management of data, storage and perform analytics via the Utilities Management Software.

5.7.13 Firewall

5.7.13.1 Supply, install, configure, and commission a Firewall for LAN. The *Contractor* shall ensure that old and new services going the Firewall are reinstated.

5.7.13.2 Setup DMZ and position a management workstation within DMZ.

5.7.14 Management Workstation

5.7.14.1 Supply, install and setup a Management Workstation (31.5 inch USB Hub Monitor, QHD, 60Hz, support Display Port Alt Mode with up to 90W Power Delivery, 1xHDMI, 1xRJ-45 (Ethernet 1 GbE, 4x Superspeed USB (5Gbps).

5.7.14.2 Setup rules for management workstation to control SCADA and provide dashboards whilst second LAN on machine connects to Transnet Data Network. Management station needs to be on Transnet domain and have relative Transnet Policies applied to it.

5.7.14.3 Test and commission entire installation.

5.8 Port of Saldanha

Site Conditions

All Plants and Materials offered shall be rated for continuous operation under the following service conditions: (Port to inputs data)

Altitude	Sea level to +50m
Ambient air temperature	Max. 40 degrees Celsius; Min. – 5 degrees Celsius
Humidity	As high as 86%
Lightning conditions	10 strikes per year as listed in SABS codes
Atmosphere	Highly saline with heavy corrosive industrial, chemical and dust-laden nature. Frequent heavy rains driven by winds reaching speeds of 100km/h and above.
Water supply pressure	between 2.0 – 6.0bar

NEW SMART ELECTRICITY METERS

5.8.1 Mini-Sub 3 -Fire & Clinic Building (3 phase, 400V)

5.8.1.1 Supply, install, mount and configure a new smart electricity meter with communication module, including wiring and termination.

5.8.1.2 Meter to be fixed to the Mini-Sub LV panel and all CT's installed as per requirements.

5.8.1.3 Supply and install one (01) media converters.

5.8.1.4 Supply, install, splice and terminate new single mode fibre optic to the Mini-Sub.

5.8.1.5 Establish connectivity; Link the meters to the billing server and the new Utility Management System.

5.8.1.6 Create an account and link to the meter and apply the appropriate tariffs.

5.8.1.7 If the GSM network is used, the data sim cards will be free issued to the Contractor.

5.8.1.8 Test and commission the installation.

5.8.1.9 Reinstate power.

5.8.2 Hostels – Main LV DB (3 phase, 400V)

5.8.2.1 Supply, install, mount and configure a new smart electricity meter with communication module, including wiring and termination.

5.8.2.2 Meter to be fixed to the LV DB and all CTs installed as per requirements.

5.8.2.3 Supply and install one (01) media converters.

5.8.2.4 Supply, install, splice and terminate new single mode fibre optic.

5.8.2.5 Establish connectivity; Link the meters to the billing server and the new Utility Management System.

5.8.2.6 Create an account and link to the meter and apply the appropriate tariffs.

5.8.2.7 If the GSM network is used, the data sim cards will be free issued to the Contractor.

5.8.2.8 Test and commission the installation.

5.8.2.9 Reinstate power.

5.8.3 Meter Room Main LV DB Panel (Floor Standing) – Bayvue Centre (3 phase, 400V)

5.8.3.1 Supply, install, mount and configure 3x new smart electricity meters with communication module, including wiring and termination.

5.8.3.2 Meters to be fixed to the LV Distribution Board, fixed behind the front facing panel with space for visuals on the LCD screen, and all CTs installed as per requirements.

5.8.3.3 Supply and install three (03) media converters.

5.8.3.4 Supply, install, splice and terminate new single mode fibre optic.

5.8.3.5 Establish connectivity; Link the meters to the billing server and the new Utility Management System.

5.8.3.6 Create an account and link to the meter and apply the appropriate tariffs.

5.8.3.7 If the GSM network is used, the data sim cards will be free issued to the Contractor.

5.8.3.8 Test and commission the installation.

5.8.3.9 Reinstate power.

5.8.4 Recreation Centre – Main LV DB (3 phase, 400V)

5.8.4.1 Supply, install, mount and configure a new smart electricity meter with communication module, including wiring and termination.

5.8.4.2 Meter to be fixed to the LV Distribution Board and all CTs installed as per requirements.

5.8.4.3 Supply and install one (01) media converters.

5.8.4.4 Supply, install, splice, and terminate new single mode fibre optic.

5.8.4.5 Establish connectivity; Link the meter to the billing server and the new Utility Management System.

5.8.4.6 Create an account and link to the meter and apply the appropriate tariffs.

5.8.4.7 If the GSM network is used, the data sim cards will be free issued to the Contractor.

5.8.4.8 Test and commission the installation.

5.8.4.9 Reinstate power.

5.8.5 Mini-Sub 1 – Bayvue Centre (3 phase, 400V)

5.8.5.1 Supply, install, mount and configure 2x new smart electricity meter with communication module, including wiring and termination.

5.8.5.2 Meters to be fixed to the mini-sub LV panel and all CTs installed as per requirements.

5.8.5.3 Supply and install two (02) media converters.

5.8.5.4 Supply, install, splice, and terminate new single mode fibre optic.

5.8.5.5 Establish connectivity; Link the meters to the billing server and the new Utility Management System.

5.8.5.6 Create an account and link to the meter and apply the appropriate tariffs.

5.8.5.7 If the GSM network is used, the data sim cards will be free issued to the Contractor.

5.8.5.8 Test and commission the installation.

5.8.5.9 Reinstate power.

5.8.6 Meter Room Main LV DB Panel (Floor Standing) – Port Control (3 phase, 400V)

5.8.6.1 Supply, install, mount and configure 2x new smart electricity meters with communication module, including wiring and termination.

5.8.6.2 Meters to be fixed to the LV panel, fixed behind the front facing panel with space for visuals on the LCD screen, and all CTs installed as per requirements.

5.8.6.3 Supply and install two (02) media converters.

5.8.6.4 Supply, install, splice, and terminate new single mode fibre optic.

5.8.6.5 Establish connectivity; Link the meters to the billing server and the new Utility Management System.

5.8.6.6 Create an account and link to the meter and apply the appropriate tariffs.

5.8.6.7 If the GSM network is used, the data sim cards will be free issued to the Contractor.

5.8.6.8 Test and commission the installation.

5.8.6.9 Reinstate power.

5.8.7 OSSB Mini-Sub – OSSB Port Terminal (3 phase, 400V)

5.8.7.1 Ensure the relevant circuits has been isolated and it is safe to commence with work.

5.8.7.2 Supply, install, mount and configure a new smart electricity meter with communication module, including wiring and termination.

5.8.7.3 Meter to be fixed to the mini-sub LV panel, and all CTs installed as per requirements.

5.8.7.4 Supply and install one (01) media converter.

5.8.7.5 Supply, install, splice, and terminate new single mode fibre optic.

5.8.7.6 Establish connectivity; Link the meters to the billing server and the new Utility Management System.

5.8.7.7 Create an account and link to the meter and apply the appropriate tariffs.

5.8.7.8 If the GSM network is used, the data sim cards will be free issued to the Contractor.

5.8.7.9 Test and commission the installation.

5.8.7.10 Reinstate power.

5.8.8 Wash Bay Mini-Sub – Port Terminal Entrance (3 phase, 400V)

5.8.8.1 Ensure the relevant circuits has been isolated and it is safe to commence with work.

5.8.8.2 Supply, install, mount and configure a new smart electricity meter with communication module, including wiring and termination.

5.8.8.3 Meter to be fixed to the mini-sub LV panel, and all CTs installed as per requirements.

5.8.8.4 Supply and install one (01) media converter.

5.8.8.5 Supply, install, splice, and terminate new single mode fibre optic.

5.8.8.6 Establish connectivity; Link the meters to the billing server and the new Utility Management System.

5.8.8.7 Create an account and link to the meter and apply the appropriate tariffs.

5.8.8.8 If the GSM network is used, the data sim cards will be free issued to the Contractor.

5.8.8.9 Test and commission the installation.

5.8.8.10 Reinstate power.

5.8.9 FMA Site Substation – FMA Distribution (Switchgear) (3 phase, 11 kV)

5.8.9.1 Supply and install a new standalone metering panel next to the existing 11kV switchgear, for housing of the new meter.

5.8.9.2 Supply, install, mount and configure a new smart electricity meter with communication module, including wiring and termination.

5.8.9.3 Meter to be fixed to the new metering panel, and all CTs installed and terminated to the incoming 11kV supply cable.

5.8.9.4 Supply and install one patch panel and one network switch.

5.8.9.5 Supply, install, splice, and terminate new single mode fibre optic.

5.8.9.6 Configure the network switch.

5.8.9.7 Establish connectivity; Link the meters to the billing server and the new Utility Management System.

5.8.9.8 Create an account and link to the meter and apply the appropriate tariffs.

5.8.9.9 If the GSM network is used, the data sim cards will be free issued to the Contractor.

5.8.9.10 Test and commission the installation.

5.8.9.11 Reinstate power.

5.8.10 Meters to be Linked to the billing server and new Utility Management System

5.8.10.1 Provision for fibre optics and network integration is required at the locations listed in Table 13.

5.8.10.2 Establish connectivity; Link the meters to the billing server and the new Utility Management System.

5.8.10.3 Create accounts and link with the relevant meters and apply the appropriate tariffs.

5.8.10.4 If the GSM network is used, the data sim cards will be free issued to the Contractor.

5.8.10.5 Test and commission.

Table 14: Shows the location where the exist smart electricity meters are to be link to the new UTS.

No.	Meter Location	Type of Circuit	Meter Quantity
1.	Substation G –Shore Supply 5	3 Phase	01
2.	Substation G –Shore Supply 7	3 Phase	01
3.	Substation G –Shore Supply 8	3 Phase	01
4.	Substation G –Shore Supply 9	3 Phase	01
5.	Substation G –Shore Supply 10	3 Phase	01
6.	SAMSA Main DB – Office Building	3 Phase	01

NEW SMART WATER METERS

5.8.11 Replacement of Existing Water Meters

The *Contractor* shall perform the following activities on all the meters listed in Table 14:

5.8.11.1 Decommission and remove the existing water meter.

5.8.11.2 Supply and install a new water meter compatible with AMR technology including all necessary couplings, bolts, sealants etc.

5.8.11.3 Supply, install, mount and configure a smart IP68 automatic data logger and meter-reading device and establish connectivity for wireless communication.

5.8.11.4 Register the meter on both the billing server and the new Utility Management System.

5.8.11.5 Create accounts and link with the relevant meter and apply the applicable tariffs.

5.8.11.6 Test and commission the installation.

Table 15: Shows the areas where the new smart water meters are to be installed.

Meter No.	Meter Location	Existing Pipe Size (mm)	Existing Pipe Material	Installation Type	Meter Size (mm)
M1	Municipal Main Meter	Uknown	UPVC	Inside a Manhole	300
M2	Fire / Clinic 2	Uknown	UPVC	Inside a Manhole	75
M3	IDZ Area 1	Uknown	UPVC	Inside a Manhole	200
M4	Kumba	Uknown	UPVC	Inside a Manhole	50
M5	Security	Uknown	Polycop	Inside a Manhole	15/22/28 /32
M6	Customs	Uknown	Polycop	Inside a Manhole	15/22/28 /32
M7	THB Shipping	Uknown	Polycop	Inside a Manhole	15/22/28 /32
M8	Tippler 1&2	Uknown	UPVC	Inside a Manhole	200
M9	Washbay	Uknown	HDPE	Inside a Manhole	75
M10	New Security Bld	Uknown	UPVC	Inside a Manhole	75
M11	Haul Road Security	Uknown	Polycop	Inside a Manhole	22
M12	Sunrise	Uknown	Asbestos Cement	Inside a Manhole	100
M14	Tippler 3 Stockpile RO Supply	Uknown	UPVC	Inside a Manhole	160
M15	Tippler 3 Main Line	Uknown	UPVC or HDPE	Inside a Manhole	160
M18	MPT Main	Uknown	Asbestos Cement	Inside a Manhole	150
M19	MPT Admin	Uknown	Asbestos Cement	Inside a Manhole	100
M20	MPT Quay	Uknown	UPVC	Inside a Manhole	160
M21	Sampling Plant	Uknown	UPVC	Inside a Manhole	50
M22	RO Plant 1	Uknown	UPVC	Inside a Manhole	75
M23	RO Plant 2	Uknown	UPVC	Inside a Manhole	160
M25	OPCSA	Uknown	Asbestos Cement	Inside a Manhole	100
M26	IOT Shop	Uknown	Polycop	Inside a Manhole	22
M28	Iron Ore Jetty	Uknown	Asbestos Cement	Inside a Manhole	100
M30	OSSB 1 - Old North Supply	Uknown	Asbestos Cement	Inside a Manhole	100
M31	OSSB 2 - Southern Supply	Uknown	UPVC	Inside a Manhole	100

Meter No.	Meter Location	Existing Pipe Size (mm)	Existing Pipe Material	Installation Type	Meter Size (mm)
M32	Sokhana	Uknown	UPVC	Inside a Manhole	75
M33	FMA	Uknown	UPVC	Inside a Manhole	75
M35	Municipal Bayvue	Uknown	Galvanised Steel	Inside a Manhole	200
M36	Municipal SCH	Uknown	Asbestos Cement	Inside a Manhole	150
M37	SAMSA	Uknown	Asbestos Cement	Inside a Manhole	75
M40	Yacht Port	Uknown	Asbestos Cement	Inside a Manhole	100
M43	Caisson 6 - Vessel Meter	Uknown	Steel	In Caisson	75
M44	Caisson 9 - Vesel Meter	Uknown	Steel	In Caisson	75
M45	Caisson 11 - Vessel Meter	Uknown	Steel	In Caisson	75
M47	Main Entrance Garages	Uknown	Polycop	Inside a Manhole	15/22/28 /32
M49	Bayvue Rec Centre	Uknown	UPVC	Inside a Manhole	75

5.8.12 Replacement of Existing Above Ground Water Meters

The *Contractor* shall perform the following activities on all the meters listed in Table 15:

5.8.12.1 Decommission and remove the existing water meter.

5.8.12.2 Supply and install a new water meter compatible with AMR technology including all necessary couplings, bolts, sealants etc.

5.8.12.3 Supply, install, mount and configure a smart IP68 automatic data logger and meter-reading device and establish connectivity for wireless communication.

5.8.12.4 Register the meter on both the billing server and the new Utility Management System.

5.8.12.5 Create accounts and link with the relevant meter and apply the applicable tariffs.

5.8.12.6 Test and commission the installation.

Table 15: Shows the areas where the new smart water meters are to be installed.

Meter No.	Meter Location	Existing Pipe Size (mm)	Existing Pipe Material	Installation Type	New Meter Size (mm)
M27	Berthing Services	Uknown	Polycop	Above Ground	22
M29	SFF Terminal	Uknown	Steel	Above Ground	75
M46	SFF Fire Hydrant	Uknown	Steel	Above Ground	75

5.8.13 Meter 13 – New Below Ground Water Meter Installation

5.8.13.1 Meter 13 is a new proposed below ground installation to be positioned at IDZ Area 2.

5.8.13.2 The existing pipe material is UPVC.

5.8.13.3 Proof trench and verify the pipe material, depth and pipe size before procuring any material for the installation.

5.8.13.4 Saw cut approximately 4.7x1m wide in 50mm premix and hack up and remove including layer works and re-instate to match existing once all work is complete.

5.8.13.5 Excavate in earth in varying depths but not exceeding 1.5m deep, approximately 4.7x1m wide to expose existing water pipe including all necessary risk of collapse, backfilling and compaction and cart away of surplus material from site.

5.8.13.6 Cutting off approximately 4.5m of pipe including fitting of flanges on both ends of exposed pipe.

5.8.13.7 Construct a new water meter manhole with overall size 2.66x1.66m and varying depths not exceeding 2.53m deep including all necessary additional excavations, risk of collapse, blinding, manhole base, stone bedding, 230mm brickwork, backfilling, concrete cover slab, including breaking openings on both ends for new pipe and cart away of surplus material all in accordance with drawings and specifications.

5.8.13.8 Supply and install No. 02x 200mm diameter steel pipes each approximately 1.4m in length, flanged on both ends and fitted on either end of manhole to existing flanged asbestos pipes and in new manholes including sealing off ends of manholes, support/thrust blocks, etc., gaskets, bolts, sealants etc.

5.8.13.9 Supply and install No. 02x 200mm spool pieces in varying lengths flanged on both ends and fixed to meter & valves including all necessary, gaskets, bolts, sealants etc.

5.8.13.10 Supply and install a 200mm swing check valve flanged on both ends and fixed to new-flanged pipes including all necessary gaskets, bolts, sealants etc.

5.8.13.11 Supply and install a 200mm In-line strainer, flanged on both ends and fixed to new-flanged pipes including all necessary gaskets, bolts, sealants etc.

5.8.13.12 Supply and install an 200mm water meter, flanged on both ends and fixed to new-flanged pipes including all necessary gaskets, bolts, sealants etc.

5.8.13.13 Supply, install, mount and configure a smart IP68 automatic data logger and meter-reading device and establish connectivity for wireless communication.

5.8.13.14 Register the meter on both the billing server and the new Utility Management System.

5.8.13.15 Create an account and link to the meter and apply the applicable tariffs.

5.8.13.16 Test and commission the installation.

5.8.14 Meter 16 – New Below Ground Water Meter Installation

5.8.14.1 Meter 16 is a new proposed below ground installation to be positioned at Stockpile 1.

5.8.14.2 The existing pipe material is UPVC.

5.8.14.3 Proof trench and verify the pipe material, depth and pipe size before procuring any material for the installation.

5.8.14.4 Saw cut approximately 4.7x1m wide in 50mm premix and hack up and remove including layer works and re-instate to match existing once all work is complete.

5.8.14.5 Excavate in earth in varying depths but not exceeding 1.5m deep, approximately 4.7x1m wide to expose existing water pipe including all necessary risk of collapse, backfilling and compaction and cart away of surplus material from site.

5.8.14.6 Cutting off approximately 4.5m of pipe including fitting of flanges on both ends of exposed pipe.

5.8.14.7 Construct a new water meter manhole with overall size 2.66x1.66m and varying depths not exceeding 2.53m deep including all necessary additional excavations, risk of collapse, blinding, manhole base, stone bedding, 230mm brickwork, backfilling, concrete cover slab, including breaking openings on both ends for new pipe and cart away of surplus material all in accordance with drawings and specifications.

5.8.14.8 Supply and install No. 02x 200mm diameter steel pipes each approximately 1.4m in length, flanged on both ends and fitted on either end of manhole to existing flanged asbestos pipes and in new manholes including sealing off ends of manholes, support/thrust blocks, etc., gaskets, bolts, sealants etc.

5.8.14.9 Supply and install No. 02x 160mm spool pieces in varying lengths flanged on both ends and fixed to meter & valves including all necessary, gaskets, bolts, sealants etc.

5.8.14.10 Supply and install a 160mm swing check valve flanged on both ends and fixed to new-flanged pipes including all necessary gaskets, bolts, sealants etc.

5.8.14.11 Supply and install a 160mm In-line strainer, flanged on both ends and fixed to new-flanged pipes including all necessary gaskets, bolts, sealants etc.

5.8.14.12 Supply and install an 160mm water meter, flanged on both ends and fixed to new-flanged pipes including all necessary gaskets, bolts, sealants etc.

5.8.14.13 Supply, install, mount and configure a smart IP68 automatic data logger and meter-reading device and establish connectivity for wireless communication.

5.8.14.14 Register the meter on both the billing server and the new Utility Management System.

5.8.14.15 Create an account and link to the meter and apply the applicable tariffs.

5.8.14.16 Test and commission the installation.

5.8.15 Meter 17 – New Below Ground Water Meter Installation

5.8.15.1 Meter 17 is a new proposed below ground installation to be positioned at Stockpile 2.

5.8.15.2 The existing pipe material is UPVC.

5.8.15.3 Proof trench and verify the pipe material, depth and pipe size before procuring any material for the installation.

5.8.15.4 Saw cut approximately 4.7x1m wide in 50mm premix and hack up and remove including layer works and re-instate to match existing once all work is complete.

5.8.15.5 Excavate in earth in varying depths but not exceeding 1.5m deep, approximately 4.7x1m wide to expose existing water pipe including all necessary risk of collapse, backfilling and compaction and cart away of surplus material from site.

5.8.15.6 Cutting off approximately 4.5m of pipe including fitting of flanges on both ends of exposed pipe.

5.8.15.7 Construct a new water meter manhole with overall size 2.66x1.66m and varying depths not exceeding 2.53m deep including all necessary additional excavations, risk of collapse, blinding, manhole base, stone bedding, 230mm brickwork, backfilling, concrete cover slab, including breaking openings on both ends for new pipe and cart away of surplus material all in accordance with drawings and specifications.

5.8.15.8 Supply and install No. 02x 200mm diameter steel pipes each approximately 1.4m in length, flanged on both ends and fitted on either end of manhole to existing flanged asbestos pipes and in new manholes including sealing off ends of manholes, support/thrust blocks, etc., gaskets, bolts, sealants etc.

5.8.15.9 Supply and install No. 02x 160mm spool pieces in varying lengths flanged on both ends and fixed to meter & valves including all necessary, gaskets, bolts, sealants etc.

5.8.15.10 Supply and install a 160mm swing check valve flanged on both ends and fixed to new-flanged pipes including all necessary gaskets, bolts, sealants etc.

5.8.15.11 Supply and install a 160mm In-line strainer, flanged on both ends and fixed to new-flanged pipes including all necessary gaskets, bolts, sealants etc.

5.8.15.12 Supply and install an 160mm water meter, flanged on both ends and fixed to new-flanged pipes including all necessary gaskets, bolts, sealants etc.

5.8.15.13 Supply, install, mount and configure a smart IP68 automatic data logger and meter-reading device and establish connectivity for wireless communication.

5.8.15.14 Register the meter on both the billing server and the new Utility Management System.

5.8.15.15 Create an account and link to the meter and apply the applicable tariffs.

5.8.15.16 Test and commission the installation.

5.8.16 Meter 34 – New Below Ground Water Meter Installation

5.8.16.1 Meter 34 is a new proposed below ground installation to be positioned at TNPA Bayvue Precinct.

5.8.16.2 The existing pipe material is UPVC.

5.8.16.3 Proof trench and verify the pipe material, depth and pipe size before procuring any material for the installation.

5.8.16.4 Saw cut approximately 4.7x1m wide in 50mm premix and hack up and remove including layer works and re-instate to match existing once all work is complete.

5.8.16.5 Excavate in earth in varying depths but not exceeding 1.5m deep, approximately 4.7x1m wide to expose existing water pipe including all necessary risk of collapse, backfilling and compaction and cart away of surplus material from site.

5.8.16.6 Cutting off approximately 4.5m of pipe including fitting of flanges on both ends of exposed pipe.

5.8.16.7 Construct a new water meter manhole with overall size 2.66x1.66m and varying depths not exceeding 2.53m deep including all necessary additional excavations, risk of collapse, blinding, manhole base, stone bedding, 230mm brickwork, backfilling, concrete cover slab, including breaking openings on both ends for new pipe and cart away of surplus material all in accordance with drawings and specifications.

5.8.16.8 Supply and install No. 02x 110mm diameter steel pipes each approximately 1.4m in length, flanged on both ends and fitted on either end of manhole to existing flanged asbestos pipes and in new manholes including sealing off ends of manholes, support/thrust blocks, etc., gaskets, bolts, sealants etc.

5.8.16.9 Supply and install No. 02x 110mm spool pieces in varying lengths flanged on both ends and fixed to meter & valves including all necessary, gaskets, bolts, sealants etc.

5.8.16.10 Supply and install a 110mm swing check valve flanged on both ends and fixed to new-flanged pipes including all necessary gaskets, bolts, sealants etc.

5.8.16.11 Supply and install a 110mm In-line strainer, flanged on both ends and fixed to new-flanged pipes including all necessary gaskets, bolts, sealants etc.

5.8.16.12 Supply and install an 110mm water meter, flanged on both ends and fixed to new-flanged pipes including all necessary gaskets, bolts, sealants etc.

5.8.16.13 Supply, install, mount and configure a smart IP68 automatic data logger and meter-reading device and establish connectivity for wireless communication.

5.8.16.14 Register the meter on both the billing server and the new Utility Management System.

5.8.16.15 Create an account and link to the meter and apply the applicable tariffs.

5.8.16.16 Test and commission the installation.

5.8.17 Meter 38 – New Below Ground Water Meter Installation

5.8.17.1 Meter 38 is a new proposed below ground installation to be positioned at Port Control.

5.8.17.2 The existing pipe material is UPVC.

5.8.17.3 Proof trench and verify the pipe material, depth and pipe size before procuring any material for the installation.

5.8.17.4 Saw cut approximately 4.7x1m wide in 50mm premix and hack up and remove including layer works and re-instate to match existing once all work is complete.

5.8.17.5 Excavate in earth in varying depths but not exceeding 1.5m deep, approximately 4.7x1m wide to expose existing water pipe including all necessary risk of collapse, backfilling and compaction and cart away of surplus material from site.

5.8.17.6 Cutting off approximately 4.5m of pipe including fitting of flanges on both ends of exposed pipe.

5.8.17.7 Construct a new water meter manhole with overall size 2.66x1.66m and varying depths not exceeding 2.53m deep including all necessary additional excavations, risk of collapse, blinding, manhole base, stone bedding, 230mm brickwork, backfilling, concrete cover slab, including breaking openings on both ends for new pipe and cart away of surplus material all in accordance with drawings and specifications.

5.8.17.8 Supply and install No. 02x 50mm diameter steel pipes each approximately 1.4m in length, flanged on both ends and fitted on either end of manhole to existing flanged asbestos pipes and in new manholes including sealing off ends of manholes, support/thrust blocks, etc., gaskets, bolts, sealants etc.

5.8.17.9 Supply and install No. 02x 50mm spool pieces in varying lengths flanged on both ends and fixed to meter & valves including all necessary, gaskets, bolts, sealants etc.

5.8.17.10 Supply and install a 50mm swing check valve flanged on both ends and fixed to new-flanged pipes including all necessary gaskets, bolts, sealants etc.

5.8.17.11 Supply and install a 50mm In-line strainer, flanged on both ends and fixed to new-flanged pipes including all necessary gaskets, bolts, sealants etc.

5.8.17.12 Supply and install an 50mm water meter, flanged on both ends and fixed to new-flanged pipes including all necessary gaskets, bolts, sealants etc.

5.8.17.13 Supply, install, mount and configure a smart IP68 automatic data logger and meter-reading device and establish connectivity for wireless communication.

5.8.17.14 Register the meter on both the billing server and the new Utility Management System.

5.8.17.15 Create an account and link to the meter and apply the applicable tariffs.

5.8.17.16 Test and commission the installation.

5.8.18 Meter 39 – New Below Ground Water Meter Installation

5.8.18.1 Meter 16 is a new proposed below ground installation to be positioned at Club House.

5.8.18.2 The existing pipe material is HDPE.

5.8.18.3 Proof trench and verify the pipe material, depth and pipe size before procuring any material for the installation.

5.8.18.4 Saw cut approximately 4.7x1m wide in 50mm premix and hack up and remove including layer works and re-instate to match existing once all work is complete.

5.8.18.5 Excavate in earth in varying depths but not exceeding 1.5m deep, approximately 4.7x1m wide to expose existing water pipe including all necessary risk of collapse, backfilling and compaction and cart away of surplus material from site.

5.8.18.6 Cutting off approximately 4.5m of pipe including fitting of flanges on both ends of exposed pipe.

5.8.18.7 Construct a new water meter manhole with overall size 2.66x1.66m and varying depths not exceeding 2.53m deep including all necessary additional excavations, risk of collapse, blinding, manhole base, stone bedding, 230mm brickwork, backfilling, concrete cover slab, including breaking openings on both ends for new pipe and cart away of surplus material all in accordance with drawings and specifications.

5.8.18.8 Supply and install No. 02x 40mm diameter steel pipes each approximately 1.4m in length, flanged on both ends and fitted on either end of manhole to existing flanged asbestos pipes and in new manholes including sealing off ends of manholes, support/thrust blocks, etc., gaskets, bolts, sealants etc.

5.8.18.9 Supply and install No. 02x 40mm spool pieces in varying lengths flanged on both ends and fixed to meter & valves including all necessary, gaskets, bolts, sealants etc.

5.8.18.10 Supply and install a 40mm swing check valve flanged on both ends and fixed to new-flanged pipes including all necessary gaskets, bolts, sealants etc.

5.8.18.11 Supply and install a 40mm In-line strainer, flanged on both ends and fixed to new-flanged pipes including all necessary gaskets, bolts, sealants etc.

5.8.18.12 Supply and install an 40mm water meter, flanged on both ends and fixed to new-flanged pipes including all necessary gaskets, bolts, sealants etc.

5.8.18.13 Supply, install, mount and configure a smart IP68 automatic data logger and meter-reading device and establish connectivity for wireless communication.

5.8.18.14 Register the meter on both the billing server and the new Utility Management System.

5.8.18.15 Create an account and link to the meter and apply the applicable tariffs.

5.8.18.16 Test and commission the installation.

5.8.19 Meter 41 – New Below Ground Water Meter Installation

5.8.19.1 Meter 41 is a new proposed below ground installation to be positioned at Marine Services.

5.8.19.2 The existing pipe material is asbestos cement.

5.8.19.3 Proof trench and verify the pipe material, depth and pipe size before procuring any material for the installation.

5.8.19.4 Saw cut approximately 4.7x1m wide in 50mm premix and hack up and remove including layer works and re-instate to match existing once all work is complete.

5.8.19.5 Excavate in earth in varying depths but not exceeding 1.5m deep, approximately 4.7x1m wide to expose existing water pipe including all necessary risk of collapse, backfilling and compaction and cart away of surplus material from site.

5.8.19.6 Cutting off approximately 4.5m of pipe including fitting of flanges on both ends of exposed pipe.

5.8.19.7 Construct a new water meter manhole with overall size 2.66x1.66m and varying depths not exceeding 2.53m deep including all necessary additional excavations, risk of collapse, blinding, manhole base, stone bedding, 230mm brickwork, backfilling, concrete cover slab, including breaking openings on both ends for new pipe and cart away of surplus material all in accordance with drawings and specifications.

5.8.19.8 Supply and install No. 02x 100mm diameter steel pipes each approximately 1.4m in length, flanged on both ends and fitted on either end of manhole to existing flanged asbestos pipes and in new manholes including sealing off ends of manholes, support/thrust blocks, etc., gaskets, bolts, sealants etc.

5.8.19.9 Supply and install No. 02 x 100mm spool pieces in varying lengths flanged on both ends and fixed to meter & valves including all necessary, gaskets, bolts, sealants etc.

5.8.19.10 Supply and install a 100mm swing check valve flanged on both ends and fixed to new-flanged pipes including all necessary gaskets, bolts, sealants etc.

5.8.19.11 Supply and install a 100mm In-line strainer, flanged on both ends and fixed to new-flanged pipes including all necessary gaskets, bolts, sealants etc.

5.8.19.12 Supply and install an 100mm water meter, flanged on both ends and fixed to new-flanged pipes including all necessary gaskets, bolts, sealants etc.

5.8.19.13 Supply, install, mount and configure a smart IP68 automatic data logger and meter-reading device and establish connectivity for wireless communication.

5.8.19.14 Register the meter on both the billing server and the new Utility Management System.

5.8.19.15 Create an account and link to the meter and apply the applicable tariffs.

5.8.19.16 Test and commission the installation.

5.8.20 Meter 42 – New Below Ground Water Meter Installation

5.8.20.1 Meter 42 is a new proposed below ground installation to be positioned at Lighthouse Services.

5.8.20.2 The existing pipe material is UPVC.

5.8.20.3 Proof trench and verify the pipe material, depth and pipe size before procuring any material for the installation.

5.8.20.4 Saw cut approximately 4.7 x 1m wide in 50mm premix and hack up and remove including layer works and re-instate to match existing once all work is complete.

5.8.20.5 Excavate in earth in varying depths but not exceeding 1.5m deep, approximately 4.7 x 1m wide to expose existing water pipe including all necessary risk of collapse, backfilling and compaction and cart away of surplus material from site.

5.8.20.6 Cutting off approximately 4.5m of pipe including fitting of flanges on both ends of exposed pipe.

5.8.20.7 Construct a new water meter manhole with overall size 2.66x1.66m and varying depths not exceeding 2.53m deep including all necessary additional excavations, risk of collapse, blinding, manhole base, stone bedding, 230mm brickwork, backfilling, concrete cover slab, including breaking openings on both ends for new pipe and cart away of surplus material all in accordance with drawings and specifications.

5.8.20.8 Supply and install No. 02 x 110mm diameter steel pipes each approximately 1.4m in length, flanged on both ends and fitted on either end of manhole to existing flanged asbestos pipes and in new manholes including sealing off ends of manholes, support/thrust blocks, etc. gaskets, bolts, sealants etc.

5.8.20.9 Supply and install No. 02 x 110mm spool pieces in varying lengths flanged on both ends and fixed to meter & valves including all necessary, gaskets, bolts, sealants etc.

5.8.20.10 Supply and install a 110mm swing check valve flanged on both ends and fixed to new-flanged pipes including all necessary gaskets, bolts, sealants etc.

5.8.20.11 Supply and install a 110mm In-line strainer, flanged on both ends and fixed to new-flanged pipes including all necessary gaskets, bolts, sealants etc.

5.8.20.12 Supply and install an 110mm water meter, flanged on both ends and fixed to new-flanged pipes including all necessary gaskets, bolts, sealants etc.

5.8.20.13 Supply, install, mount and configure a smart IP68 automatic data logger and meter-reading device and establish connectivity for wireless communication.

5.8.20.14 Register the meter on both the billing server and the new Utility Management System.

5.8.20.15 Create an account and link to the meter and apply the applicable tariffs.

5.8.20.16 Test and commission the installation.

5.8.21 Meter 48 – New Below Ground Water Meter Installation

5.8.21.1 Meter 48 is a new proposed below ground installation to be positioned at OSSB – New Northern Supply.

5.8.21.2 The existing pipe material is UPVC.

5.8.21.3 Proof trench and verify the pipe material, depth and pipe size before procuring any material for the installation.

5.8.21.4 Saw cut approximately 4.7 x 1m wide in 50mm premix and hack up and remove including layer works and re-instate to match existing once all work is complete.

5.8.21.5 Excavate in earth in varying depths but not exceeding 1.5m deep, approximately 4.7 x 1m wide to expose existing water pipe including all necessary risk of collapse, backfilling and compaction and cart away of surplus material from site.

5.8.21.6 Cutting off approximately 4.5m of pipe including fitting of flanges on both ends of exposed pipe.

5.8.21.7 Construct a new water meter manhole with overall size 2.66x1.66m and varying depths not exceeding 2.53m deep including all necessary additional excavations, risk of collapse, blinding, manhole base, stone bedding, 230mm brickwork, backfilling, concrete cover slab, including breaking openings on both ends for new pipe and cart away of surplus material all in accordance with drawings and specifications.

5.8.21.8 Supply and install No. 02 x 160mm diameter steel pipes each approximately 1.4m in length, flanged on both ends and fitted on either end of manhole to existing flanged asbestos pipes and in new manholes including sealing off ends of manholes, support/thrust blocks, etc., gaskets, bolts, sealants etc.

5.8.21.9 Supply and install No. 02 x 160mm spool pieces in varying lengths flanged on both ends and fixed to meter & valves including all necessary, gaskets, bolts, sealants etc.

5.8.21.10 Supply and install a 160mm swing check valve flanged on both ends and fixed to new-flanged pipes including all necessary gaskets, bolts, sealants etc.

5.8.21.11 Supply and install a 160mm In-line strainer, flanged on both ends and fixed to new-flanged pipes including all necessary gaskets, bolts, sealants etc.

5.8.21.12 Supply and install an 160mm water meter, flanged on both ends and fixed to new-flanged pipes including all necessary gaskets, bolts, sealants etc.

5.8.21.13 Supply, install, mount and configure a smart IP68 automatic data logger and meter-reading device and establish connectivity for wireless communication.

5.8.21.14 Register the meter on both the billing server and the new Utility Management System.

5.8.21.15 Create an account and link to the meter and apply the applicable tariffs.

5.8.21.16 Test and commission the installation.

5.8.22 Meter 50 – New Below Ground Water Meter Installation

5.8.22.1 Meter 50 is a new proposed below ground installation to be positioned at Infrastructure Depot.

5.8.22.2 The existing pipe material is UPVC.

5.8.22.3 Proof trench and verify the pipe material, depth and pipe size before procuring any material for the installation.

5.8.22.4 Saw cut approximately 4.7 x 1m wide in 50mm premix and hack up and remove including layer works and re-instate to match existing once all work is complete.

5.8.22.5 Excavate in earth in varying depths but not exceeding 1.5m deep, approximately 4.7 x 1m wide to expose existing water pipe including all necessary risk of collapse, backfilling and compaction and cart away of surplus material from site.

5.8.22.6 Cutting off approximately 4.5m of pipe including fitting of flanges on both ends of exposed pipe.

5.8.22.7 Construct a new water meter manhole with overall size 2.66x1.66m and varying depths not exceeding 2.53m deep including all necessary additional excavations, risk of collapse, blinding, manhole base, stone bedding, 230mm brickwork, backfilling, concrete cover slab, including breaking openings on both ends for new pipe and cart away of surplus material all in accordance with drawings and specifications.

5.8.22.8 Supply and install No. 02 x 110mm diameter steel pipes each approximately 1.4m in length, flanged on both ends and fitted on either end of manhole to existing flanged asbestos pipes and in new manholes including sealing off ends of manholes, support/thrust blocks, etc., gaskets, bolts, sealants etc.

5.8.22.9 Supply and install No. 02 x 110mm spool pieces in varying lengths flanged on both ends and fixed to meter & valves including all necessary, gaskets, bolts, sealants etc.

5.8.22.10 Supply and install a 110mm swing check valve flanged on both ends and fixed to new-flanged pipes including all necessary gaskets, bolts, sealants etc.

5.8.22.11 Supply and install a 110mm In-line strainer, flanged on both ends and fixed to new-flanged pipes including all necessary gaskets, bolts, sealants etc.

5.8.22.12 Supply and install an 110mm water meter, flanged on both ends and fixed to new-flanged pipes including all necessary gaskets, bolts, sealants etc.

5.8.22.13 Supply, install, mount and configure a smart IP68 automatic data logger and meter-reading device and establish connectivity for wireless communication.

5.8.22.14 Register the meter on both the billing server and the new Utility Management System.

5.8.22.15 Create an account and link to the meter and apply the applicable tariffs.

5.8.22.16 Test and commission the installation.

5.8.23 Meter 51 – New Below Ground Water Meter Installation

5.8.23.1 Meter 16 is a new proposed below ground installation to be positioned at Bayvue Admin Building.

5.8.23.2 The existing pipe material is UPVC.

5.8.23.3 Proof trench and verify the pipe material, depth and pipe size before procuring any material for the installation.

5.8.23.4 Saw cut approximately 4.7 x 1m wide in 50mm premix and hack up and remove including layer works and re-instate to match existing once all work is complete.

5.8.23.5 Excavate in earth in varying depths but not exceeding 1.5m deep, approximately 4.7 x 1m wide to expose existing water pipe including all necessary risk of collapse, backfilling and compaction and cart away of surplus material from site.

5.8.23.6 Cutting off approximately 4.5m of pipe including fitting of flanges on both ends of exposed pipe.

5.8.23.7 Construct a new water meter manhole with overall size 2.66m x 1.66m and varying depths not exceeding 2.53m deep including all necessary additional excavations, risk of collapse, blinding, manhole base, stone bedding, 230mm brickwork, backfilling, concrete cover slab, including breaking openings on both ends for new pipe and cart away of surplus material all in accordance with drawings and specifications.

5.8.23.8 Supply and install No. 02 x 110mm diameter steel pipes each approximately 1.4m in length, flanged on both ends and fitted on either end of manhole to existing flanged asbestos pipes and in new manholes including sealing off ends of manholes, support/thrust blocks, etc., gaskets, bolts, sealants etc.

5.8.23.9 Supply and install No. 02 x 110mm spool pieces in varying lengths flanged on both ends and fixed to meter & valves including all necessary, gaskets, bolts, sealants etc.

5.8.23.10 Supply and install a 110mm swing check valve flanged on both ends and fixed to new-flanged pipes including all necessary gaskets, bolts, sealants etc.

5.8.23.11 Supply and install a 110mm In-line strainer, flanged on both ends and fixed to new- flanged pipes including all necessary gaskets, bolts, sealants etc.

5.8.23.12 Supply and install an 110mm water meter, flanged on both ends and fixed to new- flanged pipes including all necessary gaskets, bolts, sealants etc.

5.8.23.13 Supply, install, mount and configure a smart IP68 automatic data logger and meter- reading device and establish connectivity for wireless communication.

5.8.23.14 Register the meter on both the billing server and the new Utility Management System.

5.8.23.15 Create an account and link to the meter and apply the applicable tariffs.

5.8.23.16 Test and commission the installation.

EXISTING SYSTEMS AND INTEGRATION

5.8.24 The *Contractor* must develop an Application Programming Interface (APIs) to integrate the software with existing systems including linking the Utility Management Software to Transnets' Integrated Port Management System (IPMS) and SAP ERP (Enterprise Resource Planning) to transfer billing data (kilo Liters & Rand Value, kilowatts hours & Rand Value) on 15th of each month.

COMMUNICATION INFRASTRUCTURE

5.8.25 Communication Infrastructure Requirements

5.8.25.1 Design a fibre optic Local Area Network within the port boundary.

5.8.25.2 Trench to lay the fibre optic sleeves, trenching to minimum depth of 600mm and a width of 300mm.

5.8.25.3 Supply and install 110mm PVC pipe and chamber system for the fibre.

5.8.25.4 Supply and install fibre optic manholes where required.

5.8.25.5 The trenching for complete installation shall not exceed a total length of 10km. Backfill and reinstate existing surface and make good.

5.8.25.6 Supply and install 10 patch panels fully populated 48 pair with LC patch leads

5.8.25.7 Supply, install and patch a total of 10km of 48 pair single mode fibre optic cable.

5.8.25.8 Supply, install and configure 10 by 24 ports managed enterprise network switches.

5.8.25.9 Supply and install a 9U swing frame cabinet 900mm deep.

5.8.25.10 Link all electricity meters through the LAN to transmit data to the billing server for processing via the Utilities Management Software.

5.8.26 Wireless Communication Network for the water meters

5.8.26.1 All waters are to be fitted with an AMR interface (IoT devices) for logging of data and communicate to the closest gateway. The AMR interface shall have long range transmission and operate on low power.

5.8.26.2 Supply and install metering gateways including civil and structural works and all appurtenances.

5.8.26.3 Configure and integrate the gateways onto the LAN to transfer data to the server and Utilities Management Software.

5.8.26.4 Supply and install a server (Network & Application) to manage and control the network. The network server shall receive data and control messages from the gateways and process the data. The application server shall interface with the network server and shall store the data, perform analytics and enable integration with other systems.

5.8.26.5 Develop an Application Programming Interface (API) to allow the network to transmit relevant billing data to the billing server and Utilities Management Software.

5.8.27 Server

5.8.27.1 Supply, install and configure two 8-core (2.10GHz), 16GB, 8 x Hot plug 2.5in, smart array P408ia, 2 x 500W, rack mount billing servers.

5.8.27.2 Each server shall be supplied with four 1.2TB Hard Drives.

5.8.27.3 Supply and install the latest Microsoft SQL server (permanent license) for the management of data, storage and perform analytics via the Utilities Management Software.

5.8.28 Firewall

5.8.28.1 Supply, install, configure, and commission Firewalls per port for LAN. The *Contractor* shall ensure that old and new services going the Firewall are reinstated.

5.8.28.2 Setup DMZ and position a management workstation within DMZ.

5.8.29 Management Workstation

5.8.29.1 Supply, install and setup a Management Workstation (31.5 inch USB Hub Monitor, QHD, 60Hz, support Display Port Alt Mode with up to 90W Power Delivery, 1xHDMI, 1xRJ-45 (Ethernet 1 GbE, 4x Superspeed USB (5Gbps).

5.8.29.2 Setup rules for management workstation to control SCADA and provide dashboards whilst second LAN on machine connects to Transnet Data Network. Management station needs to be on Transnet domain and have relative Transnet Policies applied to it

5.8.29.3 Test and commission entire installation.

5.9 Head Quarter (HQ) Central Remote Viewing

The *Contractor* shall make provision for remote viewing from Head Office through Transnet Corporate Network. This must be achieved by utilising all the management workstation within each port DMZ. Create dashboards to view utility consumption of each port and generate reports at HQ Level, see dashboard samples attached.

5.10 Advance Metering Infrastructure (AMI)

This section covers the requirements for the Automated Meter Reading (AMR) technology to be used in collecting water consumption on the water reticulation network installed in each port. AMR devices will collect and transmit the water meter data directly to Gateways that will then route it further via the TNPA Engineering Local Area Network (LAN) to the billing server in the port. All devices must be covered by at least 2 to 3 gateways that can read data from that device, the devices shall have a redundancy factor of 2.

5.10.1 Private Long Range Wireless Area Network

5.10.1.1 The *Contractor* shall investigate, design and install a private wireless communication network that will allow reading of the water meters remotely and transmit the water meter data via Gateways that will then route the data further via the TNPA Engineering Local Area Network (LAN) to the billing server in the port and upload the data into the new Utility Management System using Microsoft enterprise SQL server database.

5.10.1.2 The wireless network shall have long-range communication (up to 10km), ultra low power and deep indoor penetration.

5.10.1.3 Each gateway/ receiver shall have the capability to support up to 1000 devices/ meters.

5.10.1.4 The wireless communication network solution shall be robust and secure ICASA approved open non-proprietary radio frequency protocols which optimize and enhance communication range and lengthen battery life meters (built-in radio), meter interface units and gateways shall be preferred.

5.10.1.5 The wireless communication system shall seamlessly integrate with existing systems in the ports. The AMR solution shall communicate via an open protocol such as TCP/IP, Modbus etc.

5.10.1.6 Gateways are to be linked back to the servers via the Local Area Network.

5.10.1.7 The wireless network shall be easy to install, manage and maintain.

5.10.1.8 The network system shall have the capabilities to be monitored via a dashboard and have the ability to trace the water data back through the system to the meter. Timestamps should reflect when the meter took its reading and where the data was held. Each reading should be uniquely tied to the meter it came from to avoid the possibility of confusion.

5.10.1.9 If communication fails for a period (failed batteries, network outage/congestion), the system should be able to retrieve missed data from the meter itself. In addition, the system shall allow for a handheld (Drive by or Walk by) device to be used to pick-up data or collect meter readings should any communication failure occur.

5.10.1.10 The communication network shall operate on a license free spectrum (No ICASA License).

5.10.1.11 The wireless network solution shall have no monthly or yearly subscriptions. Cloud solutions will not be considered.

5.10.2 AMR Gateways and Communication

5.10.2.1 Gateways are to be used to collect data from the meters and upload to the billing server via the LAN network. The gateways shall be easy to install and configure and shall be compatible with LoRa, Wi-Fi, Fiber (RTU), Ethernet and GSM/GRPS/LTE.

5.10.2.2 The Gateway shall communicate in the unlicensed managed 868 MHz range with all the AMR modules in its assigned area and must be capable to cover up to 8 km radius.

5.10.2.3 The gateway data collectors shall collect data from the devices and send the data to the billing server. The transmission interval shall be adjustable between 30 minutes to 24 hours.

5.10.2.4 Gateway shall be of a compact and robust design to receive meter data in periodic intervals and transfer this data via ethernet into the Billing Software or other TNPA approved platform.

5.10.2.5 The gateways shall be configurable via fixed IP address for on the Local Area Network.

5.10.2.6 Gateways/ receivers shall have the capability to support up to 1000 devices/ meters.

5.10.2.7 The gateways shall be PoE (Power over Ethernet) or AC or solar powered unit with optional battery backup.

5.10.2.8 The minimum Protection Class shall be IP65.

5.10.3 Automatic Meter Reading (AMR) Interface

5.10.3.1 The meter interface shall be Hall Effect sensors, reed switches are to be avoided due to their mechanical nature and the danger of physical break.

5.10.3.2 The meter interface shall have a communication range of up to 10km open environment and at least 5km range urban and must be compatible with Wi-Fi, Fibre (RTU), Ethernet and GSM/GRPS/LTE connection.

5.10.3.3 The interface shall be LoRa certified.

5.10.3.4 The device shall be powered by a battery and it shall be replaceable and serviceable batteries. The battery life shall be between 5 to 10 years or more. (extended battery pack)

5.10.3.5 The AMR interface shall be capable to give the following:

- Meter ID
- Meter Address
- Meter Reading in (kL)
- Meter Reading Date
- Low Battery Alert
- High Flow Alert
- Low Flow Alert
- Tamper Alert
- Meter Error Alert
- Back Flow Alert

5.11 Fiber Optic Backbone Local Area Network

The *Contractor* shall establish a 1 Gig backbone single mode fiber 1310nm network with redundant ring configuration at each port that will interconnect various devices (i.e., Electricity Meters, AMR Gateways, Servers and Management Workstation). The fiber optic installation shall be carried out in accordance with "Annexure E: Project Specification Fiber Cable 08-2025". The fiber network shall have core redundancy in the following areas:

- Fiber/ path redundancy

- Hardware redundancy

Network equipment shall conform to the following standards:

5.11.1 Managed Network Switches

5.11.1.1 Each port Local Area Network shall be based on the layer 3 catalyst 9200L, 24 port, 4x1G uplink and catalyst 9200L, 12 port, 2x1G uplink managed enterprise network switches as well as TP Link converter modules.

5.11.1.2 The Contractor shall develop the network switch topology with a ring configuration. TNPA requires switched 10/100/1000 Ethernet at all end nodes locations. Each connection must support both the 10BaseT ,100BaseT and 1000BaseT standards. Core network connections must support Gigabit Ethernet in order to provide the bandwidth required.

5.11.1.3 Network switches shall be installed in substations and administration buildings unless otherwise specified.

5.11.1.4 RJ45 Cat 6 shieled cabling shall be used for wiring "Field Devices" to the switch.

5.11.1.5 The Contractor in collaboration with the Employer shall issue the,

a) IP, Gateway, Subnet mask and domain addresses of the "Field Devices" that will be programmed on all devices.

b) VLAN setting

5.11.1.6 Test and commission the entire installation and confirm that all network switches are online and communicating on the LAN.

5.11.1 Patch Panels

Supply and install 24 Core fiber optic patch panels with subscriber connector (SC) pigtails.

5.11.2 Rackmount Chassis

Rackmount chassis designed to accommodate 12 TP-Links media converters shall be supplied for central power where multiple media converters are used.

5.11.3 Equipment Cabinet

5.11.4.1 Wall mounted cabinets shall conform to the following standards:

a) Shall be of the swing frame type.

b) Shall be reversible (swing in both directions).

c) Shall have a weight carrying support between the cabinet housing and the frame to ensure that the cabinet lock does not carry any weight in the locked position.

d) Dimensions 9U.

e) Fitted with a set of two punched profiles.

f) Fitted with two high performance ball bearing low noise fans fitted on the sides of the cabinet. One fan shall expel air from the cabinet and the other impels air into the cabinet.

g) Fitted with a lockable tinted Safety flexi glass door. The frame and the door shall be lockable with the same key. Two keys shall be supplied for each cabinet.

h) The cabinet shall be powder coated.

i) Shall be fitted with a 5 way metal power duct with a circuit breaker.

j) Shall have cable entries at the bottom and top of the box.

5.11.4.2 All cabinet shall be mounted level. After installation both the door and the cabinet shall be able to open at least 90 degrees.

5.11.4.3 All cabinets shall be fitted with blank panels in all un-utilized positions (1U Blanking Panels) and Brush Panels.

5.11.4.4 All cabinets shall be marked with a label.

5.11.4.5 All labels shall be permanent and printed black on white background.

5.11.4.6 The cabinets shall be mounted at least 2m or as high as the ceiling allows.

5.11.4 **Network Monitoring Software**

5.11.5.1 Supply and install a network monitoring software that monitors system status, availability, speed, uptime, health, network devices and traffic.

5.11.5.2 The software shall be able to monitor over 1000 devices.

5.11.5.3 The license for the software shall be a perpetual license.

5.12 Smart Utility Management Software Solution

This section covers the requirements for the utility management software to be deployed at each port for managing both water and electricity consumption within the port. The data collected from the meters will be stored in the servers using SQL server database. The stored data will be analysed on the server and available for display via the Utility Management Software Solution graphical user interface (Dashboards). No cloud-based solutions will be accepted.

5.12.1 Development of Smart Utility Management Software Solution

5.12.1.1 Development, installation, testing and commissioning of a smart utility management software solution. The software solution to be developed shall be able to retrieve water and electricity data from various software and be able to monitor, perform analysis and store TNPA's metering data.

5.12.1.2 The software solution shall:

a) Provide TNPA with a web-based centralised utilities management software to capture, process and visualise TNPA's water and electricity data per port.

b) Have easy to use interface with drop down menus, tabs and dashboards.

c) Automatically import data from other software systems or remote devices

d) Perform energy and water consumption forecasting.

e) Provide modular software design that is easily customisable and highly scalable system.

f) User configured system with ability to extract and import data on high consumption users for energy and water consumption (e.g., top 10 in graphical and table format as well as generating of reports)

5.12.1.3 Electricity and Water Consumption Analysis

The software solution shall be capable to perform broad analysis of energy/water data including electricity/water analysis and create comparison tables at port level as well as Operating Division level.

The following energy data is to be visualised, but not limited to:

a) Electrical Energy Consumption (kWh),
b) Maximum Demand (kVA)
c) Power Factor (positive and negative kVARs)
d) Load Profiling (Graph for kWh used vs Budgeted kWH – hourly, daily, weekly, monthly and yearly).
e) Power Quality Capabilities

The following WATER data is to be visualised, but not limited to:

a) Average flow rate in kL
b) Accumulative kL
c) Current month kL usage
d) Current month to date kL usage
e) Night flow vs Day flow analysis
f) Line Pressure Monitoring
g) Leak Detection Alarming

5.12.1.4 Financial Analysis

Perform financial analysis, monitor budgets and analyse energy in terms of cost. The following cost summary be accessible and be visualised, but not limited to:

a) Rands/ kWh
b) Rand/kL
c) Budget kL vs Actual Usage
d) Budget kWh vs Actual Usage inclusive of recoveries
e) Variances
f) Hourly average usage (kL & kWh)
g) Total kWh/kL cost
h) Budget Costs
i) Tariff configuration (Water & Electricity)
j) Tariff Analysis (Water & Electricity)
k) Losses and Unrecovered Revenue

5.12.1.5 Dashboards:

Software dashboards shall be in accordance with "Annexure D – Dashboards on the Smart Utilities Management Software".

The software shall have the following capabilities:

a) The software solution shall be capable to bring together essential energy and water information on a single page.
b) Provide information in different formats, graphs, tables, charts and trending analysis.
c) Have the capability to view up to four screens at once with automatic updates.

5.12.1.6 Alerts and Reports

a) The system shall be configurable to generate automatic energy alarms distributed by email and SMS to the relevant people.
b) Pre-set and automatically generate energy report on set intervals or periods [day(s), week(s), month(s), year(s)] with calendar plot.
c) The system shall have flexible and easy to use reporting functionality with the ability to produce reports in a variety of formats, (i.e. Excel, PDF, Word, csv, xml e.t.c) as well as being printed.
d) Users must be able to compile and implement new reports to their own design without having to revert to the service provider/ developer.
e) Create benchmarking reports based on user defined standards.

f) Compare bill values against collected meter data in graphical format to verify and identify anomalies.

g) Logging of all software malfunctions and system errors.

5.12.1.7 System Integration and Operating System

a) The system shall be able to handle operation on desktop devices with a modern Operating System and shall be accessible on mobile.

b) The support OS shall include, but not be limited to:

- Windows,
- Android,
- iOS

c) The solution shall be stable, reliable and performant, having a high level of user availability.

d) The solution shall allow electronic transmission of information and data storage using industry accepted standards of communication, methods as well as be aligned to the relevant Transnet standards for data exchange and transmission.

e) The solution shall be highly configurable by TNPA staff without the need to revert to the service provider/ software developers of the solution. This includes, configuration of workflow, processes, data elements, user preferences, display columns and reports.

f) The solution shall be based upon proven and industry standard technologies.

g) The solution shall be able to receive data from multiple connectivity points (Ethernet, Wi-Fi, or GSM).

5.12.1.8 User Access and Security

a) The solution must provide suitable security to control access to the functionality. Access must be role and user based. The system must allow for security and password rules, where possible be integrated with the domain security for TNPA internal Users.

b) Users shall have the ability to self-manage their profile online.

5.12.1.9 Software

a) The solution must be able to run on an industry-recognised server platform, for example Microsoft Server 2012 R2 (or above) for server or similar.

b) The database used by the solution should be a recognised industry-standard enterprise database, for example Microsoft SQL Server 2012 (or above), or similar.

c) The solution must run on a minimum user PC operating system of 64-bit Windows 10, etc. and above.

d) The solution must be able to communicate with the following office software used by TNPA:

- Microsoft Office Professional Suite 2013 and above.
- Microsoft Exchange 2010 and above.
- SharePoint 2013 and above is compatibility required with Office suite, existing billing systems as per Annexures, SCADA/ IoT, maintenance and utility management software.

e) The user interface shall accessible via commonly used browsers such as Chrome, Safari, Firefox, E and at a minimum be compatible with Microsoft Edge/ Internet Explorer 11 or later versions.

f) The solution must have the role of Administrator. This role will perform restricted tasks within the solution such as, but not limited to, the following:

- Creating new users.
- Removing users.
- Applying user permissions.
- Configuration of the solution.

g) The software must be South African based and fully supported in SA and have office or support functionality in at least the major cities in SA (i.e., Durban, Cape Town, Johannesburg, Pretoria, Bloemfontein, or Port Elizabeth.

5.12.1.10 Geographical Information System (GIS) or Supervisory Control and Data Acquisition (SCADA)

The software shall have an integrated Geographical Information System or similar to SCADA for monitoring of the "Field Devices".

The GIS shall include the following information:

a) Device I.D
b) Co-ordinates
c) Last Communication
d) Active Alerts
e) IP Address
f) Routing to gateway
g) Current Reading

The dashboard view shall show:

a) Current and average readings for a period,

b) Active alerts,

c) Last seen.

d) The GIS/Map shall have all devices shown (gateways, water meters, pressure devices and Electricity Meters).

5.13 Technical specification of the Water Meter

5.13.1 Water Meter:

5.13.1.1 All meters are to be SANS 1529-1:2006 as well as Trade Metrology Act, 1973 (Act 77 of 1973) compliant.

5.13.1.2 The meter shall comprise of a 9-digit analog display for consumption (m3) and status information.

5.13.1.3 Have a built-in radio AMR capabilities.

5.13.1.4 The meter shall have a dial compatible with a High Resolution Interface (HRI)

5.13.1.5 Detect continuous water leaks.

5.13.1.6 Offer two communication modes, fixed radio network and mobile read (Walk-by/ Drive-by)

5.13.1.7 Protection Class IP68

5.13.1.8 Maximum working pressure 1600kPa

5.13.1.9 In all cases, the tenderer shall give a full description of the meter offered. Corrosion resistant materials shall be employed throughout and parts that are in contact with the water flowing through shall be non-toxic and non-tainting.

5.13.1.10 The meter body must be manufactured from cast iron and powder coated with a fusion bonded epoxy to a minimum dry thickness of 150 microns.

5.13.1.11 Meter installation position shall be horizontal.

5.13.1.12 The water meter shall be clearly and indelibly marked with the following information:

a) Name or trademark of the manufacturer.

b) Meter serial number where first two digits indicate year of manufacture.

c) Direction of flow on both sides of the body

d) Unit of measurement

e) Meter type and size

f) Maximum admissible pressure

g) Pressure loss class

h) Temperature class

i) Metrological approvals and flow values

5.13.1.13 All mechanical meters supplied in terms of this contract shall perform to accuracy of better than ± 2% error over the meters' operating range.

5.13.1.14 All meters supplied shall be AMR compatible and ready to receive a data capture device.

5.13.1.15 The water meters shall allow for the data interface and pulse outputs to be easily mounted afterwards without breaking any meter seals.

5.14 Technical specification of the Electricity Meter

5.14.1 Electricity Meter

All smart electricity meters supplied shall have the capabilities to measure different electrical parameters such as but not limited to Active Energy (kWh/MWh), Reactive Energy (kVArh/MVArh), Apparent Energy (kVAh/MVAh) etc. in a three (3) phase, three or four wire 50 Hz network.

Specification of the meter:

- Frequency: 50Hz ± 2%
- Accuracy: Class 0.5S Active Energy (kWh), Class 1.0 Reactive Energy (kVArh)
- Voltage 3 x 58/100...240/415V
- Current: 1/5A
- Maximum continuous current: 200% In
- Other data: Instantaneous values
- Switching: Internal clock
- Outputs: 5 Input, 6 outputs contacts
- Standard: IEC 60687 & IEC 61035
- Data output: LCD,

Meter construction

- Display: Programmable 8-digit liquid crystal display and shall be capable to display while un-powered.
- Figure height: 8mm
- Construction: Anti static, glass fibre re-enforced plastic

Communication

The meter must be compatible with Wi-Fi, Fibre, Ethernet and GSM/GRPS/LTE connection.

5.15 Technical specification of the Power Quality Meters

5.15.1 Power Quality Meter (11 kV)

The meter shall:

- Comply with IEC 61000-4-30 Class A power quality measurement requirements.
- Measure and record voltage, current, power, energy, frequency, power factor, harmonics, voltage sags, swells, interruptions and transients.
- Support power quality event logging and waveform capture.
- Provide Ethernet and/or GSM communication as specified.
- Support industry-standard protocols such as Ethernet, Modbus and TCP/IP.
- Be suitable for operation on 11 kV networks.

5.15.2 Input/Output (I/O) Modules

The I/O modules shall be fully compatible with the specified Power Quality Meter and shall provide the functionality required for monitoring, control and integration requirements of the Works.

As a minimum, the I/O Modules shall support:

- Digital Inputs (DI) for status monitoring and alarm indication.
- Digital Outputs (DO) for remote control and signaling functions
- Analogue Inputs (AI) where required for the acquisition of analogue process signals.

Analogue Outputs (AO) where required for interfacing with external systems.

5.16 Guarantee

5.16.1 The *Contractor* shall provide a 12-month guarantee/ warranty period post Completion per port as well as to ensure all business requirements and functionality are operational and accepted by the *Employer*.

5.16.2 The *Contractor* is required to develop a maintenance regime for both the meter and the electronics that will ensure all guarantees uphold for the full guarantee period.

6 List Of Drawings

6.1 Drawings issued by the *Employer*

Drawings

SECTION 2

7 Management and start up

7.1 Management meetings

Regular meetings of a general nature may be convened and chaired by the *Project Manager* as follows:

Title and purpose	Approximate time & interval	Location	Attendance by:
Kick-Off Meeting	Once-off	Microsoft (MS) Teams	*Project Manager* (and appropriate delegates), *Supervisor*, and *Contractor* (appropriate key persons)
Overall contract progress and feedback	Bi-Weekly	Microsoft (MS) Teams	*Employer*, *Project Manager* (and appropriate delegates), *Supervisor*, and *Contractor* (appropriate key persons)
Technical Meetings	Bi-Weekly	Microsoft (MS) Teams	*Project Manager* (and appropriate delegates), *Supervisor*, and *Contractor* (appropriate key persons)
Risk Register and Compensation Events	As and When required	Microsoft (MS) Teams	*Project Manager* (and appropriate delegates), *Supervisor*, and *Contractor* (appropriate key persons)
Issues on Site	As and when required	On Site	CM, *Project Manager, Supervisor* and the *Contractor*

Meetings of a specialist nature may be convened as specified elsewhere in this Works Information or if not so specified by persons and at times and locations to suit the Parties, the nature and the progress of the works. Records of these meetings are to be submitted to the *Project Manager* by the person convening the meeting within five days of the meeting.

All meetings are to be recorded using minutes or a register prepared and circulated by the person who convened the meeting. Such minutes or register are not to be used for the purpose of confirming actions or instructions under the contract as these are to be done separately by the person identified in the conditions of contract to carry out such actions or instructions.

7.2 Documentation Control

7.2.1 The control, maintenance and handling of documents and drawings, using a suitable document control system, remain the sole responsibility of the *Contractor.*

7.2.2 All contract correspondence is issued through document control. All hardcopy communication will be delivered to the *Employer* via the Document Controller. In the event of urgent communication,

electronic communication can be transmitted to the relevant Document Controller assigned to the Project and hardcopy to follow.

7.2.3 Each supplier of documentation and data to the Project is responsible for ensuring that all documentation and data submitted conforms to the Project Standards and data Quality requirements in terms of numbering, uniqueness, quality, accuracy, format, completeness and currency of information. Data not meeting the Project Standards and data Quality requirements will be cause for rejection and returned to the Contractor for corrective action and re-submission.

7.2.4 Should any change be made to documentation or data, which has already been submitted to the Project, then new or revised documentation or data shall be issued to replace the outdated information.

7.2.5 It is the responsibility of all Project participants undertaking work on the Project to ensure they obtain and comply with the relevant requirements to suit their deliverables and Scope of Works.

7.2.6 The Contractor is to ensure that the latest versions of the required application software and a suitable 'IT' Infrastructure is in place to support the electronic transmission of documentation.

7.2.7 Electronic files submitted to the Project shall be clear of known viruses and extraneous "macros". The supplier of documentation is required to have, at all times, the latest generation of virus protection software and up-to-date virus definitions.

7.2.8 The Contractor shall be responsible for the supply of all Supplier/Subcontractor/Manufacturer, etc. documentation and data related to their package of work and shall ensure that these Suppliers have the capability to supply the necessary documentation and data in the required time-frame and quality prior to awarding sub-orders.

7.2.9 The required number of copies shall as a minimum be three (3) (1 x original + 2 x hard copies), with the corresponding PDF and 'Native' file formats upon final submission.

7.2.10 The Contractor shall apply "wet signatures" to the original Documentation before scanning the signed original and prior to formal submission to the Project.

7.2.11 Final issues of all documentation shall be supplied to the Project in "wet signature" format along with the associated corresponding electronic 'native files' and PDF renditions.

7.2.12 The Contractor shall during the Covid-19 Pandemic issue documents electronically to the identified document controller, accompanied by a transmittal which clearly indicates the purpose of the submission.

7.2.13 The *Contractor* shall ensure adequate resources are available to manage and execute the Document Control function as per the requirements of the Project.

7.3 Health and Safety Requirements

7.3.1 The *Contractor* complies with the following SMP: All health and safety matters associated with the *works* will be dealt with in accordance with Occupational Health & Safety Act, 1993 (Act No. 85 of 1993) and the Transnet National Ports Authority Health and Safety Specifications attached to this Works Information.

7.3.2 The Contractor shall prepare, implement and administer the Contractor's Health and Safety Management Plan (CHSMP). The Health and Safety Management Plan must provide a systematic method of managing hazards and implementing control measures.

7.3.3 The Contractor shall prepare and submit the Occupational Health & Safety file to the Project Manager for review and acceptance.

7.3.4 Pre-employment medical examinations as well as exit medicals will be required and must further include for chest X-rays. These medical examinations must be carried out by a registered Occupational Health practitioner. All costs associated will be to the Contractor's account.

7.3.5 The Contractor ensures that its Sub-contractors comply with the CHSMP and relevant statutory requirements of the Occupational Health & Safety Act, 1993 (Act No. 85 of 1993).

7.3.6 The roles and responsibilities of the various personnel acting on behalf of the Project Manager with respect to the SMP and health and safety issues are as stated in the paragraphs following:

7.3.7 The Construction Manager is responsible (in the context of the SMP only) for health and safety on the Site and Working Areas and reports to the Project Manager.

7.3.8 The Construction Manager specific tasks (in the context of the SMP) are:

a) Implement the *Employers* safety management system.

b) Monitor Contractor's compliance to the CHSMP.

c) Ensure risk is at an acceptable level.

d) Ensure the Contractor's workforce and Construction Management Team is competent.

e) The Contractor performs the works having due regard to the HSSP.

f) The HSSP is:

7.3.9 The Project Site Safety Manager (PSSM) is responsible for ensuring that the Contractor complies with the SMP. The PSSM acts on behalf of the Project Manager.

7.3.10 The Project Site Safety Manager (PSSM) specific tasks are:

a) Ensure that the overall project safety requirements are complied with.

b) Provide guidance on safety related issues arising during the execution of the project.

7.3.11 The *Contractor* shall submit a Safety, Health and Environmental (SHE) file showing the *Contractor's* adherence to the OHS Act and all legislative requirements. The SHE plan prepared before award of work must be signed and approved by the *Employer's* Legal & Compliance Department. Thereafter the *Contractor* shall be required to attend a safety induction. The *Contractor* shall pay special attention and compliance to Transnet National Ports Authority SHE Specification, a copy of which is included with this tender. Documentation required includes;

- SHE Plan
- Method Statement
- Risk Assessment

7.3.12 The SHE File is to be kept on Site at all times. The file has to contain amongst others:

- Principal Contractor Organogram
- Letter Of Good Standing with Compensation Fund
- General Liability Insurance (Summary of Policy)
- Notification Letter of Construction Work ~ Department Of Labour (If Applicable)
- Appointments (Inclusive of legal appointments)
- Contractor Induction: Employees and Visitors
- Principal Contractor's SHEQ Policy
- Health & Safety Plan
- Fall Protection Plan inclusive of Fall Protection Risk Assessment (If Applicable)
- Risk Assessments (inclusive of action plan to manage controls)
- Method Statements
- Safe Operating Procedures
- Incidents / Accidents Register and Investigation Report Template
- Emergency Contact Telephone Numbers
- Contractor Site Emergency Plan (For Site establishment)
- Business Continuity Plan Including Emergency Plan
- Documented Proof of Daily Toolbox Safety Talks/ DSTI
- Inspections Checklist
- All Registers
- Welfare Facilities arranged
- Electrical Compliance (COC) (If Applicable)
- Communication Plan
- Training Records and Competency Certificates
- Employee Personal Profile Dossier completed
- Staff Medical Certificates (Must correspond with Employee Personal Dossier)
- Employee Personal Profile Dossier completed
- Environment Management Plan

7.3.13 Clients Obligation

- Client SHE Specification
- Induction Indemnity Form completed
- Induction Attendance Register
- List of legal Permits and Authorisation completed
- Pre-site Hand over Inspection Checklist
- Site access certificate completed
- Mandatory Agreement (TIMS Section 37(2) Agreement)

7.3.14 Asbestos that forms part of structure of building or on premises

7.3.12.1 Handling of Asbestos Cement Products

In order to ensure that the handling, altering, cleaning, preparation for painting or removal of any asbestos cement products, is carried out in a safe, uniform and appropriate manner as required by the Asbestos Abatement Regulations 2020, framed under the Occupational Health and Safety Act (Act No. 85 of 1993) and the Environment Conservation Act, 1989 (Act No 73 of 1989), the *Contractor* will either:

a) Acquire the services of an Asbestos Approved Inspection Authority in order to train their employees and draw up **Plan of Work**. It must comply with requirements of Regulation 15;

b) Acquire the services of a Registered Asbestos Removal *Contractor*. **The services of the AAIA must be acquired by the awarded *Contractor* for the project;**

c) Keep all records on the SHE File relating to asbestos management on site and that includes proof of training, air monitoring results, etc. which will be handed over to the **TNPA Project Leader** upon completion of the work / contract;

d) Provide an up-to-date inventory of asbestos in place, as contemplated in regulation 4, when asbestos work is planned;

e) Ensure that an asbestos risk assessment, as contemplated in regulation 5, is carried out prior to asbestos work;

f) Ensure that a written safe work procedure is developed and followed by employees.

7.3.12.2 Disposal of Asbestos Cement Products

The *Contractor* shall ensure that all Asbestos Cement Products are disposed at an **Asbestos disposal site (approved for disposal of hazardous material)** that means a site specifically designated for the purpose of asbestos disposal in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008).

7.4 Environmental constraints and management

The *Contractor* complies with the following Construction Environmental Management Plan (CEMP):

7.4.1 The *Contractor* performs the *works* and all construction activities within the Site and Working Areas in accordance with the provisions of the environmental management plan guidelines as contained in the *Employer's* Standard Environmental Specifications.

7.4.2 The Contractor performs the works and all construction activities within the Site and Working Areas having due regard to the environment and to environmental management practices as more particularly described within the Standard Environmental Specification (SES) and Project Environmental Specifications (PES).

7.4.3 The SES describes the minimal acceptable standard for environmental management for a range of environmental aspects commonly encountered on construction projects and sets environmental objectives and targets, which the Contractor observes and complies.

7.4.4 The PES describes more particularly the environmental standards applicable to the works, the Site and the Working Areas and sets out variance (including additions) to the SES. The PES may require higher minimal standards than those described in the SES as may be required by the Project Manager or Others.

7.4.5 The overarching obligations of the Contractor under the CEMP before construction activities commence on the Site and/or Working Areas is to provide an environmental method statement for a particular construction operation at the Site and/or Working Area by the Contractor and where requested by the CM and to comply with the following:

The *Contractor* shall identify the kinds of environmental impacts that will occur as a result of his activities and a method statement describing how each of those impacts will be avoided, prevented or managed so that the standards set out in this documents are achieved.

The EMP must include, but not limited to the following sections detailing the environmental aspects and possible impacts and management controls (mitigation measures) pertaining to the risks listed in the section:

- Site establishment including *Contractor's* Site camp
- Protection of sensitive/no-go areas
- Management of hazardous chemicals and flammable substances
- Pollution control & Spill response
- Waste Management
- Environmental education and awareness
- Protection of marine species and birds
- Removal of project waste

- Decommissioning of Site camp
- Contractor's SHE Officer
- Monitoring and auditing and
- Record keeping

7.4.6 The *Contractor* shall ensure that his management, foremen and the general workforce, as well as all suppliers and visitors to Site have attended the Induction Programme prior to commencing any work on Site. If new personnel commence work on the Site during construction, the *Contractor* shall ensure that these personnel undergo the Induction Programme and are made aware of the environmental specifications on Site.

7.4.7 The Contractor must appoint a sufficient number of named assistants to the CSHEO to monitor environmental issues e.g. litter, spills, illegal activities, fence patrol, dust etc. These appointments, along with details of the individuals being appointed and job descriptions, must be sent to the Project Manager for his approval.

7.4.8 During the installation period, the Contractor complies with the following:

7.4.8.1 A copy of the SES, and the relevant PES shall be available on Site, and the *Contractor* shall ensure that all the personnel on Site including Subcontractors and their staff as well as suppliers are familiar with and understand the specifications contained in the SES as amended by the PES.

7.4.8.2 Method statements that are required during construction must be submitted to the *Project Manager* for approval at least 20 days prior to the proposed commencement of the activity. Emergency construction activity method statements may also be required. The activities requiring method statements cannot commence if they have not been approved by the *Project Manager*.

7.4.8.3 Where applicable, the Contractor shall provide job-specific training on an ad hoc basis when workers are engaged in activities, which require method statements.

7.4.8.4 The Contractor shall ensure that any Materials delivery drivers are informed of all procedures and restrictions (e.g. which access roads to use, no go areas, speed limits, noise, etc) required by the CEMP before they arrive at Site and off load any Materials.

7.4.8.5 The list below is a list of some of the other issues that the Contractor must ensure he has planned for to meet the requirements of the environmental specifications. It is not a comprehensive list but serves as a guide:

a) Workshop and maintenance of Plant

b) Protection of historical and archaeological artefacts

7.4.8.6 The Contractor complies with environmental inspections and audits which will be conducted by the Employer's environmental officers during the execution of the project, detailed requirements of the audits to be agreed with the successful tenderer after award.

7.4.8.7 The Contractor ensures that all personnel on Site including Subcontractors and their staff are familiar with and understand the requirements of the CEMP.

7.5 Quality Assurance Requirements

7.5.1 The *Contractor* shall have, maintain and demonstrate its use to the *Project Manager* (and/or the *Supervisor* to satisfy the requirements of the documented Quality Management System to be used in the performance of the *works as per the General Quality Requirements for Contractors and Suppliers :* ***TNPA-QUAL-REQ-014.1***

7.5.2 The *Contractor* submits his Quality Management System documents to the *Project Manager* as part of his programme under ECC Clause 31.2 to include details of:

- Project Quality Plan for the contract.
- Quality Control Plans (QCP's).
- A schedule of internal audits during the contract.

7.5.3 The *Contractor* develops and maintains a comprehensive register of documents that will be generated throughout the contract including all quality related documents as part of its Quality Plan.

7.5.4 The *Project Manager* indicates those documents required to be submitted for either information, review or acceptance and the *Contractor* indicates such requirements within his register of documents. The register shall indicate the dates of issue of the documents with the *Project Manager* responding to documents submitted by the *Contractor* for review or acceptance within the *period for reply* prior to such documents being used by the *Contractor*.

7.5.5 The Quality Plan means the *Contractor*'s statement, which outlines strategy, methodology, resources allocation and Quality Control co-ordination activities to ensure that the *works* meet the standards stated in the *Works* Information.

7.5.6 The Quality Control Plans shall identify all inspection, test and verification requirements to meet Contractual obligations, specifications, drawings and related details including destructive, non-destructive testing, witness and hold points.

7.6 Programming Constraints

7.6.1 All construction activities and sequencing of the works shall be planned as per the programming and method of construction outlined in this document.

This document contains the engineering and construction activities for all eight ports. The ports have been organized into three main regions: Eastern, Central and Western, each with its own distinct characteristics and specialized services. The Eastern region includes Durban and Richards Bay. The Central region consists of East London, Ngqura and Port Elizabeth. The Western region is composed of Mossel Bay, Cape Town and Saldanha.

The Contractor is required to have construction/ installation Teams per region (Eastern, Central and Western) and the Teams are to be subdivided into two i.e., one for the supply and installation of water meters and one for the supply and installation of electricity meters. These installations shall take place simultaneously. The *Contractor* is required to provide all necessary resources, tools and equipment to support this strategy. These requirements shall be included in the C*ontractor's* schedule by the *Contractor*.

Eastern Region		
a.	Port of Richards Bay	Team One - Water Team Two - Electricity
b.	Port of Durban	Team Two - Electricity
Central Region		
c.	Port of Port Elizabeth	Team One - Water Team Two - Electricity
d.	Port of East London	Team One - Water Team Two - Electricity
e.	Port of Ngqura	Team One - Water Team Two - Electricity
Western Region		
f.	Port of Cape Town	Team One - Water Team Two - Electricity
g.	Port of Saldanha	Team One - Water Team Two - Electricity
h.	Port of Mossel Bay	Team One - Water Team Two - Electricity

7.6.2 The *Contractor* shall be aware that the *works* will be conducted in operational areas hence the programme shall accommodate delays due to operational related challenges such as traffic.

7.6.3 The *Contractor* shows on each programme he submits to the *Project Manager*, the requirements of the [CEMP, SES, PES and SMP state others as required] as described in the Works Information, together with the associated environmental method statements.

7.6.4 The *Contractor* shows on each programme he submits to the *Project Manager*, the requirements of Health and Safety issues need to be highlighted on the programme], design requirements refer to paragraph design issues / activities on the programme], procurement requirements and construction operations on the programme, but the *Project Manager* might require various mandatory statements (e.g.) in relation to Equipment design and/or assembly / dismantling].

7.6.5 The *Contractor* complies with the *Employer's* programme (Key Dates provided) when he submits his first programme.

7.6.6 The *Contractor* complies with the *Employer's* programme {i.e. estimated project duration of ninety–six weeks [twerty four months]} inclusive of public holidays, builder's break [i.e. 16 December – 10 January] and known special non-working days} when he submits his first programme.

7.6.7 Furthermore, the number of days in excess of the number of working days anticipated to be lost, due to climatic conditions are already included on the estimated project duration.

7.6.8 The *Contractor* presents his first programme and all subsequently revised programmes (see ECC Clauses 31.2 and 32.1) in hard copy format and soft copy format.

7.6.9 The *Contractor* uses Primavera for his programme submissions or a similar programme software package equivalent to Primavera subject to the prior written notification and acceptance by the *Project Manager*.

7.6.10 The *Contractor* shows on his Accepted Programme and all subsequently revised programmes schedules showing the critical path or paths and all necessary logic diagrams demonstrating sequence of operations.

7.6.11 It is incumbent upon the *Contractor* to submit a level-4 schedule/programme clearly showing the project duration and critical path for approval within 14 days of the award of this contract. The schedule/programme is to be discussed and agreed between the *Contractor* and *Sub-Contractor's* prior to submission, this must be subject to discussion and review by the *Project Manager*. No claim for an extension of time or acceleration must be entertained by *Project Manager* due to any failure of the *Contractor* and *Sub-Contractor*(s) to accommodate one another.

7.6.12 The *Contractor's* proposed construction programme must be in a bar chart form.

7.6.13 The *Contractor* must submit his programme within the time stated (14 days) above, to the *Project Manager* for acceptance. The programme must be in the form of a bar chart or any other time-activity form acceptable to the *Project Manager* and must clearly show:

- The proposed rate of progress in order to complete the *works* within the required period as tendered, showing the various activities, their durations and proposed re-sourcing levels (major plant and labour) for each element of the *works*. Sufficient detail must be provided to enable the *Project Manager* to be able to gauge construction progress.
- The sequence of activities and any dependencies (time or resource related) between them.
- The critical path activities.
- Key dates/information, etc. in respect of work to be carried out or to be provided by others.
- The anticipated value of work to be done during each month i.e. monthly cash flows.
- Other information specifically required by the *Project Manager*.

- The *Contractor* shows on each revised programme he submits to the *Project Manager* a resource histogram showing planned versus actual progress, deviations from the accepted Programme and any other remedial actions proposed by the *Contractor*.
- The *Contractor* must submit programme report information to the *Project Manager* at mutually agreed intervals in addition to the intervals for submission of revised programmes.

NB: The *Contractor's* performance shall be strictly monitored on the provided and mutually agreed and accepted programme.

7.6.14 The *Contractor's* monthly programme narrative report includes:

- Level 4 Project Schedule – showing two separate bars for each task i.e. the primary bar must reflect the current forecast dates and the secondary bar the latest Accepted Programme.
- 2-week Look ahead Schedule - showing two separate bars for each task i.e. the primary bar must reflect the current forecast dates and the secondary bar the latest Accepted Programme.
- S-curves – reflecting the actual percentage complete versus the planned percentage for the overall contract.
- Detailed progress report
- Details of activities running late, indicating what steps have been or must be taken to ensure that the work is completed within the specified time.
- A report on all labour, plant and materials on site.

7.6.15 When drawing up the programme, the *Contractor* must, inter alia, take into consideration and make allowance for:

- Expected weather conditions and their effects.
- Known physical conditions or artificial obstructions.
- The accommodation and safeguarding of public, traffic and *Employer's* assets.
- Dealing with, altering and installing services.
- The reasonable requirements and programmes of the *Employer*.
- All other actions required in terms of this contract.

7.6.16 The following details must be submitted together with the programme:

- The number of working hours per day, working days per week, assumed holiday or shut down periods on which the programme is based.
- The overall labour and major plant resource levels on which the programme is based.
- The detailed Traffic Management Plan during Installation, Testing and Commission.

7.6.17 The *Contractor* must base his initial programme of work on the scope of work as described in the Works Information, project specification and the Bill of Quantities. This programme must be reviewed on a regular basis by the *Contractor* in accordance with changing circumstances, delays and amendments to the work ordered by the *Project Manager*.

7.6.18 Minor revisions to the accepted programme may be introduced from time to time by mutual agreement between the *Contractor* and the *Project Manager*. Should there be any major revision required in the programme, this can only be implemented through a written instruction to the *Contractor* by the *Project Manager* and subsequently a revised programme must be submitted within two weeks of receipt of such an instruction.

7.6.19 It should be noted that it is in the *Contractor's* interest to provide a comprehensive programme giving as much information as possible about the times allowed for the various activities as well as resources or other limitations affecting the programme, since the accepted programme may be used to evaluate any claims in terms of the general conditions of contract for extensions of time.

7.6.20 Acceptance of the programme merely constitutes an acknowledgement by the *Project Manager* that the Accepted Programme represents a contractually compliant, realistic and achievable depiction of the *Contractor's* intended sequence and timing of construction of the *works*.

7.6.21 Acceptance of the programme does not relieve the *Contractor* of his duties in the terms of the contract obligations.

7.6.22 Acceptance does not turn the *Contractor's* programme into a contract document or mandate that the works should be constructed exactly as set out in the Accepted Programme.

7.6.23 Acceptance does not turn the *Contractor's* programme into a contract document or mandate that the works should be constructed exactly as set out in the Accepted Programme.

7.6.24 The *Contractor* must submit to the *Project Manager*, at least three working days before each monthly site meeting copies of the following:

- The contract programme with progress charts and programme graphs updated to reflect the planned versus actual progress to date.
- The *Contractor* shall update the program and supply the progress reports to show actual and expected progress compared to the latest agreed Accepted Program. Progress information may be verified by the *Project Manager* at any stage.
- A summary of progress on site over the month preceding the site meeting. The report must be in the form of a detailed narrative to the contract programme.
- Details of activities running late, indicating what steps have been or must be taken to ensure that the work is completed within the specified time.
- A report on all labour, plant and materials on site.

7.7 *Contractor's* management, supervision and key people

7.7.1 The *Contractor* shall a detailed organogram of his people and shows how they will be utilised under this contract. The resource proposal (organogram) shall as a minimum, include the quantity of staff and details of their role and responsibilities and line of communication.

7.7.2 Key Personnel-:

a) Project Manager
b) Contracts Manager
c) Construction Manager x 03 (One for each region)
d) Planner
e) Document Controller
f) Quality Officer
g) Safety Manager
h) Safety Officer x 03 (One for each region)
i) Electrical/ Electronic/ Software Engineer
j) Civil Engineer
k) Network Architect Specialist
l) Information Security Specialist
m) Plumber
n) Master/ Installation Electrician

7.7.2.1 The *Contractor* is required to provide all the key personnel for the full duration of this Contract, none of these persons will be replaced by a person of lesser ability or qualification.

7.7.2.2 All personnel engaged to carry out work on the Project must have the necessary skills and knowledge and be competent to perform the task for which they have been employed.

7.8 The *Contractor's* Invoices

7.8.1 When the *Project Manager* certifies payment (see ECC Clause 51.1) following an assessment date, the *Contractor* complies with the *Employer's* procedure for invoice submission.

7.8.2 The invoice must correspond to the *Project Manager's* assessment of the amount due to the *Contractor* as stated in the payment certificate.

7.8.3 The invoice states the following:

Invoice addressed to Transnet SOC Ltd;
Transnet SOC Limited's VAT No: 4720103177;
Invoice number;
The *Contractor's* VAT Number; and
The Contract number

The invoice contains the supporting detail

7.8.4 The invoice is presented either by email or by hand delivery.

Invoices submitted by email are addressed to:

AAAAA.XXXXXX@transnet.net
For the attention of AAAAA XXXXXX

Invoices submitted by hand are presented to:

XXXXXXXX,
Port of XXXXX
4001
For the attention of AAAAA XXXXXX
The invoice is presented as an original.