PART C3: SCOPE OF WORK

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C3.1 EMPLOYER'S WORKS INFORMATION

Contents

SECTION 1

1 Description of the *works*

1.1 Interpretation and terminology

1.1.1 Abbreviations

The following abbreviations are used in this Works Information:

Abbreviation	Meaning given to the abbreviation
AIA	Authorised Inspection Authority
APN	Access Point Name
ASTM	American Society for Testing and Material
AWS	American Welding Society Standards
BBBEE	Broad Based Black Economic Empowerment
BS	British Standards Institute Specifications
CEMP	Construction Environmental Management Plan
CD	Compact Disc
CDR	*Contractor* Documentation Register
CDS	*Contractor* Documentation Schedule
CIRP	Constructor's Industrial Relations Practitioner
CRL	*Contractor* Review Label
CSHEO	*Contractor*'s Safety, Health, and Environmental Officer
CM	Construction Manager
DTI	Department of Trade and Industry
DWG	Drawings
EO	Environmental Officer
FAT	Factory Acceptance Tests
FEQ	Field Engineering Query
GSM	General System for Mobile Communications
GPRS	General Packet Radio Services
HAW	Hazard Assessment Workshop
HAZOP	Hazard and Operability Study

HSSP	Health and Safety Surveillance Plan
INC	Independent Nominated Consultant
IoT	Internet of Things
IP	Industrial Participation
IP	Internet Protocol
IR	Industrial Relations
IPP	Industrial Participation Policy
IPO	Industrial Participation Obligation
IPS	Industrial Participation Secretariat
IRCC	Industrial Relations Co-ordinating Committee
ISO	International Standard Organisation
ISTQB	International Software Testing Qualifications Board
JSA	Job Safety Analysis
CIRP	*Contractor*'s Industrial Relations Practitioner
MSISDN	Mobile Station International Subscriber Directory Number
Native	Original electronic file format of documentation
NCR	Non-conformance request
NDE	Non-destructive examination
NEMA	National Electrical Manufacturing Association
OTA	Over The Air
PES	Project Environmental Specifications
PHA	Preliminary Hazard Assessment
PIRM	Project Industrial Relations Manager
PIRPMP	Project Industrial Relations Policy and Management Plan
PLA	Project Labour Agreements
PQP	Project Quality Plan
PQR	Procedure Qualification Record
PSIRM	Project Site Industrial Relations Manager
PSPM	Project Safety Program Manager
PSSM	Project Site Safety Manager

ProgEM	Programme Environmental Manager
ProjEM	Project Environmental Manager
QA	Quality Assurance
QCP	Quality Control Plan
R&D	Research and Development
SAT	Site Acceptance Tests
SANS	South African National Standards
SASRIA	South African Special Risks Insurance Association
SES	Standard Environmental Specification
SHE	Safety, Health and Environment
SHEC	Safety, Health and Environment Co-ordinator
SIM	Subscriber Identification Module
SIP	Site Induction Programme
SMP	Safety Management Plan
SMS	Short Message Service
SSRC	Site Safety Review Committee
TP	Transnet Property
TFR	Transnet Freight Rail
TNPA	Transnet National Ports Authority

1.1.2 **Definitions**

- Specifications: Means the document (s) forming part of the *Works* Information in which are described the methods of executing the various items of works to be done, and the nature and quality of the plant and materials to be supplied.
- Reference in *Works* Information and standard specifications to equipment means the equipment as defined in the scope of works or the plant fitted on the equipment as defined in the scope of works, depending on the context.
- Utilities: The services provided to Transnet Properties by an external supplier (Municipality, Eskom, Water Boards) such as Electricity, Water, Rates and Taxes, Sewer, and Refuse. These services can also be provided by Transnet Property to its internal and external clients.

- Utilities Supplier(s): External supplier of electricity and water (Municipality, Eskom, Water Boards), who might also invoice on services such as such as Electricity, Water, Rates and Taxes, Sewer, and Refuse.
- Point of delivery (POD)/point of supply: Either a single point of supply, or a specific group of points of supply from where electricity is supplied to TP by the Utilities Supplier, or from where the customer supplies electricity to the Utilities Supplier located within a single substation, at which electricity is supplied/delivered at the same declared voltage and tariff.
- Tariff structure/schedule: A combination of different monthly charges, each at particular rates that are usually escalated annually and are applied to recover measured quantities, such as consumption and capacity costs, and unmeasured quantities, such as service costs, and their relationship to each other.
- Smart Meters: a type of meter that is installed to measure the consumption of electricity, gas, or water at the point of installation that is able to communicate this information using a wireless connection. In the context of this document, the terms "bulk meter", "check meter" and "submeter" means Smart Meter.
- Utilities Account Invoice Billing Verification: refers to the *Employer's* internal process of using Bulk Meters as check meters to verify the tariff charges billed by the Utilities Suppliers in accordance with the consumption recorded by the Bulk Meters and the tariff structure applied to the account.
- Tenant Consumption Allocation Billing: refers to the *Employer's* internal process of using Submeters as the baseline for invoicing tenants in accordance with their consumption recorded by the Submeters. The term "allocation" refers to the division of cost charged to the Utility Account from which payments to the Utilities Suppliers are recovered from the tenants under the Account.

1.1.3 **Interpretation of incorporated documentation**

Wherever the following words or phrases are used in the listed or referenced documentation, they are interpreted in this contract as follows:

Word or Phrase	Interpretation
'Transnet SOC Limited' in the context of: Owner, occupier or user of the new facility; insurer of works; paymaster (i.e., Transnet Shall pay);	the *Employer*

a party to the contract	
'Transnet SOC Limited' in the context of: a duty or procedure to be performed in the administration of the contract	the *Project Manager* or *Supervisor* as determined by the conditions of the contract
'Transnet Property' in the context as operator and owner, occupier, or user of the new facility	the *Employer*
'The successful bidder' in the context of the tenderer/bidder that receives the Letter of Award	the *Contractor*
'Main specification' as referenced in the *Employer*'s standard specification	This Works Information
accepted by (or to the satisfaction of) the *Project Manager*, Engineer or Architect	accepted by the *Project Manager* or the *Supervisor*
a duty, procedure, decision or action of the Engineer or Architect and or the Superintendent, client representative, *Site Supervisor* or Clerk of works	an action of the *Project Manager* or the *Supervisor* depending on the context, Clause 14 of the core clauses determines what actions of each are. Either may delegate terms of Clause 14.2

1.2 Executive overview

1.2.1 Background:

Transnet Property (TP) manages a large portfolio of commercial and residential properties across South Africa. The majority of these properties occupied by tenants are not metered for electricity and water consumption. TP is responsible for settling the consumption bills with the Utilities Suppliers across the portfolio. The utility bills received from the Utility Suppliers are typically sourced from bulk meters for each account, owned by the Utility Supplier, that feeds multiple buildings with various tenants in the precinct. TP recovers the utility consumption cost from the tenants through lease agreements. In the absence of metering infrastructure, the tenants are charged at a flat rate for utilities leading to substantial discrepancies between the actual consumption and billed invoices. Currently, the recovery of utilities consumption costs has not been successful, due to:

- The absence of metering infrastructure (flat rate method applied),
- Non-payment of utilities by tenants (especially mass housing) and,
- No existing metering/consumption recovery systems.

Most of the remaining properties that are metered have outdated meters with basic accumulated energy consumption displayed. A minority of properties have smart meters installed but are still subject to manual readings and on-site connection of meters for historical data download. The metered properties require excessive travel to the various sites where manual readings are recorded.

Overall utilities costs constitute 46% of operational expenses. Energy costs make up approximately 18% of TP's operating expenses and water costs are 13% from YTD. Energy costs in South Africa have inflated by more than 300% over the past decade and is projected to continue increasing for the foreseeable future. The South African electricity system has also been experiencing capacity constraints since late 2007, resulting in frequent implementation of rotational load shedding to avoid total grid collapse. This has caused serious energy security concerns for the country as well as Transnet. In the South African grid network, coal accounts for approximately 72% of electricity generation DMRE (2019) and it is one of the leading sources of carbon emissions. Transnet developed an Energy Strategy, in support of the South African Government initiatives and commitments to curb carbon emissions, to manage its electricity consumption and reduce its own carbon footprint. TP is required to align with the Transnet Group Energy Strategy to address the 3 main drivers which are to:

- Reduce energy costs,
- Improve energy security and,
- Curb carbon emissions

The availability of energy consumption data is imperative to perform the function of energy management. Energy management refers to the process of monitoring, controlling, and optimizing the use of energy with the primary goal of achieving improved energy efficiency, reducing energy consumption, and minimising energy costs while minimising environmental impact. Energy management begins with the collection of data on energy consumption and usage patterns. This often involves installing energy meters and sensors to measure electricity, natural gas, water, or other energy sources. Once data is collected, it is analysed to identify trends, patterns, and areas where energy efficiency improvements can be made. In addition, energy data collected over a minimum of 12 months is a basic requirement to acquire Energy Performance Certificates (EPC). On the 8th of December 2020 it became mandatory for accounting officers and building owners to display and submit an Energy Performance Certificate (EPC) for their building, with an effective end date of 07 December 2025.

Similarly, TP has adopted a Water Strategy which seeks to ensure continual reliable supplies for the workforce and promote good stewardship by being a water saving organisation. The Water Strategy is a proactive approach that ensures that the water, on which our quality of life depends, is managed to ensure its long-term sustainability, while providing for economic growth and development within the organisation.

The Water Strategy in addition provides a framework for the protection, use, development, conservation, management, and control of water (from all sources of water, i.e., supplied by a Water Services Institution, surface water and groundwater) within TP through water management strategies which define projects and activities to restore, sustain, and enhance water usage as Regulated by Water Acts and defined by the Transnet Water Policy. The National Smart Metering project is one of projects and activities identified by the strategy to develop a water usage profile and initiate water billings based on trends from live data.
The advanced metering infrastructure therefore remains the pivotal step for achieving this goal.

1.2.2 Project Overview:

The National Smart Metering Project will be carried out over three (3) phases with the current Scope of Works covering all phases of the project.

Table 1: National Smart Metering Project Phased Approach

	Commercial Portfolio				Residential Portfolio		EPC	Software System	
	Bulk Meters		Submeters		Bulk Meters		EPC	Online Data Platform	
	Electricity	Water	Electricity	Water	Electricity	Water	Electricity		
PHASE 1	120	50	673	673	28	14	25	Development, deployment Smart Meter integration	Energy = 846 Water = 737 Total = 1583
PHASE 2	100	50	260	260				Smart Meter integration	Energy = 360 Water = 310 Total = 670
PHASE 3	100	50	55	55				Smart Meter integration	Energy = 155 Water = 105 Total = 260
	320	150	988	988	28	14	25	2513	

Each phase correlates to a new financial year. The *Contractor* is required to ensure that the *works* carried out during Phase 1 allows for expansion to the next two (2) phases of the project.

The locations of installation of Smart Meters are spread nationally across five (5) regions:

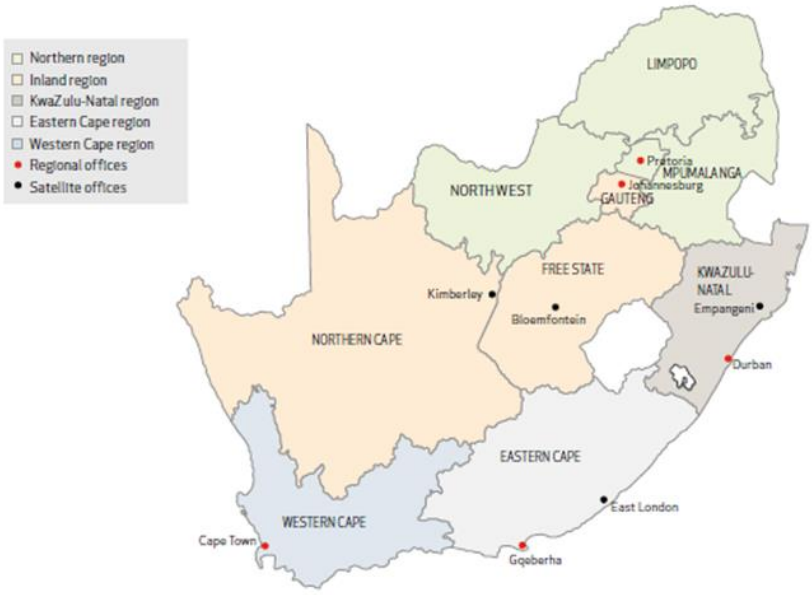

Figure 1: TP's Regional and National Footprint

Table 2: National Smart Metering System Phase 1

	Commercial				Residential		EPC
	Bulk Meters		Submeters		Bulk Meters		
	Electricity	Water	Electricity	Water	Electricity	Water	Electricity
KZN Region	20	10	83	83	6	3	2
Western Region	20	10	112	112	4	2	4
Inland Region	40	10	138	138	10	5	8
Northern Region	20	10	115	115	6	3	5
Eastern Region	20	10	225	225	2	1	6
Total	**120**	**50**	**673**	**673**	**28**	**14**	**25**

Phase 1 will cover the Top 10 commercial electricity and water accounts per region, 14 residential hostels and 25 EPC buildings.

Table 3: National Smart Metering System Phase 2

	Commercial			
	Bulk Meters		Submeters	
	Electricity	Water	Electricity	Water
KZN Region	20	10	36	36
Western Region	20	10	50	50
Inland Region	20	10	73	73
Northern Region	20	10	43	43
Eastern Region	20	10	58	58
Total	**100**	**50**	**260**	**260**

Phase 2 will cover the Top 11 to 20 commercial electricity and water accounts per region.

Table 4: National Smart Metering System Phase 3

	Commercial			
	Bulk Meters		Submeters	
	Electricity	Water	Electricity	Water
KZN Region	20	10	10	10
Western Region	20	10	7	7
Inland Region	20	10	20	20
Northern Region	20	10	0	0
Eastern Region	20	10	18	18
Total	**100**	**50**	**55**	**55**

Phase 3 will cover the Top 21 to 30 commercial electricity and water accounts per region.

The *Employer* shall provide SIM cards to the *Contractor* to enable GSM communication of the installed Smart Meters via the *Employer's* cellular network provider in accordance with the *Employer's* ICT policies.

1.2.3 The Scope of Works:

The *works* that the *Contractor* is to perform will be as follows and further detailed in the Works information:

- The *Contractor* shall be an integration of the following category:
  - Multidisciplinary professional team and his areas of responsibility as included in the Engineering Professions Act 2000, Published by the Engineering council of South Africa
- Consultation with respective local municipalities where meters will be installed prior to the designing and installation of the metering system,
- Surveying of the properties where the meters will be installed to ensure all requirements are taken into consideration to ensure the project is successful, including GSM coverage surveying,
- Site assessments for the installation of Electricity Smart Meters that provide meter voltage, current specifications,
- Site assessments for the installation of Water Smart Meters that provide meter sizing specifications,
- Removal and decommissioning of the existing meters to be replaced,

- Supplying, installing, testing, and commissioning of **348** Electricity Smart Meters (bulk/check meters) at each commercial point of delivery/consumption nationally,
- Supplying, installing, testing, and commissioning of **25** Electricity EPC Smart Meters at each commercial point of delivery/consumption nationally,
- Supplying, installing, testing, and commissioning of **164** Water Smart Meters (bulk/check meters) at each commercial point of delivery/consumption nationally,
- Supplying, installing, testing, and commissioning of **998** Electricity Smart Meters (submeters) at each commercial point of consumption nationally,
- Supplying, installing, testing, and commissioning of **998** Water Smart Meters (submeters) at each commercial point of consumption nationally,
- Supplying, installing, testing, and commissioning of **28** Electricity Smart Meters (bulk/check meters) at each residential point of consumption nationally,
- Supplying, installing, testing, and commissioning of **14** Water Smart Meters (bulk/check meters) at each residential point of consumption nationally,
- Perform accurate real-time water and electricity data reading, capturing, monitoring, and storage of the electricity and water Smart Meters at the installed on-site location,
- Integration of all Smart Meters with SIM cards that enables GSM communication authenticated to transmit data to a centralised Online Data Platform via a device manager,
- Develop and deploy a centralised Online Data Platform to capture, process and visualize the electricity and water smart meters' data,
- Authenticate and provision installed Smart Meter SIM cards to connect and communicate with the Online Data Platform.
- Perform data transmission of Electricity Smart Meter Four Quadrant measurements at 15-minute intervals:
    - Apparent Power Demand (kVA)
    - Active Power Demand (kW)
    - Reactive Power Demand (kVAR)
    - Power Factor (PF)
    - Apparent Energy Consumption (kVAh)
    - Active Energy Consumption (kWh)
    - Reactive Energy Consumption (kVARh)
- Perform data transmission of Electricity Smart Meter Power Quality at 15-minute intervals:

  - Total Harmonic Distortion (THD)
  - Harmonics (up to the 31st)
  - Unbalance

- Perform data transmission of Water Smart Meter measurements at 30-minute intervals:
  - Current water flow rate (m^3/h)
  - Water consumption (kl)
  - Water pressure (kPa)

- Provide data transmission of Smart Meter notifications required in the event of:
  - Tamper detection
  - Fault detection
  - Low Battery detection
  - Leakage detection

- Provide live and historical kVA, kWh, PF, kVAR, kVAh, kVARh and kWh energy statistics on the online platform,
- Provide live and historical m^3/h, kl, and kPa water statistics on the Online Data platform,
- Visualise energy and water data represented by concise graphs, tables, and charts on the online platform,
- Provide energy and water load/consumption profiles and trends on the online platform,
- Provide login credentials for end users to access online platform, view, edit, import and/or export data according to authorised system access.
- Provide national and regional management users management of the accounts linked to a manager user's profile.
- Provide customised display of national and regional metering data for Utility Managers and Utilities Administrators,
- Provide customised display of national and regional metering data for Finance Managers,
- Provide customised display of national and regional metering data for Energy & Sustainability Managers,
- Provide customised display of national and regional metering data for Data Analysts,
- Create database(s) of Utilities Accounts, Utility Suppliers tariff structures, Tenant Leases, SAP Cost Centres and derive their relationships with the Smart Meters,
- Provide electricity and water consumption information converted into cost (ZAR) using the relevant Utilities Supplier's tariff structure.

- Provide water and electricity Utilities Account bill verification using the relevant Utilities Supplier's tariff structure.
- Provide consumption and cost over a selected period for each utility, thus, day(s), week(s), month(s), year(s) with calendar plot.
- Provide interface between Utilities Manager dashboard and Finance Manager dashboard to send verified bills for payment.
- Provide interface between Utilities Manager dashboard and Finance Manager dashboard to send tenant billing for invoicing.
- Integrate Finance Manager dashboard with *Employer's* SAP system where Utility bills are paid, and tenant invoices are generated.
- Provide Smart Metering tamper detection alerts on the online platform and via provided cell phone numbers and email addresses.
- Provide Smart Metering fault detection alerts on the online platform and via provided cell phone numbers and email addresses.
- Provide Smart Metering fault detection logging on the online platform and SAP system.
- Provide Offline Meter alerts on the online platform and via provided cell phone numbers and email addresses.
- Provide Water Leak Detection alerts on the online platform and via provided cell phone numbers and email addresses.
- Provide Low Battery alerts for Water Smart Meters on the online platform and via provided cell phone numbers and email addresses.
- Provide event logging for activities performed and events triggered on the Online Data Platform.
- Provide Utilities Consumption forecast that can be used for budgeting purposes.

Execution of the works must occur simultaneously in each region. The site assessments and installation of meters must be undertaken on a site-by-site basis covering all smart water and electricity meters within each site. Testing and commissioning of each meter must be done upon installation of the metering design at the point of measurement to ensure the readiness of the smart meter for onboarding into the online data management platform.

The software development for the online data management platform must be completed within a maximum period of 6 months starting from the date of the contract to allow for a phased

"live" deployment of the Web-based front-end application. Provisioning and onboarding of smart meters to the online data management platform must be performed upon completion of the testing and commissioning for each meter provided that the platform features have been developed. Full deployment of the online data management platform must occur at the end of Phase 1. The software development works for Phase 2 and 3 then involves the onboarding of the remaining smart metering installations into the fully deployed online data management platform.

1.3 *Employer's* objectives

The *Employer's* objective is to appoint a competent and capable service provider for design, development, installation, testing and commissioning purposes i.e., to obtain a *Contractor* to undertake site surveys, engineering, project development with implementation plans, produce detailed designs for approval by the *Contractor's* professional personnel and accepted by the *Employer's* representative, compile the construction and final as-built drawings, front-end and back-end development of an Online Data Platform, produce detailed designs of the Online Platform for approval by the *Contractor's* professional personnel and accepted by the *Employer's* representative, implementation, and administration of the contract.

The *Contractor's* team must include but not limited to the following professional registered key personnel: engineering, information technology and project management.

2 Engineering and the *Contractor's* design

2.1 *Employer's* design

2.1.1 The *Employer*'s design for the *works* the following:

None

2.2 Parts of the *works* which the *Contractor* is to design.

The *Employer's* Concept of Operations document for the NSM system will be shared and discussed with the *Contractor* upon Letter of Award to indicate the envisioned system operation in accordance with the Scope of Works.

2.2.1 The *Contractor* is to design the following parts of the *works as* per paragraph 1.1 above:

<u>Hardware design:</u>

- Detailed Smart Metering system from the field to the point of interface with Transnet Server.
- Detailed drawing of each Smart Meter to be installed.

- Layout of the location of the Smart Meter(s) in each property
- Detailed hardware manuals
- Distribution board connection of electrical meters showing circuit breakers, CT's, VT's, etc.

All hardware designs shall be signed-off and approved by the competent discipline professional person.

Software design:

- Frontend dashboard development for the following national and regional end-user views:
  - Utilities Management
  - Finance Managers
  - Energy and Sustainability Managers
  - Data Analysts
- Backend analytics and calculations:
  - Costs associated with Utilities consumption and electricity demand using Utilities Suppliers tariff structures,
  - GHG emissions associated with energy consumption using coefficients from the latest UN Assessment Report (AR),
- Interface design between components, subcomponents, systems, and subsystems.

All software designs shall be signed-off and approved by representatives of the end-users and the competent discipline professional person.

2.2.2 Unless expressly stated to form part of the design responsibility of the *Employer* as stated under 2.1 *Employer's* design above and whether or not specifically stated to form part of the design responsibility of the *Contractor* under this paragraph 2.2, all residual design responsibility and overall responsibility for the total design solution for the *works* rests with the *Contractor*.

2.3 Procedure for submission and acceptance of *Contractor's* design

2.3.1 The *Contractor* shall address the following procedures for the installation of hardware in the National Smart Metering system:

a) Consultation with respective municipality

Prior to the design and installation, the *Contractor* must consult the respective municipality for alignment, support, tariffs, compatibility with existing infrastructure/meters, etc.

b) Verify the existing infrastructure on site.

The *Contractor* is to conduct the comprehensive site assessment prior designing to ensure that the designs are compatible with the infrastructure on site, e.g., property GPS coordinates and physical address, etc. It is imperative that the Contractor determines and verifies:

- Voltage and current requirements, whether it's a 3 or single phase, main switch rated current, etc. for the sites of Electricity Smart Meters installation.
- Meter sizes in accordance with the existing water pipe size for the sites of Water Smart Meters installation.

c) Verify the cellular network coverage on site.

The *Contractor* is required to conduct a comprehensive assessment of the cellular network coverage alongside the verification of existing infrastructure at each site of installation for all Smart Meters. In the event of no cellular coverage the *Contractor* must propose alternative communication methods for affected sites.

d) Installation of Smart Meters

Upon approval of the electrical smart meters and water smart meters installation design from the *Employer*, the *Contractor* shall undertake the on-site works of the Smart Meters installations. The *Contractor* must install the SIM cards provided by the *Employer's* Network Service Provider into each Smart Meter.

e) Testing and Commissioning

The *Contractor* must perform testing and commissioning of installed Smart Meters under the supervision of the *Employer's* representative who shall also sign-off the testing and commissioning documents.

f) 'As-Built' Records

The *Contractor* shall record all amendments and deviations from the drawings issued at the start of the Contract. This shall be done on a set of drawings especially issued for this purpose. These shall be handed to the *Employer* on the completion of Works. The Certificate of Completion will not be issued without this information having been submitted to the *Employer*.

2.3.2 The *Contractor* shall address the following procedures for the software design of the National Smart Metering system:

a) Configuration of a Device Manager to facilitate communication between Smart Meters and Online Data Platform

The end-to-end connectivity solution is envisaged to have; Subscriber Identification Module (SIM) Cards, Network Connectivity, Access Point Name (APN), Authentication, Billing, Security

and Management Portal provided by the *Employer's* Network Service Provider. The *Contractor* shall, in consultation with the *Employer's* ICT representative and Network Service Provider, provide Device Manager software offering a user-friendly and intuitive onboarding process that enables the addition, configuration of Smart Meter devices to the system and as such, provide OTA updates enable ICT administrators to push updates and patches to devices automatically. The Device Manager software should enable remote troubleshooting to reduce manual efforts and resolve user issues effectively. The Device Manager should enable ICT administrators to view and manage each Smart Meter's metadata, e.g., the serial number, make, model and current version of the firmware. The SIM cards connected to the Smart Meters require connection to and be authenticated to the Data Center which hosts the *Employer's* services. The Device Manager must provide access control, encryption, and authentication, to prevent data breaches and unauthorized access. The Device Manager must satisfy the ICT cybersecurity requirements in alignment with the *Employer's* ICT policies.

Upon installation of hardware for the Smart Metering infrastructure, the Contractor must provision and authenticate the SIM cards to communicate with the Online Data Platform.

b) Online Data Platform Back-end Development

Representatives from the *Employer's* end-user groups shall provide the *Contractor* with information relevant to the back-end databases and calculations required. The databases are:

- Utilities Accounts
- Utilities Suppliers and tariff structures
- Tenant Lease Agreements
- SAP Cost Centres

The *Contractor* shall create grouping and subgrouping of Smart Meters to link:

- Submeters with their Bulk Meters
- Bulk Meters with their Utilities Account
- SAP Cost Centres with their Utilities Account
- Submeters with their Tenant Lease Agreement

The *Contractor* is required to provide the *Employer* with the:

- Data Platform Logical Architecture establishing the structure of data elements and the relationships among them.
- Data Platform Physical Architecture indicating different layers or components incorporated into the management of the data that must cover Data Ingestion, Data Storage, Data Processing, User Interface, and Data Pipeline Layers

- Data Platform Taxonomy detailing the hierarchy of categories and subcategories that can be used to classify and organise data consistently and logically.

Design and implementation information created by the *Contractor*, such as system or software architecture diagrams or documents, design specifications, call flow graphs, modelling diagrams, interface specifications, or similar work products that specify component or system structure must be provided to the *Employer*.

c) Consultation with end-users to verify understanding of Dashboard Views Required

The *Contractor* is required to provide Concept Designs of Dashboard Views to the *Project Manager* and representatives of End-User groups to verify that all requirements are clearly and unambiguously understood prior to development activities. All calculations and data used to perform data analysis must be verified with the *Project Manager* and representatives of End-User groups for correctness.

d) Testing Throughout the Software Development Lifecycle

The *Contractor* is required to implement a combination of the V-model and Agile software development approach to integrate the test process throughout the development process and implement the principle of early testing while ensuring collaboration and communication between the *Contractor* and the *Employer*. System testing should focus on the overall, end-to-end behaviour of the system as a whole, both functional and non-functional. Acceptance testing to assess the system readiness for deployment and use by the end-users must involve:

- User Acceptance testing (UAT)
- Operational Acceptance testing (OAT)
- Contractual Acceptance testing
- Alpha and beta testing

Testing and Commissioning of the software must be performed by an ISTQB Certified Tester.

2.3.3 The *Contractor* undertakes and is responsible for design safety reviews.

2.3.4 Documentation Submission

Each drawing and document shall be identified with the following information:

- Project Name and Number
- Contract Number or Purchase Order Number
- Equipment Tag Number (s) (if applicable)
- Official Name of the *Contractor*'s Company
- Project Document or Drawing Number

- Electronic File Name (identical to the *Employer*'s Document or Drawing Number and not the *Contractor*'s Document or Drawing Number)
- Identification and Signature of the Originator, checker, Approver, PR Eng, etc.
- Complete Descriptive Title
- Revision

2.4 Review and Acceptance of *Contractor* Documentation

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

2.5 Other requirements of the *Contractor's* design

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 guarantee in the intellectual property and copyright in the design data created in relation to the *works*.

2.7 Design of Equipment

2.8 Equipment required to be included in the *works.*

2.9 As-built drawings, operating manuals, and maintenance schedules

2.9.1 The *Contractor* provides the following:

'As-Built' Records:

- The *Contractor* shall record all amendments and deviations from the drawings issued at the start of the Contract. This shall be done on a set of drawings especially issued for this purpose.
- The *Contractor* shall submit all operating schedules and maintenance manuals and installed product guarantees at the end of the Contract.

3 Construction

3.1 Temporary *Works*, Site services & construction constraints

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

The contractor will be required to install meters in various properties nationally and the *Contractor* shall always ensure the safety is adhered to at all times. This shall entail the provision of protective barriers, lanterns, signs, etc. for protection, direction, and control of traffic.

The *Contractor* shall organise the work to cause the least possible inconvenience to the tenants and other activities or operations within the properties. Access for Others to adjacent areas shall always be maintained.

The *Contractor* shall obtain the necessary entry permits for all staff working within the area in accordance with the access control requirements of the *Employer* and shall issue each personnel member with an appropriate identification card.

Identification cards shall be made by the *Contractor* to a standard acceptable to the *Project Manager* and shall include at least the following information:

- Company Name and Logo
- Employee Name and ID Number
- Date of Issue and period of Validity
- Company Details
- Telephone Number
- Fax Number
- E-mail address

All costs incurred in providing construction personnel with ID cards and access permits shall be borne by the *Contractor*.

The site establishment area shall be clearly site posted and compliant with the relevant safety regulations and restrictions that might be in place until the *Contractor* has de-established from site.

The *Contractor* is responsible for the security of the works until completion and hand-over and must make his own arrangements security and the safekeeping of his property. The *Contractor*'s watchmen are allowed on Site for this purpose.

If the working area is situated within the Customs controlled area, the *Contractor* and his people shall observe all Customs regulations within the operations area.

The fullest collaboration between the *Contractor*, the Facilities Managers, Utilities & Energy team, and the *Project Manager* is essential regarding the working of the operations area.

Housing of the *Contractor*'s people on site is not permitted.

All work on, over, under or adjacent to railway lines and near high voltage equipment shall comply with Transnet Specifications.

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

As per paragraph 3.1.1 above.

3.1.3 People restrictions on Site; hours of work, conduct and records:

The working hours shall be in accordance with the requirements of the Department of Labour or with agreement of the relevant trade unions. This information relating to working hours shall be supplied to the *Project Manager* prior to commencement of the proposed working hours.

The *Contractor*'s staff shall be confined to the working area and defined access routes. Staff found disobeying these instructions will be subjected to disciplinary action.

The *Contractor* shall keep daily records of his people engaged on the site and *Working Areas* (including Sub-*Contractor*s) with access to such daily records available for inspection by the *Project Manager* at all reasonable times.

3.1.4 Health and safety facilities on Site

At all times during installation, assembly, and testing of the equipment the *Contractor* is responsible for the safety all persons on site and on the equipment and a shall have the necessary system and procedures in place to effectively manage this in full accordance with paragraph 6.3.

3.1.5 Environmental controls, fauna & flora, dealing with objects of historical interest.

The *Contractor* shall perform the works and all construction activities within the Site and *Working Areas* having due regard for the environment and environmental management practices. All work shall comply with the requirements of paragraph 6.4.

Under no circumstance shall spoil, rubble, materials, equipment, or unfinished operations be allowed to accumulate unnecessarily.

All discarded/spoiled materials shall be disposed of at an approved dumpsite and the *Contractor* shall furnish the *Project Manager* with receipts and disposal certificates from a legal dumpsite.

It will be the *Contractor*'s responsibility to ensure that the area he/she is working in is kept neat, clean, and tidy at all times and that no health or safety hazards are created.

The *Contractor* shall make good all damages to the environment to the satisfaction of the *Project Manager*.

3.1.6 Title to Materials from demolition and excavation

All redundant plant and material removed from the existing building will remain the property of the *Employer* and will be disposed of by the *Employer*.

3.1.7 Cooperating with and obtaining acceptance of others

During the course of the contract, departments of the *Employer* and other *Contractors* may be working in the general area surrounding the Working Area. The *Contractor* must make allowance for the necessity to interface with the activities of Others, and to allow for safe access and working conditions.

The success of the project depends on the effective co-operation of all *Contractor*s on site and the *Contractor*, if necessary, must discuss his program on a day-to-day basis with the *Project Manager* to ensure effective co-ordination.

3.1.8 Publicity and progress photographs

The *Contractor* shall obtain the permission and approval of the *Employer* before erecting any notice boards or using the details of the contract in any advertising media.

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*.

3.1.9 *Contractor's* Equipment

All Equipment supplied and used by the *Contractor* on Site shall be selected and operated in such a way that design loadings of the particular areas ae not exceeded and that damages to all existing surfaces and services are avoided. The *Contractor* will be required to repair, at his own cost and to the satisfaction of the *Project Manager*, any such damages caused by him.

The *Contractor* shall keep daily records of his Equipment used on site and *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.

3.1.10 Equipment provided by the *Employer.*

No Equipment will be provided by the *Employer*.

3.1.11 Site services and facilities:

When required in terms of the delivery methodology, a Site will be made available to the *Contractor* as erection Site and for all his *Working Areas*. This working area will only be available to the *Contractor* from the date indicated on the Programme.

The *Contractor* shall make his own arrangement for the supply of electricity when working on site.

The *Contractor* must make available potable water for consumption and make provision for construction water from appropriate licenced water bodies. The *Contractor* will be required to submit proof of the appropriate licensing of water sources.

The *Contractor* shall make his/her own arrangement for the supply of other services such as ablution facilities, fire protection, lighting, and all other services required to undertaking the works. The *Contractor* shall provide, maintain, and finally remove, proper portable latrines of sufficient number at his own cost. Latrines shall be properly constructed and placed in suitable positions and maintained in a clean and sanitary working condition.

Whenever the *Employer* provides facilities for the *Contractor*'s use within the *Working Areas* and the *Contractor* adapts such facilities for use, then the *Contractor* shall make good and provides full reinstatement to the land (including all apparatus of the *Employer* and Others in, on or under the land) and surrounding areas to its original standard upon dismantling of such facilities and hand-back to the *Employer*.

3.1.12 Facilities provided by the *Contractor:*

The *Contractor* shall provide necessary site offices, storage, and other associated facilities as required by him to complete the works effectively and efficiently.

Establishment of the working area, fencing and other work required to make the working are fit for use is entirely the *Contractor*'s responsibility.

The *Contractor* must ensure that the working area is well lit at night and that all fences, obstacles, and hazards are marked.

Project Manager's approval must be obtained for the use of any temporary lighting on site due to the impact that this may have on road and rail traffic in the interface with the surrounding properties.

The *Contractor* must maintain the working area in a neat and tidy condition to the satisfaction of the *Project Manager*.

The *Contractor* must make his own arrangements for the disposal of the sewage and wastewater. Sewage may not be wasted on site. Transnet Facilities may not be used.

The *Contractor* must make his own arrangement for telecommunication facilities, if required, for his use during the execution of the works.

The *Contractor*, within fourteen days after completion, must completely remove from site all his plant, materials, Equipment, stores and temporary accommodation or any other asset belonging to him and leaves the site in a tidy condition to the satisfaction of the *Project Manager*. No excess or discarded materials, plant or stores may be buried or dumped within the precinct.

Unless expressly stated as a responsibility of the *Employer* as stated under 3.1.11. Site services and facilities, all residual requirements for the provision of facilities and all items of the Equipment necessary for the *Contractor* to provide remains the responsibility of the *Contractor*.

Wherever the *Contractor* provides facilities (either his own or for the *Project Manager* and/or *Supervisor*) and all items of Equipment, involving, *inter alia*, offices, accommodation, laboratories, Materials storage, compound areas etc, within the *Working Areas*, then the *Contractor* makes good and provides full reinstatement to the land (including all apparatus of the *Employer* and Others in, on or under the land) and surrounding areas to its original standard, upon dismantling of such facilities and items of Equipment.

3.1.13 Existing premises, inspection of adjoining properties and checking work of Others.

The *Contractor* will be held responsible for any damage to existing structures and services caused by him during the execution of this Contract, fair wear and tear excluded, and shall repair damage to the satisfaction of the *Project Manager* before completion of works.

For this purpose, a joint inspection with the *Project Manager* will be carried out prior to occupation of the works and any existing damage noted. Repair works to damaged existing structures and services may be carried out during the contract period or during the defect correction period of authorised. The *Contractor* may be required to conduct a photographic site survey of the occupied area showing existing structures and services This report must be submitted to the *Project Manager* for approval and will be used in assessing the damages to the structures and services if applicable.

3.1.14 Survey control and setting out of the *works.*

Immediately after the starting date, and prior to final design, the *Contractor* shall survey the buildings, existing capacity for bulk wet services, electrical supply, etc. This survey serves to confirm dimensions and relative positions of all infrastructure, existing or to be supplied by Others, that will interface with the *Contractor*'s designs and installations. It is the *Contractor*'s responsibility to ensure that the equipment supplied in terms of the contract interfaces successfully with the existing things.

Any deviation from the data supplied by the *Employer* in the Works Information must be brought to the attention of the *Project Manager* and discussed and finalised with the *Project Manager* prior to final design of the equipment.

3.1.15 Excavations and associated water control

Excavation and backfilling of in the residential and commercial areas shall be done in such a way as to ensure the least possible disruption to the public and entrances to properties.

3.1.16 Underground services, other existing services, cable, and pipe trenches and covers.

In the absence of the As-Built drawings, the *Contractor* is required to provide detectors and spotters on site to probe for any hidden services prior to any excavation on site. Where there is a high possibility of existing services being disturbed, at his professional discretion, the *Contractor* shall use hand excavations.

3.1.17 Control of noise, dust, water, and waste

All site activities must comply with the relevant parts of the *Employer*'s construction Environmental Management Plan.

3.1.18 Sequences of construction or installation

All work shall be staged and planned to best meet the sectional and/or final completion dates as stipulated in the Contract Data, while making optimal use of the available *Working Areas*.

3.1.19 Giving notice of work to be covered up.

As per Quality Management Procedure **(Section 6.5)**

3.1.20 Hook ups to existing *works*

Not applicable

3.2 Completion, testing, commissioning, and correction of Defects

3.2.1 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 all incidental work and services 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.

3.2.2 Commissioning

A complete and detailed Test Inspection Plan (TIP) for testing of pre-assembled modules, as well as the commissioning of the complete work, shall be submitted by the *Contractor* for approval by the *Project Manager*, two months before the start of testing and/or commissioning. The TIP shall list all tests and inspections deemed necessary by the *Contractor* to prove to the *Employer*'s satisfaction that the equipment complies with the Works Information and must include the following:

- Verification certification for the connections and CT/VT ratios for all meters.
- Location of meters in applicable reticulation diagrams.
- An infrared photo of the installation and colour photo of each meter are required.

- Comprehensive commissioning file including drawings showing the location of meters in the reticulation diagram, CT ratios and summation details shall be supplied.
- Design and implementation information created by the *Contractor*, such as system or software architecture diagrams or documents, design specifications, call flow graphs, modelling diagrams, interface specifications, or similar work products that specify component or system structure.

- The following must be supplied on commissioning:
  - Electrical Certificate of Compliance (CoC)
  - Performance test
  - Certification of Calibration
  - Electrical schematic drawings for all components
  - Operational and maintenance instruction and schedule for all components supplied.
  - Parts catalogue
  - Operator and maintenance staff training for less than three people.
  - All required Smart Meter software (Soft copies).
  - Software test work products created as part of the test process including test plans, analysis, design, implementation, and reports.

The *Contractor* will be required to show practically and analytically that the installations and their controls can repeat the duty cycle continuously at rated capacity, without breaking down.

Modules assembled off site shall be trial assembled as fully tested as far as practical and be accepted by the *Supervisor* prior to delivery to site. All tests performed off site shall be repeated as part of commissioning once the work has been completed at site.

Before issuing the Request for Inspection (RFI) to the *Supervisor*, the *Contractor* shall satisfy himself that the work is complete in all respects and shall carry out his own upfront tests of the equipment. During this period the *Supervisor* may carry out the visual inspection of the work. After receipt of the RFI, the *Supervisor* will conduct the full inspection of the work and issue his inspection report with punch list as applicable. If any part of the work is rejected during his inspection, it shall be repaired or replaced to the satisfaction of the *Project Manager*. It will then be subjected to another inspection by the *Supervisor*.

After all nut minor defects on the *Supervisor*'s punch list have been corrected and the TIP has been approved by the *Project Manager*, the *Project Manager* will issue a Mechanical Completion (MC) Certificate to the *Contractor*.

After receipt of the MC, the *Contractor* shall fully test the equipment in the presence of the *Supervisor* and Engineer according to the approved TIP. These tests shall not commence until all works has been completed which is essential for safe operation of the equipment.

During these tests, the equipment must perform all its functions and operate throughout the range it was designed for. As far as practical, the equipment shall be fully tested prior to it being moved into the operational area.

Before the commencement of any tests the *Contractor* shall provide the initial fill of diesel, oil, grease, etc. for components which requires such.
All simulation devices required shall be provided by the *Contractor*.

3.2.3 Putting works into operation (acceptance testing)

On completion of commissioning but before the start of acceptance testing, the *Contractor* shall supply triplicate, the performance test certificates and conformance certificates that the equipment is in complete working order and safe for use. Where required by law, these certificates shall be issued by local authorities.

Once satisfied that all required certificates have been supplied and that commissioning has been concluded successfully, the *Project Manager* will issue the Take-Over and Care (TC) Certificate.

After Receipt of the TC, the equipment shall be moved into the operational area and be subjected to acceptance testing i.e., actual live operation of the equipment.

During acceptance testing the equipment will be operated by the *Employer*s operators, but the *Contractor* shall provide at his own cost the personnel and all equipment necessary for the acceptance testing, including sufficient number of suitably qualified people to assist the *Employer*'s operators for the duration of acceptance testing.

3.2.4 Take over procedures.

Once satisfied that the acceptance testing has been concluded successfully, the *Project Manager* will issue the Take-Over, Care and Control (TCC) which signifies take-over of the particular part of the works as per clause 35.3 of the contract.

The *Contractor* ensure that the documentation as described under of the Works Information is presented to the *Project Manager* four (4) weeks after take-over.

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 include plant within the works) to present to the *Employer*.

The *Contractor* ensures that the *Project Manager* has a full and accurate dossier of Maintenance and Operating Manuals at the earlier of take-over or Completion.

Where the *Contractor* has presented Maintenance and Operating Manuals to the *Project Manager* at take-over, the *Contractor* modifies and updates As-Built documents as necessary prior to Completion.

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

The *Contractor* complies with the following constraints and procedures of the *Employer* where the *Project Manager* arranges access for the *Contractor* after Completion:

As per paragraph 3.2.1 above

3.2.6 Performance tests after Completion

Where acceptance tests as per paragraph 3.2.3 cannot take place before Completion due to operational constraints or other failure on the part of the *Employer*, the *Project Manager* may agree that these tests be performed after Completion.

3.2.7 Training and technology transfer

Effective maintenance personnel training is critical to the long-term performance of the equipment and plant. The *Contractor* will assist the *Employer* in organising the training sessions by identifying the appropriate staff for each session and creating an overall training plan.

For each training session, the *Contractor* is to provide a detailed agenda for each piece of equipment or system for which training is required. The agenda describes the scope, duration, and method statements along with the name and qualifications of the trainers. The *Contractor* develops the plan for including in the training session *Contractor*s/trainers from different disciplines, when appropriate. The trainer documents each training session (duration, general subjects covered, and attendees).

4 Plant and Materials Standards and Workmanship

4.1 Investigation, Survey and Site Clearance

4.1.1 The provision of all services described this Works Information document:

Guideline for defining the Scope of services and for determining the Professional Fees for Persons Registered in terms of the Engineering Professional Act, 2000 (Act 46 of 2000) as amended upon in the project brief below:

- Engage with the *Employer's* representative to establish and confirm the interfacing of the field equipment outputs with the Transnet Server.

- Assess the current status quo of the buildings and utilities supply.
- Verify the required Smart Meter voltage application per Electricity Smart Meter site of installation.
- Assess the sites of installation for Water Smart Meters and provide required meter size per site.
- Assess the current status quo of the cellular network coverage at the installation sites.
- Produce relevant documentation for implementation phase.
- Attend all site meetings, project meetings, design coordination meetings and relevant client meetings.
- Prepare commissioning, pre-commissioning and handover reports.

4.2 Building works

Not applicable

4.3 Civil Engineering and Structural Works

The *Contractor* must take care that no unnecessary damage is caused to Civil- i.e, roads, pavements, etc. and Structures – i.e., buildings, concrete, carports, etc. during installations nearby buildings.

Where it becomes necessary to cut Civil or Structural elements, the permission of the Project Manager shall be obtained in writing. The *Contractor* will be held responsible for any damage to a Civil or Structural infrastructure due to unauthorised works.

The Contractor shall take care that all authorised materials which are to be built in, are firmly fixed in position and that disturbed infrastracture is reinstated to its original form.

4.4 Electrical & Mechanical engineering works

- The *Contractor* procuring the machine or material shall ensure that the information below is complied with. The information or requirement is binding and must be supplied by the *Contractor* in consultation with the *Employer* and must ensure that mutual agreement is reached between the two parties (the *Contractor* and the *Employer*) before the supply of the equipment or material.
- The works entails designing, supplying, installing, testing, and commissioning of the online National Smart Metering system for the electricity and water at various commercial and residential buildings owned by the *Employer* nationally (South Africa).
- The *Contractor* shall depict the position of the meters and connection on the single line schematic drawings (where available).

- The *Contractor* shall provide the detailed verification method to be utilised to ensure the system is reliable and accurate.
- The *Employer* reserves the right to cancel the contract if it appears after award that the system is not performing as per requirements.
- The verification shall include detailed calculations where virtual summations are done, justifying reliability of the method.
- The *Contractor* shall guarantee that the rating and size, etc. of the equipment offered will be adequate to perform the duties required.
- The equipment shall be offered complete in all respects, including standard components normally offered by the manufacturers, all of which shall be specified in detail.
- The equipment as made and supplied shall be complete in every respect of modern design using the most advanced proven technology extensively supported by reputable local companies and built to good engineering practices.
- The *Contractor* shall supply a list of all main components (mechanical and electrical, etc.) proposed as well as the addresses of the local support companies.
- All parts and components shall be adequately protected against damage and corrosion during shipping, transport, and storage.
- Where meters are daisy chained, a clear charging system shall be provided.
- The *Contractor* shall check all installations for possible over burden to existing CT's and VT's and based on likelihood supply and fit dedicated CT's and VT's to maximize meter accuracy. For these, a separate quote shall be submitted to the *Project Manager* prior to implementation.
- The *Contractor* shall check the correctness of the existing installations in terms of wire sizes, polarities, and ratios.

4.5 Software Development Works

4.5.1 The *Contractor* is required to undertake software development activities to ingest, consolidate and analyse Utilities consumption data, both electricity and water, from the on-site Smart Meters on a national Online Data Platform.

- **Use Device Manager software to facilitate communication between the Smart Meters and the Online Data Platform.**
  - The *Contractor* shall ensure that each Smart Meter SIM card provided by the *Employer's* Network Service Provider is securely authenticated to transmit data to the Online

Platform via fixed IP addresses connection to the *Employer's* APN in alignment with the *Employer's* ICT policies.

- Server must run on Virtual Environment; server specifications and application must be provided for configurations by the *Employer*.
- The Device Manager shall provide access control, encryption, and authentication, to prevent data breaches and unauthorized access.
- The Device Manager shall offer a user-friendly and intuitive onboarding process that enables the addition, configuration of Smart Meter devices to the system and as such, provide OTA updates enable authorised personnel to push updates and patches to devices automatically.

- **Uniquely identify Smart Meters and link identity to site location**
  - The *Contractor* is required to maintain a database of installed Smart Meters with their unique SIM card ID code/number and details e.g., property GPS coordinates and physical address, existing water pipe size, whether it's a 3 or single phase, main switch rated current, etc. that can be viewed via the Online Platform.

- **Design customised dashboards to meet the requirements of End-Users.**
  - The *Contractor* shall consult with representatives from each of the *Employer's* end-user group to perform front-end development of the Online Data Platform to provide the end-users with the required User Interfaces. The end-user groups are:
    - Utilities Management
    - Finance Managers
    - Energy and Sustainability Managers
    - Data Analysts

- **Provide authorised login credentials for End-Users.**
  - The *Contractor* shall ensure that any and all access to the Online Data Platform is controlled using authenticated login credentials.
  - Customised access to the Online Data Platform shall be provided using the end-user's login credentials according to their user group and area jurisdiction (national or regional).
  - National and regional management users shall be provided with management control of the accounts linked to a manager user's profile.

- **Smart Meters Data Ingestion and Processing**
  - Electricity Smart Meters, including both Bulk Meters and Submeters, shall ingest four quadrant power and energy data transmitted at 15-minute intervals:

- Apparent Power Demand (kVA)
- Active Power Demand (kW)
- Reactive Power Demand (kVAR)
- Power Factor (PF)
- Apparent Energy Consumption (kVAh)
- Active Energy Consumption (kWh)
- Reactive Energy Consumption (kVARh)

- Water Smart Meters, including both Bulk Meters and Submeters, shall ingest water data transmitted at hourly intervals:
  - Current water flow rate (m3/h)
  - Water consumption (kl)
  - Water pressure (kPa)
- The Online Data Platform must provide Utilities consumption and cost for each Smart Meter over a selected period for each utility, thus, day(s), week(s), month(s), year(s) with calendar plot.
- The Online Data Platform shall receive alerts from installed Smart Meters and provide alert notifications via the Online Data Platform as well as cell phone numbers and email addresses provided by the *Employer* in the event of:
  - Tamper detection
  - Offline Meter
  - Fault detection
  - Leakage detection (Water Smart Meters only)
  - Low Battery (Water Smart Meters only)
- All alerts shall be recorded and tracked via an event logger provided by the Online Data Platform where Utilities Management personnel can record updates on the resolution of the alerts.

- **Link Bulk Smart Meters with their associated Utility Suppliers Account number**
  - The *Contractor* shall be supported by the *Employer's* Utility Management personnel to perform the exercise of creating a database of Utility Accounts that correspond to the Bulk Smart Meters at their Point of Delivery from which Utilities Suppliers bill the *Employer* for consumption.
  - The Utility account details include, but are not limited to:
    - Utilities Supplier,
    - Utilities Account number,
    - Applicable tariff structure and their billable line items,
    - *Employer's* cost center number from which account is paid.

- **Link Submeters with their associated Bulk Meters**
  - The *Contractor* shall be supported by *Employer's* Utility Management personnel to perform the exercise of creating a database of Lease Agreements that correspond to the Submeter at the Point of Supply from which tenants will be billed for their Utilities consumption.
  - Each Submeter shall be linked with their corresponding Bulk Meter Utilities Account details for verification of tenant invoicing (allocation of Utilities Account cost associated with their consumption) and Utilities recovery management.

- **Provide Utilities Account Invoices Bill Verification Capability**
  - The *Contractor* is required to provide the capability to verify consumption billing of invoices received from Utilities Suppliers for each Account on the Utilities Management User Interface.
  - Utilities management personnel performing this function must be allowed to specify invoice billing period over a selected period for each utility, thus, day(s), week(s), month(s), year(s) using consumption recorded by the Account's Bulk Meter.
  - Utilities management personnel must have the capability of loading Utilities Account Invoices by:
    - importing Microsoft excel files detailing itemised billing, and/or
    - automated generation of tariff structure line items where cost associated can be inputted to the Online Platform.
  - Utilities management personnel must have the capability of manually adding irregular billed items not typically included in the tariff structure, e.g., interest, deposits.
  - Each billed item on the invoices must be verified via back-end calculations where discrepancies must be flagged for dispute with the Utilities Suppliers.
  - In the event of a dispute, average payment of the invoice must be calculated to be sent to Finance Managers.
  - Disputes must be logged and tracked on the Online Data Platform.
  - In the absence of flagged disputes, the Online Data Platform must allow verified bills to be sent to Finance Managers.

- **Provide Tenant Consumption Allocation Billing Capability**
  - The *Contractor* is required to provide the Utilities Management User Interface the capability to bill tenants with their consumption costs over a selected period for each utility, thus, day(s), week(s), month(s), year(s) using the consumption data recorded by the tenant's Submeter on the Online Platform.

- The Online Data Platform must allow tenant billing allocation cost to be sent to Finance Managers User Interface.
- The *Contractor* shall provide the capability to reconsolidate tenant billing upon receipt of the linked Account invoice for the selected period in the event of discrepancies.

- **Integration of the Employer's SAP system with the Online Platform**
  - The *Contractor* shall provide Finance Managers with the capability to send verified Utility invoices to the *Employer's* SAP system where payments can be actioned.
  - Finance Managers must also be provided with the capability to record payments made for each account on the Online Platform for reporting purposes.
  - The *Contractor* shall provide the User Interface for Finance Managers with the capability to send tenant billing allocations to the *Employer's* SAP system where invoices can be generated.
  - The User Interface for Finance Managers must also be provided with the capability to record payments received for each tenant/lease on the Online Platform for reporting purposes.

- **Provide historical and live Smart Meter data logging and visualisation.**
  - The *Contractor* must provide visualised historical data transmitted for each Smart Meter over a selected period for each utility, thus, day(s), week(s), month(s), year(s) with calendar plot via profile graphs, tables, etc., on the Online Data Platform.
  - The Online Data Platform must provide live data views for each Smart Meter.
  - The Online Data Platform must provide the capability for end-users to perform remote downloading and exporting of data from the Smart Meters over a selected period for each utility, thus, day(s), week(s), month(s), year(s) with calendar plot.
  - Profile data in graphical form with date and time stamps refreshed in 15-minute intervals.
  - Profile graphs shall display the following information for electricity consumption:
    - Electricity consumption (kWh)
    - Power demand
    - Time-of-use patterns of specific TOU tariffs
    - Phasor Diagrams, displaying the Voltage (V), Current (A) and energy consumption (kWh) going through each individual phase at any specific given time.
    - Power factor calculator indicating Rand value savings if Power Factor had been in accordance with Utilities Supplier required Power Factor.
  - Profile graphs shall display the following information for water consumption:
    - Water consumption (kl)

- Maximum Demand (kl)
- Average consumption per day (l)
- Predicted consumption per months (kl)

- **Provide Smart Metering Data Analysis**

  The *Contractor* must consult with the *Employer's* Data Analysts to provide required calculations and subsequent views of analysed data according to consumption, expenditure and carbon emissions that is both visualised on the Online Platform and downloadable for reporting purposes.

- **Provide Event Logger for Online Platform**

  The *Contractor* is required to log events performed by the Online Data Platform including, but not limited to:

  - Smart Meter Alert/Alarm notifications
  - The Utilities Invoice Billing Verification process
  - The Tenant Consumption Billing Allocation process

4.5.2 **Technical Requirements**

The following regulations and standards shall be complied with:

- Occupational Health and Safety Act, Act No. 85 of 1993
- SANS 10142-1: The wiring of premises: Low voltage installations
- SANS 10142-2: The wiring of premises: Medium Voltage installation above 1 kV AC not exceeding 22 kV AC and up to and including 3000 kW installed capacity.
- NRS 000-2: NRS definitions Part 2: Electricity Pricing
- NRS 029: Current Transformers (CT's)
- NRS 042: Guide for the protection of the electronic equipment against damaging transients.
- NRS 048: Electricity supply – quality of supply part 2: Voltage characteristics, compatibility levels, limits, and assessment methods.
- NRS 048-9: Electricity supply – quality for supply part 9: Load reduction practices, system restoration practices, and critical load and essential load requirements under system emergencies.
- SANS 474/NRS 057: Code of practice for electricity metering
- SANS 62052-11/IEC 62052-11: Electricity metering equipment (s) – General requirements, tests, and test conditions – Part 11: Metering equipment.
- NRS 049: Advanced metering infrastructure (AMI) for residential and commercial customers.

4.5.3 **12 Months Maintenance Period**

- The successful bidder shall provide 12 months planned and corrective maintenance to the installation, free of charge, after date of Practical Completion during the guarantee period.
- Maintenance is to be carried out according to a pre-programmed schedule by competent maintenance personnel. All parts required to be furnished free of charge except where proof has been submitted that the failure of such parts or components are due to negligence, misuse, or accidents. The Project Manager may require additional examinations or action to rectify faults should he deem it necessary.
- Maintenance and repairs are to be carried out during normal working hours. In addition, the Contractor is to provide a call-out service 24 hrs/day, 7 days/week. The maximum response time for breakdowns is not to exceed 2 hours.
- The Contractor shall provide the list of critical spare parts for the equipment.
- Provide operating manuals, maintenance manuals, keys, and passwords for the controllers to the Project Manager upon handover.

4.5.4 **Ongoing Maintenance**

- The Contractor is to submit a price with their tender for ongoing maintenance of the installation after expiry of the 12-month guarantee period, is to apply.

5 List Of Drawings

5.1 Drawings issued by the *Employer.*

Not Applicable

SECTION 2

6 Management and start-up

6.1 Management meetings

6.1.1 The *Contractor* shall hold regular design review meetings with the *Project Manager* during the initial phase planning and design phase of the contract. The *Contractor* shall attend management meetings at the Project Manager's request. It is envisaged that at least 1 monthly contract management meeting, plus weekly site meetings will be held. The *Contractor* will also be required to attend safety meeting once a month. The *Contractor* will also attend risk kick off meeting and a close-out meeting. The *Contractor* will be required to present all relevant information including Quality plans, schedules, progress reports, subcontractor management details, and health, security, environmental and safety issues at each meeting.

6.1.2 The *Contractor* shall attend risk reduction meetings as and when called by the *Project Manager*.

6.1.3 Other meetings of a specialist nature may be conveyed by persons and at times and locations to suite Parties, the nature and progress of the *Works*. Records of these meetings shall be submitted to the *Project Manager* by persons conveying the meeting within five days of the meeting.

6.1.4 All meetings shall be recorded using minutes or a register prepared and circulated by the person who conveyed the meeting. Such minutes of register shall not be used for the purpose of confirming actions or instructions under the contract as they shall be done separately by the person identified in the conditions of contract to carry out such actions or instructions.

6.2 Documentation Control

6.2.1 The *Contractor* shall submit all documentation (including correspondence and drawings) to the *Employer* and to the *Project Manager's* requirements in accordance with the *Project Manager's* document control procedure.

6.2.2 The *Contractor's* documentation shall be issued to the *Project Manager* under cover of the *Contractor's* Transmittal Note Indicating all Contract references (Project No., Contract No., etc.) as well as the *Contractor's* Project Document Number, Revision Number, Title, Chronological listing of transmitted documentation.

Formats of Contractor data submitted is dependent on the project procedure and content and shall be specified by the *Project Manager*, upon the notified request of the *Contractor* i.e.

- Both Adobe Acrobat (.pdf) and native files
- Only a native file
- Only a hard copy
- Only a.pdf file

6.2.3 The *Contractor* shall deliver both hardcopies and electronic copies (CD Rom) to the *Project Manager* at the address stated within the Contract Data.

6.2.4 The documentation to be submitted for reviews shall be submitted on or before the dates specified in the Documentation Register under cover of the *Contractor's* Transmittal Note, and the Transmittal Note must state the purpose of the submission. Documentation for different purposes must be sent on separate transmittals. The *Contractor* shall note that documentation will be rejected if this requirement is not met.

6.2.5 Acceptance of the documentation by the *Project Manager* will in no way relieve the *Contractor* of his responsibility of the correctness of information, or conformance with his obligation to provide the *Works*. This obligation rests solely with the *Contractor*.

6.2.6 After review, a copy of the original reviewed/marked up drawing/document, with the *Project Manager's* consolidated comments and document status marked on the *Contractor* Review Label, is scanned and the hard copy shall be return to the *Contractor* under cover of the *Project Manager's* Transmittal Note for revision or resubmittal as instructed.

6.2.7 The code resulting from the reviews is as follows:

- Code C1 – "Proceed, No Exception Taken"
- Code C2 – "Proceed, with Exception as Noted, Revise and Resubmit"
- Code C3 – "Do no Proceed, Revise as Noted and Resubmit".
- Code C4 – "Information Only – Accepted as Submitted"
- Code C5 (FN) – "Certified Final – No Further Submittal Required"
- Code C6 (AB) – "Certifies As-Built – No Further Submittal Required"

6.2.8 Initially hard copy documentation shall be returned to *Contractor* outside the Gauteng Area by Courier. *Contractors* in the Gauteng area will be advised by e-mail or fax (accompanied by a copy of the project's Transmittal Note) that documentation is available for their collection.

6.2.9 The *Contractor* shall allow the *Project Manager* two (2) weeks to review and respond to the *Contractor's* submission of their documentation, i.e., from the time of receipt to the time of dispatch. However, works shall proceed without delay in the event of late return of the documentation by the *Project Manager* with prior notification in writing by the Contractor.

6.2.10 On receipt of the reviewed documentation, the *Contractor* shall make any modifications requested/marked-up and re-submit the revised documentation to the *Project Manager* within two (2) weeks. Queries regarding comments/changes should be addressed with the *Project Manager* prior to re-submittal.

6.2.11 All revised data shall be submitted by the *Contractor* in its entirety and shall reflect the revision control numbers and shall also indicate which documentation and the revised documentation supersedes, if applicable. In the case of drawings every sheet has its own revision number and is revised as an individual document. In the case of documents, all sheets under cover of one document number shall be under the same revision number and resubmitted, even if the revision is a minor one.

6.3 Safety risk management

6.3.1 Health and Safety Standard

The *Contractor* shall comply with the requirements of the *Employer's* Project Site Specific Health and Safety Specification and Occupational Health & Safety Guidelines as per the Act.

6.3.2 *Contractor's* General Requirements for Health and Safety

The *Contractor* is solely responsible for carrying out the work under the Contract having the highest regard for the health and safety of its employees, the *Employer's* employees, and persons at or in the vicinity of the Site, the *Works*, temporary work, materials, the property of third parties and any purpose relating to the *Contractor* carrying out its obligations under this Contract.

The *Contractor* must initiate and maintain safety precautions and programs to conform to all applicable Health and Safety laws or other requirements, including requirements of any applicable government instrumentality and client corporate, business unit and site requirements. The *Contractor* must, at its own cost, erect and maintain safeguards for the protection of workers and the public. The *Contractor* must manage all reasonably foreseeable hazards created by performance of the work. The *Contractor* must:

- Provide all things and take all measures necessary for maintaining proper personal hygiene, ensuring safety of persons and property, and protecting the environment at or near the Site.

- Avoid unnecessary interference with the passage of people and property at or near the Site.
- Prevent nuisance and excessive noises and unreasonable disturbances in performing the Services.
- Be responsible for the adequacy, stability, and safety of all of its site operations, of all its methods of design, construction and work and be responsible for all of the work, irrespective of any acceptance, recommendation or consent by the *Employer*, its subcontractors, employees, agents and invitees, or any Government Body.
- Costs for the above are borne by the *Contractor*.

The *Contractor* must comply and is responsible for ensuring that all of its Sub-contractors comply with the relevant legislation(s) and statutory regulations for health and safety, the *Employer's* Health and Safety requirements included in the Contract and other document pertaining to health & safety contained in the Programme Health & Safety Management System and include standards, policies, procedures, guidelines, and safe work instructions.

6.3.3 ***Contractor's Health and Safety Management Plan***

The *Contractor* must prepare, implement, and maintain a project-specific Health and Safety Management Plan. The plan must be based on the requirements set out in this specification as well as all applicable legislation. It must cover all activities that will be carried out on the project site(s), from mobilisation and set-up through to rehabilitation and decommissioning.

The plan must demonstrate the *Contractor's* commitment to health and safety and must, as a minimum, include the following:

- A copy of the *Contractor's* Health and Safety Policy; in terms of the OHS Act section 7,
- Procedures concerning Hazard Identification and Risk Assessment, including both Baseline and Task-Based Risk Assessments,
- Arrangements concerning the identification of applicable Legal and Other Requirements, measures to ensure compliance with these requirements, and measures to ensure that this information is accessible to relevant personnel,
- Details concerning Health and Safety Objectives – a process must be in place for setting objectives (and developing associated action plans) to drive continual improvement,
- Details concerning Resources, Accountabilities and Responsibilities – this includes the assignment of specific health and safety responsibilities to individuals in accordance with legal or project requirements, including the appointment of a Project Manager, Health and Safety Officers, Supervisors, Health and Safety Representatives, and First Aiders,

- Details concerning Competence, Training and Awareness – a system must be in place to ensure that each employee is suitably trained and competent, and procedures must be in place for identifying training needs and providing the necessary training,
- Communication, Participation and Consultation arrangements concerning health and safety, including Safety Observations and Coaching, Toolbox Talks, Daily Safe Task Instructions, project health and safety meetings, and notice boards,
- Documentation and Document Control – project-specific documentation required for the effective management of health and safety on the project must be developed and maintained, and processes must be in place for the control of these documents,
- Processes and procedures for maintaining Operational Control, including rules and requirements (typically contained in Safe Work Procedures) for effectively managing health and safety risks, particularly critical risks associated with working at heights, confined spaces, mobile equipment, and light vehicles, lifting operations, hazardous chemical substances, etc.,
- Emergency Preparedness and Response procedures,
- Management of Change – a process must be in place to ensure that health and safety risks are considered before changes are implemented,
- Sub-contractor Alignment procedures – a process must be in place for the assessment of sub-contractors and suppliers with regard to health and safety requirements and performance (before any contract or purchase order is awarded),
- Measuring and Monitoring plans, including a plan for the measuring and monitoring of employee exposure to hazardous substances or agents (e.g., noise, dust, etc.) in order to determine the effectiveness of control measures,
- Incident Reporting and Investigation procedures describing the protocols to be followed with regard to incident reporting, recording, investigation, and analysis,
- Non-conformance and Action Management procedures concerning the management of corrective actions,
- Performance Assessment and Auditing procedures concerning health and safety performance reporting, monthly internal audits to assess compliance with the project health and safety requirements, and daily site health and safety inspections, and
- Details concerning the Management Review process followed to assess the effectiveness of health and safety management efforts.

6.3.4 ***Site Supervision***

The *Contractor* shall comply with OH&S Act – Section 8, 9, 13 and 16 and the Construction Regulations 2014.

The *Contractor* must nominate and appoint a responsible person on site to whom the *Project Manager* may refer in connection with the *Works*. Persons are nominated for all shifts worked or whilst any activity relating to the Contract is being performed on site and must have the authority to bind the *Contractor* with respect to the Contract. (OH&S Act - 16 Sections (2)).

The *Contractor* must ensure that the performance of all specified *Works* is supervised throughout by a sufficient number of qualified and competent appointed representatives of the Contractor, who have experience in the type of work specified. (OH&S Act – Construction Reg. 8 (1) and 8 (2.)

Note: No work may commence and or continue without supervisory Appointees present on site. The *Contractor's* Site Supervisor must be equipped with a mobile telephone with message bank and/or pager or an equivalent communication device so that communication throughout the Contract can be maintained at all times.

The *Contractor's* Site Supervisor must provide a list of names and contact telephone numbers of all *Contractors* and Sub-Contractor's contact persons on Site. This list is updated as a new *Contractor* or Sub-Contractor employee commences on Site.

The *Contractor's* Site Supervisor must keep a record of all employees, including date of induction, relevant skills, and licences, and be able to produce this list at the request of the *Supervisor*.

The *Contractor's* Site Supervisor must complete manning sheets describing the day's activities, labour numbers and classifications and issue these to the Supervisor prior to 9.00 am on a daily basis.

The *Project Manager's* Site Safety Representative is notified of any new starter with evidence of induction and site-specific induction prior to commencement of work.

6.3.5 ***Contractor's*** **Health and Safety Manager**

The *Contractor's* Health and Safety Manager specific tasks are:

- Design the health and safety management systems specific to the need of the project, organisational and specific construction project management system.
- Facilitate and coordinate the preparation of a site-specific construction health and safety plan.

- Manage the process for the assessments and approval of sub-contractor's health and safety plan in line to the Client requirements.
- Facilitate monthly health and safety meetings.
- Ensure identification of the hazards and risks relevant to the construction project through regular coordinated site inspections.
- Attend and participate in all project meetings.
- Use of trends analysis to identify systems deficiencies and incident trends, outline relevant improvements.
- Manage the necessary changes to the health and safety plans.
- Manage the reporting and investigation of project related incidents.
- Manage and maintain health and safety and communication structures and systems, distribution of health and safety specific documents to contractors.
- Monitor, measure and report on health and safety system performance through facilitating compliance health and safety audits
- Analysing of audit results and trends to ensure continual improvement.
- Evaluate the levels of compliance of contractors to the project health and safety plan and Transnet Property site specific health and safety specifications.
- Manage and evaluate processes for reporting of non-compliance issues and implementation of identified appropriate corrective and preventative action.
- Manage site health and safety during defects liability period.
- Prepare a health and safety close-out report as per Client requirements.

Health and Safety Manager must register with SACPCMP to be allowed to practise construction safety in the *Employer's* managed projects.

Before placing a Health and Safety Manager on the project site(s), the *Contractor* must forward a copy of the person's CV to the nominated project management representative or to the *Employer's* Stream Health and Safety Manager for review and acceptance. A proposed candidate may be rejected should he/she not meet the experience and / or qualification requirements, or due to poor work performance on previous projects.

6.3.6 ***Contractor's* Safety Officer**

The *Contractor* must appoint a full-time Health and Safety Officer for the duration of the contract that is registered with the SACPCMP (The South African Council for Project Construction

Management Professions). If more than 100 employees are deployed on the project site(s) (directly or through sub-contractors), at least two full-time Health and Safety Officers must be appointed, with an additional Health and Safety Officer appointed for every 100 additional employees thereafter.

The Health and Safety Officer must be on site when work commences at the start of the day and must remain on site until all activities for that day (including the activities of sub-contractors) have been completed. A Health and Safety Officer must be present during all shifts, so if work is carried out over more than one shift per day, the Contractor must make provision for an additional Health and Safety Officer.

Each *Contractor's* Health and Safety Officer shall be responsible for:

- Reviewing all applicable legal and project health and safety requirements and providing guidance to Contractor and sub-contractor personnel (particularly the Contractor's Project Manager) to help ensure compliance at all times,
- Assisting with the implementation of effective hazard identification and risk management processes for all work to be carried out by the *Contractor*,
- Participating in the Baseline Risk Assessment for the *Contractor's* scope of work (prior to site establishment) and ensuring that identified control measures are implemented,
- Participating in all Task-Based Risk Assessments conducted for the work to be carried out by the *Contractor* and ensuring that identified control measures are implemented,
- Conducting *Contractor's* health and safety induction training for all *Contractors* and sub-contractors' personnel,
- Compiling and maintaining all health and safety related documents and records required of the *Contractor*,
- Communicating relevant health and safety information to *Contractor* and sub-contractor personnel (e.g., incidents and lessons learnt, leading practices, hazards, risks, and control measures, etc.),
- Carrying out Safety Observations and Coaching (one per day),
- Evaluating (on a daily basis) the content of the Daily Safe Task Instructions (DSTI's) conducted by the *Contractor's* appointed supervisors, and attending at least one DSTI each day,
- Attending monthly *Contractor* and Site Health and Safety Meetings,

- Assisting with the implementation of the *Contractor's* Health and Safety Management Plan and associated Safe Work Procedures,
- Carrying out Planned Task Observations on an ad hoc basis,
- Assisting with the implementation, testing and maintenance of an effective Emergency Response Plan for all Contractor and sub-contractor activities,
- Responding to workplace incidents (as appropriate),
- Participating in incident investigations,
- Maintaining accurate health and safety statistics (for the *Contractor* and all sub-contractors), and compiling health and safety performance reports as required,
- Auditing the health and safety management system and workplace activities of the *Contractor* and each sub-contractor on a monthly basis to assess compliance with the project health and safety requirements, and
- Tracking and reporting on the implementation of corrective actions (arising from incident investigations, audits, inspections, etc.).
- The *Contractor* must ensure that they have made adequate provision of safety officers as per the works information works packages i.e. (construction of mechanical and electrical works) Health and Safety Officer is adequately equipped to enable him to perform his duties effectively. Before placing a Health and Safety Officer on the project site(s), the *Contractor* must forward a copy of the person's CV to the nominated project management representative or to the Programme Health and Safety manager for review and acceptance. A proposed candidate may be rejected should he not meet the experience and/or qualification requirements, or due to poor work performance on previous projects.

6.3.7 ***Contractor's*** **Safety Manual**

The *Contractor* must provide a hard copy of its safety manual, policies, and procedures to the *Project Manager* for acceptance prior to the commencement of any site work. The *Contractor* must ensure that his personnel, at all times, strictly observe and comply with the procedures set out therein. The *Project Manager* or the *Project Manager's* nominated Representative may from time-to-time request safety procedures applicable to the area of operations. The *Contractor* must forward to the *Project Manager* any updates or revisions to its safety manuals, policies or procedures as soon as practicable following revision or update.

The *Project Manager* may require the *Contractor* from time to time to supplement its safety manual, policies, and procedures with guidelines and/or operating standards provided to the *Contractor* by the *Project Manager*. The *Contractor* must comply with such requests where the

request is consistent with the requirements of the Contract. The *Contractor* must give prompt written notice to the *Project Manager* of any objection to the requested supplement, including the reasons for objection. The *Project Manager's* rights under this Clause are not intended, and must not be construed, to relieve the *Contractor* from any obligations to ensure compliance with all provisions of this Contract.

6.3.8 **Performance Measurement and Reporting**

a) Health and Safety Statistics

The *Contractor* and each of its Sub-contractors must complete and submit Health and Safety statistics to the *Project Manager* or the *Project Manager's* nominated representative, or as amended by the *Project Manager*, before mid-day on the Friday of each week. The *Contractor* must submit monthly Health & Safety Statistics before mid-day on the last day of each month to the *Project Manager's* nominated representative.

b) Safety Management Records

The *Contractor* must submit to the *Project Manager* for acceptance a schedule of the specific Health and Safety records it intends to maintain for the Contract. As a minimum, such records are as specified by applicable legislation. Copies are provided to the *Project Manager* or the *Project Manager's* nominated Representative if requested.

c) Field Technical/Safety Audit by the *Project Manager*

The *Project Manager* or the *Project Manager's* nominated Representative has the right to conduct audits/inspections of the Consultant, Professional Service Provider (PSP) and *Contractor* Safety Management Plan implementation, operations, equipment, emergency procedures, etc., at any time, and the *Contractor* must fully cooperate with the *Project Manager* or the *Project Manager's* nominated Representative during such audits/inspections. The *Project Manager's* rights under this clause does not, must not and will not relieve the Consultant, Professional Service Provider (PSP) and *Contractor* of its own obligations to conduct audits and reviews of its own Health and Safety performance.

Where such audits/inspections reveal deficiencies in the *Contractor* procedures, drills, training or equipment, or non-conformities with the *Contractor* accepted project Safety Management Plan, of a minor nature (Risk Rating of 6 or less), the *Contractor* must investigate the cause of the nonconformity and initiate corrective and preventive action to rectify such deficiencies and non-conformities and prevent recurrence as soon as practicable.

Where such audits/inspections reveal deficiencies of a major nature (Risk rating of 7 or greater), the *Contractor* must stop work on the operation/activity concerned, immediately investigate the cause of the nonconformity, and initiate corrective actions to rectify such deficiencies and non-conformities and to prevent recurrence. These corrective action plans is submitted to the *Project Manager* for review and comment within 24 hours of the audit finding.

Where such deficiencies include an unsafe practice or a breach of the statutory or the Contract's requirements, the *Project Manager* or the *Project Manager's* nominated Representative may in accordance with the General Conditions of Contract suspend the work associated with the unsafe practice or breach until the deficiency is rectified.

The *Project Manager* or the *Project Manager's* nominated Representative will establish a schedule of regular field safety audits which will be based on an audit tool aligned to the *Contractor* Safety Management Plan and site operations and activities. The *Contractor* audit conformance will be assessed as a percentage and where conformance is better than 90% it will be considered satisfactory and the *Contractor* must develop and implement an action plan within 4 weeks, to be reviewed at the next regular audit. Where the *Contractor* level of conformance is between 75 – 90%, a corrective action plan will be required to be developed and implemented within 2 weeks, and a follow up audit will be carried out. Where the *Contractor* conformance is less than 75% the *Contractor* must stop work until an investigation of the cause/s has been completed and corrective actions have been developed and implemented by the *Contractor.*

The *Contractor* must provide to the *Project Manager* or the *Project Manager's* nominated Representative, at a time to be agreed, but not to exceed monthly intervals, a regular status report on all outstanding corrective actions until they are successfully closed out.

d) Unsafe Act/Condition Auditing

The *Contractor* must implement a system to recognize, correct, and report unsafe acts/conditions (Unsafe Act/Condition Auditing) associated with all Site activities.

All such observations must be recorded and delivered to the TCP Health and Safety Manager.

6.3.9 **Involvement, Communication and Motivation**

The Contractor and subcontractor's workforce must, through their supervision, safety notice boards, toolbox meetings and daily pre-start meetings be kept aware of safety related matters.

a) Safety Meetings

The *Contractor* must implement and comply with OH&S Act, Section 19

The *Contractor* must conduct weekly safety meetings with his employees to foster safety awareness. Copies of minutes and action items arising from such Toolbox meetings is submitted or otherwise made available for review by the *Project Manager* or the *Project Manager's* nominated Representative.

Such meetings should at least address:

- Accident / safety incidents
- Hazardous conditions
- Hazardous materials / substances
- Work procedures
- Protective clothing / equipment
- Housekeeping
- General safety topics
- Job or work look-ahead issues
- Safety statistics
- Significant Safety Occurrences (SSO)

The *Contractor* must conduct at least one formal safety meeting per month and must maintain appropriate records of attendance and meeting content. Such records are made available to the *Project Manager's* Representative. In addition to Daily Safe Task Instructions, the *Contractor* must conduct at least weekly "toolbox" meetings to discuss safety issues and procedures.

b) Pre-Start Safety Briefings

The *Contractor* must hold documented Daily Safe Task Instructions with each work team before the start of each shift. Attendance records and brief topic notes is kept for auditing and record purposes.

c) Safety Review Meetings

The *Contractor`s* Site Manager and a Site Safety Representative must take part in weekly safety review meetings between the *Contractor* and the P*roject Manager* or the *Project Manager's* nominated Representative.

The *Contractor* must attend all project safety meetings as outlined in the Project Safety Management Plan.

d) Site Safety Review Committee

The *Contractor* complies with the requirements of the SSRC with respect to his own activities and others on the Site and Working Areas.

e) HAZOP Review

The *Contractor* participates in HAZOP reviews upon the instruction and direction of the *Project Manager.*

The reviews may include, but not be limited to, studies to ensure that the plant is built and operated as designed and that personal safety, employee health and environmental protection systems conform to the *Employer's* and legislative requirements.

f) Job Safety Analysis

The *Contractor* completes a JSA prior to carrying out any operation on the Site and/or Working Area to the approval of the *Project Manager*.

g) Lines of Communication

The following personnel act on behalf of the *Project Manager* and may communicate directly with the *Contractor* and his key persons with respect to the SMP:

- Construction Manager (CM)
- Project Site Safety Manager (PSSM)

6.3.10 **Roles and responsibilities**

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:

a) Construction Manager

The CM 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*.

The CM specific tasks (in the context of the SMP) are:

- Implement the safety management system.
- Monitor compliance to the established safety management system.
- Ensure risk is at an acceptable level.
- Ensure Consultant Construction Management Team are competent.

- Provide for:
- Planning, organisation, leadership, and control
- Particular technical competencies for critical work
- Supervision and control on each shift
- Regular monitoring and assessment
- Workplace inspections

b) Project Site Safety Manager

The PSSM is responsible for ensuring that the Contractor complies with the SMP. The PSSM acts on behalf of the Project Manager.

The PSSM specific tasks (in the context of the SMP) are:

Define, in accordance with the HSSP, the:

- Safety program (instructions, training, meetings, inspections, incentive)
- Health and medical program
- Checks that Contractors have issued their Health and Safety plans, PPSPS and procedures before the beginning of work.
- Organizes safety awareness campaigns.
- Promotes communication on all health and safety matters (awards, incentives, meeting/inspections/audits reports)
- Checks conformance of equipment to technical requirements and regulations.
- Issues and address the site EHS activities reports.
- Promotes everybody's best efforts to keep accident frequency and severity ratios at their lowest level.
- Promotes a proper and continuous housekeeping of plant and temporary facilities in order to create the most suitable conditions for workers to wok and to be encouraged to follow HSE requirements.
- Conducts worksite EHS walks with all Contractors, and directs appropriate corrective actions.
- Monitors that all factors likely to improve health and safety are taken into consideration, particularly those which lead to:
    - Promoting personnel protection as an absolute requisite

- Investigating, identifying, and neutralizing potential hazards
- Close coordination with all parties involved in construction in order to avoid overcrowded areas and dangerous operations.
- Thorough preparation of work critical phases
- Close contacts to local EHS authorities
- Continuous follow-up in order to correct immediately unsafe acts and situations.

- In case of accident, he takes actions necessary to:
  - Initiate quick interventions of the emergency means.
  - Check that first aid and evacuation of injured persons are properly carried out.
  - Obtain a clear accident report from the sub-contractor concerned.
  - Report immediately to the Construction Manager.
  - Investigate to identify the root causes of all incidents and near misses.

6.3.11 **Commissioning Safety Study**

The *Project Manager*, through his Construction Management Team, will facilitate and coordinate a formal Commissioning Safety Study and ensure that required procedures are prepared prior to the commencement of the commissioning phase.

The Commissioning Safety Study will provide a final checkpoint for the completed work and is part of the process for ensuring that all necessary actions have been completed. The elements to be considered include:

- Mechanical and electrical integrity systems are in place (e.g., equipment tests and inspections of critical equipment, quality control procedures, etc.) which will confirm that construction, equipment and materials are in accordance with design specifications.
- Formal hazard analyses for pre-commissioning and commissioning activities have been completed, appropriately documented, and communicated, and are available to all personnel.
- Punch-list work has been sufficiently completed so that installations are safe to apply hazardous energy.
- Documentation relevant to any modifications has been created/updated.
- Safe operating, maintenance and emergency procedures are in place.

- Operating and maintenance manuals are available, and training of commissioning employees has been completed.
- Red Line drawings are available.
- A Commissioning Permit (to apply hazardous energy) is developed and implemented.
- The *Project Manager* will ensure that after commissioning there is a formal documented hand over to operations and maintenance personnel and others who will be impacted by hazards that have been identified during project activities. This will involve communication of any changes to the process hazards, procedures, and operating philosophy. Safe systems of work will be established and updated throughout the Project. Safe systems of work will be subject to on-going review to ensure their effectiveness. Site-wide Permits to Work will be used as the basis of safe systems of work for specified hazardous activities.

6.3.12 **Working at Night**

A site-specific health and safety management plan should be well documented and structured so that both employers and employees can benefit from its use. The following are recommended components of a safety management plan for night example works.

a) Site personnel responsibility

It should be determined and stated clearly in the site-specific health and safety management plan the responsibility of each individual at construction site for night-time works. *Project Manager*, Engineers, Designers, Safety Officer and Site Supervisors as well as workers each have their specific responsibility to make sure the highest level of priority is given towards safety and health issues.

The *Contractor* must ensure adequate provision of safety officer personnel are present whenever working at night activities are taking place.

b) Permission to work at night.

The *Contractor* shall apply in writing for permission to work at night and should be obtained from the relevant authority in this case the *Employer's Project Manager*, before construction works at night is carried out. The *Contractors* should submit their application for work at night permit to the *Employer's* Client representative and it is advisable to follow all requirements enforced by the authority to executing night-time construction works. It is recommended that the *Employer's* representative should also notified TNPA responsible personnel about intended night shift work. Dredging works in particular shall be a 24hr activity.

c) Housekeeping

Accidents can occur as a result of poor housekeeping. Hazards at construction site are the same for both day and night shift while the risks of injury are much higher during night works because of the inherent poor illumination. It is essential that the workplace is kept clean and tidy to ensure safety and prevent accidents.

d) Emergency Preparedness and Response (EPR)

The *Contractor* should develop and implement the EPR that is specifically night-time environment and submit for approval before work at night is carried out. A well-established EPR can help both Contractors and employees to prepare; response and recover should a disaster occurs.

e) Public safety

When construction works involves public area, it is important to make sure the safety of the public. The *Contractor* must consider the following when planning for night-time work; identify the hazards for example construction vehicle movement or too much glare from lighting equipment and plan for vehicular movement to not interrupt peak hours and make sure adequate supervision is provided for such movement.

The *Contractor* must provide sufficient signage to warn the public and put barriers at a safe distance to keep the public away.

Set up safe walkways where it is unavoidable to work near or in public vicinity.

Arrange noisy equipment or machinery at farthest point from the public or adopt an engineering control to reduce the noise.

When overhead crane is operating near the public, clear off the area and make sure adequate supervision is in place.

Schedule for daily cleaning of the adjacent public road and filling up holes as well as uneven surfaces.

f) Types of Risks and factors affecting night-time work.

In order to decide when to conduct night-time work, factors (parameters) affecting night-time work must be identified. The *Contractor* must ensure the following factors are identified:

- Risk
- Illumination
- Nuisances
- Productivity

- Cost
- Safety

The *Contractor* must ensure that they implement the following step in an effective risk management program as to identify possible risks. Specific concerns related to night-time work zones include poor visibility and work quality, staffing issues, unwanted noise and glare, decreased worker and driver alertness, impaired drivers, higher vehicle speeds, increased labour costs, materials and traffic control, and problems in logistics and supervision. These risks are categorized broadly as safety, cost/production and schedule, quality, organizational relationships, technical, construction, economic, and environmental.

g) Risk

Night-time construction introduces numerous risks to a construction project. One clear set of examples is driver and worker fatigue and reduced visibility, which are factors that could increase safety risks. Other major factors contributing to the risks of night-time work are human factors such as sleep, stress, work, social or domestic issues, and psychological characteristics, such as appetite and safety. Additional factors associated with the risks of night-time construction work zones are reduced workspace for machinery and equipment movement, inadequate lighting, high speed of traffic during the night, and long working hours. Working at night does not supersede the requirements of the *Employer's* Project Health and Safety Specification (HAS-SP-01) that enforces compliance during day shift.

h) Document Control

All safety documents shall comply with the Project Document Control Procedures.

6.4 Environmental constraints and management

6.4.1 The *Contractor* complies with the following CEMP:

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 SES and PES.

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.

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.

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 were requested by the CM and to comply with the following:

Where relevant, method statements, as detailed in the SES and PES, shall be provided by the *Contractor*. These include, but are not limited to, the following where applicable:

- Establishment of construction lay down area.
- Hazardous and non-hazardous solid waste management
- Storm water management
- Contaminated water management
- Prevention of marine pollution
- Hydrocarbon spills
- Diesel tanks and refuelling procedures
- Dust control
- Spoil dumping
- Sourcing, excavating, transporting, and dumping of fill material.
- Noise and vibration control
- Removal of rare, endemic, or endangered species
- Removal and stockpiling of topsoil.
- Rodent and pest control
- Environmental awareness training
- Site division
- Emergency procedures for environmental incidents
- *Contractor's* SHE Officer
- Closure of construction laydown area

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.

Where required, one of the first actions to be undertaken by the *Contractor* shall be to erect and maintain a temporary fence along the boundaries of the Site and Working Areas as applicable, and around any no-go areas identified on the layout plans, to the satisfaction of the *Project Manager.*

The plant search and rescue (if applicable) must be undertaken and completed prior to any Site clearance or any other construction activity that may damage the vegetation can commences on Site.

The *Contractor* must appoint an Environmental Officer (EO)/Safety, Health and Environmental (SHE) Officer to undertake environmental management on site. The EO/SHE officer should have relevant environmental qualifications and experience, and this must be approved by TCP before commencement of work on site.

During the construction period, the *Contractor* complies with the following:

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).

Method statements that are required during construction must be submitted to the *Project Manager/Construction 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/Construction Manager*.

Where applicable, the *Contractor* shall provide job-specific training on an *ad hoc* basis when workers are engaged in activities, which require method statements.

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.

The *Contractor* shall be responsible for rehabilitating and re-vegetating all areas to the satisfaction of the *Construction Manager* as detailed in the SES and PES.

The *Contractor* shall clear and clean the Site and Working Areas and ensure that everything not forming part of the *works* is removed from the Site and Working Areas and that all rehabilitation has taken place in accordance with the PES and or relevant method statement. An

Environmental Closure Certificate will then be issued by the Environmental Department and signed off by the *Project Manager*.

The *Contractor* complies with environmental inspections and audits as contained within Annexure ENV-STD-001.

The *Contractor* makes copies of the CEMP, SES and PES available at the offices of the *Contractor* on Site. The *Contractor* ensures that all personnel on Site (including Subcontractors) are familiar with and understand the requirements of the CEMP.

6.4.2 **The *Contractor* complies with the following:**

The Contractor shall identify the kinds of environmental impacts that will occur as a result of his activities and then prepare separate method statements describing how each of those impacts will be prevented or managed so that the standards set out in this document are achieved. These method statements will be prepared in accordance with the requirements set out in the CEMP.

To ensure that environmental issues are considered in the establishment of the Site offices and all other facilities on Site.

6.4.3 **The *Contractor* complies with the following PES:**

a) The lines of communication of the various personnel acting on behalf of the *Project Manager* who communicate to the *Contractor* and his key persons with respect to the CEMP are contained in Section 5.2 of the CEMP.

b) The roles and responsibilities of the various personnel acting on behalf of the *Project Manager* with respect to environmental issues are stated in Section 5.1 of the CEMP.

c) The ProjEM is responsible for ensuring that the *Contractor* complies with the CEMP. The ProjEM acts on behalf of the *Project Manager*.

d) The CM is responsible (in the context of the CEMP only) for environmental management on the Site and Working Areas and reports to the *Project Manager*. The CM acts on behalf of the *Project Manager*.

e) The CSHEO submits daily, weekly, and monthly to the TP EO.

f) The *Contractor* complies with the CEMP, SES and PES. The *Contractor* abides by the instructions of the *Project Manager* regarding the implementation of the CEMP.

6.4.4 **The Contractor complies with the following SES:**

The *Contractor* shall identify the kinds of environmental impacts that will occur as a result of his activities and then prepare separate method statements describing how each of those

impacts will be prevented or managed so that the standards set out in this document are achieved. These method statements will be prepared in accordance with the requirements set out in the CEMP.

To ensure that environmental issues are considered in the establishment of the Site offices and all other facilities on Site.

Scope

The standard applies to all activities relating to the planning of the Site, Site establishment, operation of the Site and closure of the Site.

Site plan

The *Contractor* shall establish his construction camps, offices, workshops, staff accommodation and any other facilities on the Site and *Working Areas* in a manner that does not adversely affect the environment. However, before construction can begin, the *Contractor* shall submit to the *Project Manager* for his approval, plans of the exact location, extent and construction details of these facilities and the impact mitigation measures the *Contractor* proposes to put in place.

The plans shall detail the locality as well as the layout of the waste treatment facilities for litter, kitchen refuse, sewage, and workshop-derived effluents. The Site offices should not be sited in close proximity to steep areas. It is recommended that the offices, and in particular the ablution facilities, aggregate stockpiles, spoil areas and hazardous material stockpiles are located as far away as possible from any water course as possible. Regardless of the chosen Site, the *Contractor*'s intended mitigation measures shall be indicated on the plan.

Sewage

Particular reference in the Site establishment plan shall be given to the treatment of sewage generated at the site offices and staff accommodation and at all localities on the Site where there will be a concentration of labour. Sanitary arrangements should be to the satisfaction of the CM.

Safe and effective sewage treatment will require one of the following sewage handling methods: septic tanks and soak-aways, dry-composting toilets such as "enviro loos", or the use of chemical toilets which are supplied and maintained by a *Subcontractor*. The type of sewage treatment will depend on the location of the Site and the surrounding land uses, the duration of the contract and proximity (availability) of providers of chemical toilets. Should a soak-away system be used, it shall not be closer than 800 metres from any natural watercourse or water

retention system. The waste material generated from these facilities shall be serviced on a regular basis.

Toilets and latrines shall be easily accessible and shall be positioned within walking distance from wherever employees are employed on the *works*. Use of the veld shall not, under any circumstances, be allowed.

Outside toilets shall be provided with locks and doors and shall be secured to prevent them from blowing over. The toilets shall also be placed outside areas susceptible to flooding. The *Contractor* shall arrange for regular emptying of toilets and shall be entirely responsible for enforcing their use and for maintaining such latrines in a clean, orderly, and sanitary condition to the satisfaction of the *Project Manager*.

Effluent Management

All effluent water from the camp / office Sites shall be disposed of in a properly designed and constructed system, situated so as not to adversely affect water sources (streams, rivers, pans dams etc). Only domestic type wastewater shall be allowed to enter this drain.

Waste Management Objective

To ensure that all waste generated during construction and commissioning of the facilities is properly disposed of.

Examples of typical construction waste which, could be expected on the Site are indicated in the following table:

TABLE 2: EXAMPLE OF CONSTRUCTION WASTE CLASSIFICATION

WASTE	CLASSIFICATION	
	HAZARDOUS	NON-HAZARDOUS
Clean soil		X
Construction debris contaminated by oil or organic compounds	X	
Empty drums (depends on prior use)	X	X
Empty paint and coating containers		X
Waste paint and/or solvent	X	
Waste oil	X	
Phenolic waste	X	
Waste concrete		X
Rubble (not contaminated by oil or organic compounds)		X

Waste containing appreciable properties of fibrous asbestos	X	
Sewerage sludge	X	
Scrap metal		X
Explosive waste	X	
Waste timber		X
Waste Cable		X
PCB waste	X	
Waste plastic		X
Aerosol containers	X	
Batteries, light bulbs, circuit boards, etc.	X	X
Domestic waste		X

Scope

The standard applies to all construction, commissioning and Site activities that may lead to the generation of waste.

Approach

Waste is grouped into general or hazardous, depending on its characteristics. The classification determines handling methods and the ultimate disposal of the Material.

General waste to be expected during construction includes the following:

- Trash (wastepaper, plastics, cardboard, etc.) and food waste from offices, warehouses, and construction personnel.
- Uncontaminated construction debris such as used wood and scrap metal.
- Uncontaminated soil and non-hazardous rubble from excavation or demolition.

Hazardous waste is waste, which has the potential, even in low concentrations, to have a significant adverse effect on public health and/or the environment. This would be on account of its inherent chemical and physical characteristics, such as toxic, ignitable, corrosive, carcinogenic or other property.

Waste avoidance and minimisation

A ladder approach to waste management is encouraged. Waste should preferably be managed in the following order:

- Prevent: by waste avoidance and minimisation during production
- Recycle: waste recycling, recovery, and utilisation
- Treat: waste treatment in order to reduce toxicity and to minimise the quantities of waste

- Disposal: waste disposal, probably by incineration, destruction, or landfill

Waste Management

The *Contractor* is responsible for the removal from Site of all waste generated through the *Contractor*'s activities. The *Contractor* shall ensure that all waste is removed to appropriate licensed waste management facilities.

- The classification of waste determines handling methods and the ultimate disposal of the Material. The *Contractor* shall manage hazardous wastes that are anticipated to be generated by his operations as follows:
- Characterise the waste to decide if it is general or hazardous.
- Obtain and provide an acceptable container with label.
- Place hazardous waste material in container
- Inspect the container on a regular basis as prescribed by the *Contractor*'s waste environment management plan.
- Track the accumulation time for the waste.
- Haul the full container to the disposal Site.
- Provide documentary evidence of proper disposal of the waste.

The EO will work in conjunction with the *Contractor*'s construction safety and industrial hygiene personnel to create a *Contractor*'s Hazardous Materials Management Program. This program will establish the necessary protocol for proper handling and removal of hazardous Materials on the Site.

Information on each hazardous substance will be available to all persons on Site with the EO. Training and education about the proper use, handling, and disposal of the material will be available to all workers who will be handling the Material.

The EO must be informed of all activities that involve the use of hazardous substances to facilitate prompt response in the event of a spill or release.

The *Contractor* shall manage NON-HAZARDOUS / GENERAL WASTE that are anticipated to be generated by operations as follows:

- Determine if waste is non-hazardous and obtain containers for waste storage.
- Notify waste hauler when container is full so that it can be removed and replaced with an empty

On the Project, however, waste generating entities are directed to control the generation of non-hazardous waste by:

- Eliminating waste generation or reducing the total volume
- Reducing the degree of contamination of waste generated
- Reclaiming materials otherwise considered waste

The *Contractor* shall therefore recycle NON-HAZARDOUS / GENERAL WASTE that are anticipated to be generated by its operations as follows:

Obtain and label recycling containers for:

- Office Waste
- Aluminium and steel cans
- Glass Bottles
- Scrap Metals
- Waste Timber
- And locate them within temporary office building and trailers.
- Establish recycled material collection schedule
- Arrange for full bins to be hauled away

Spent batteries, circuit boards, and bulbs, while non-hazardous, require special collection and handling.

Vehicle and Equipment Refuelling Objective

To eliminate / control fuel and oil spillage at refuelling facilities

Scope

The standard applies to all refuelling, lubrication and oil changing requirements on all vehicles and machinery.

Refuelling

Engine driven compressors, pumps, air conditioners, and arc welders can have small leaks (usually oil) that can accumulate to become spills, which require clean up. These leaks become more evident if the equipment remains in the same place for an extended period of time. Damaged fuel tanks, fuel hoses, and fuel pumps can be sources of significant fuel leaks. Hydraulic systems can blow gaskets or hoses resulting in large quantities of hydraulic fluid spilled to the ground and under lock and key arrangements.

Control

No vehicles or machines shall be serviced or refuelled on Site except at designated servicing or refuelling locations, no oil or lubricant changes shall be made except at designate locations, or in case of breakdown or emergency repair.

The *Contractor* shall store fuel and oil at a secure area, which shall be bunded and designed with a liner or paved surface to prevent spillage from entering the ground.

The *Contractor* shall provide details of its proposed fuel storage and fuelling facility to the EO for approval, the design shall comply with the regulations of the *Water Act* (Act 36 of 1998), the *Hazardous Substances Act* (Act 15 of 1973), and the *Environment Conservation Act* (Act 73 of 1989).

Spill Response

The *Contractor* shall comply with the regulations of the Water Act (Act 36 of 1998), the *Hazardous Substances Act* (Act 115 of 1973), and the *Environment Conservation Act* (Act 73 of 1989).

The *Contractor* shall provide details for approval of its spill response plan in the event of any spills of fuel, oils, solvents, paints or other hazardous Materials. The plan will show measures to be taken to remove contaminated soils from Site and demonstrate complete removal of contamination.

The *Contractor* shall instruct construction personnel on the following spill prevention and containment responsibilities:

- Repair all leaks of hydrocarbons or chemicals as soon as possible
- Take all reasonable means to prevent spills or leaks
- Do not allow sumps receiving oil or oily water to overflow
- Prevent storm water run-off from contamination by leaking or spilled drums of oil or chemicals
- Do not discharge oil or contaminants into storm sewer system

If a spill to land occurs, the *Contractor* is responsible for:

- Immediate action to stop or reduce the spill and contain it
- Actions necessary to prevent the spill from contaminating groundwater or off-Site surface water
- Disposal of contaminated Material to location designated thereto
- Any spill to water has the potential to disperse quickly; therefore, the spill must be contained immediately using appropriate containment Equipment.

If a spill to water occurs, the *Contractor* is responsible for:

- Immediate action to stop or reduce the spill and contain it
- Notifying the appropriate on-Site authorities
- Actions necessary to prevent the spread of the contamination by deploying booms and/or absorbent Material
- Proper disposal of spilled Material

Spray Painting and Sandblasting

Objective

To ensure that all spray painting and sandblasting on Site is done in a controlled manner where appropriate measures are taken to prevent paint contamination of the soil and to ensure that sandblasting grit/media is properly disposed of.

Scope

All spray painting and sandblasting on Site.

Spray Painting and Sandblasting

Spray painting and sandblasting should be kept to a minimum. All painting should as far as practicable be done before Equipment and Material is brought on Site. Touch up painting is to be done by hand painting or by an approved procedure. A method statement shall be submitted to the SHEC for approval.

The *Contractor* will inform the EO of when and where spray painting or sandblasting is to be carried out prior to commencement of *work*. The EO will monitor these activities to ensure that adequate measures are taken to prevent contamination of the soil.

NB: If the area is in confined or high areas then a protection plan is to be issued for approval.

Dust Management

Objective

The *Contractor* (associated with activities such as earth*works*, geotechnical surveys, piling, storm water drainage, construction of roads and railways, foundations, brick building, operating workshops, fencing, erecting construction camps, and batch plant activities, etc.) shall submit a dust control plan for approval by the EO.

Scope

Control of dust on the construction Site and access roads

Dust Management

Material in transit should be loaded and contained within the load bin of the vehicle in such a way as to prevent any spillage onto the roads and the creation of dust clouds. If necessary, the load bin of the vehicle shall be covered with a tarpaulin to prevent dust.

Dust to be controlled on unsurfaced access roads and Site roads using sprayed water. The *Contractor* is responsible for managing dust generated as a result of his activities. The CM will be responsible for the dust control of the Site and *Working Areas*.

Some dust control measures, which are normally applied during construction, are presented in this section for inclusion by the *Contractor* in the *Contractor*'s dust control method statement.

These dust-mitigating procedures include the following:

- Limit vehicle speeds on unpaved roads to 20 km/h
- Wash the paved surfaces within the construction area twice a week
- Minimise haulage distances
- Apply water to gravel roads with a spraying truck when required

Environmentally friendly soil stabilisers may be used as additional measures to control dust on gravel road and construction area

- Dust suppression measures will also apply to inactive construction areas. (An inactive construction Site is one on which construction will not occur for a month or more.)
- Construction Material being transported by trucks must be suitable moistened or covered to prevent dust generation.
- Strip and store topsoil in separate stockpiles with mounds not exceeding 2m in height to, among other things, to prevent wind-blown dust.
- Minimise disturbance of natural vegetation during right-of-way construction (e.g., transmission lines and erection of fences) to reduce potential erosion, run-off, and air-borne dust.
- Implement a system of reporting excessive dust conditions by construction personnel (as instructed through Environmental Awareness Training).

Water for dust control shall be taken only from approved sources.

Storm Water and Dewatering Management

Objective

To ensure that storm water and dewatering drainage across the Site occurs in a manner that will negate contamination by oils, fuels, litter, and other waste and that will prevent erosion of the construction terrace.

Scope

All dewatering activities

Storm Water and Dewatering Management

Water is a valuable resource in the area. Both the quality and quantity of water used by the *Contractor* should be considered in making resource conservation plans.

Potential construction phase impacts on surface water and groundwater are associated with construction are run-off and percolation, dewatering activities, and miscellaneous liquid wastes associated with construction activities.

In general, construction activities may affect water quality and/or quantity of ground water and/or surface water of the area.

The *Contractor* shall be aware that, apart from run-off from overburden emplacements and stockpiles, storm water can also be contaminated from batch plants, *works*hops, vehicle wash-down pads, etc., and that contaminates during construction can include hydrocarbons from fuels and lubricants, sewerage from Employee ablutions, even excess fertiliser from rehabilitation areas, etc.

The *Contractor* shall take cognisance of the fact that discharges to controlled waters such as the sea, rivers, or groundwater or to sewerage systems are controlled under the South African Water Legislation.

Surface run-off

Construction activities such as surface grading and excavation will disturb surface areas on Site. This will increase the potential for soil erosion and subsequent sediment transport during periods of precipitation run-off or when excavation dewatering is required. Construction activities also have the potential to change local surface drainage and sediment transport patterns, Site floodplain delineation, and percolation rates into the soil.

Dewatering

Dewatering during the groundwork produces a surface water discharge that may require collection and sedimentation. Dewatering has also the potential to effect groundwater quality and quantity.

Wastewater

Liquid wastes including used solvents, used lubricating oils, chemical flushing agents, spill clean-up wastes, painting wastes, and concrete mixing drum washings, etc., have the potential to affect surface water and groundwater quality.

General

- Temporary drainage must be established on Site during the construction period and until permanent drainage is in place. *Contractors* are responsible for maintaining the temporary drainage in their areas. The *Contractor*s must provide secondary drainage that prevents erosion
- *Contractor*s must ensure good housekeeping in their areas to prevent contamination of drainage water
- The *Contractor* shall clear stagnant water

Specific water Management measures (surface and groundwater) for incorporation by the *Contractor* in the CEMP include the following:

- The *Contractor* shall ensure that no contaminated surface water shall flow off Site as a result of *Contractor* operations. Silt traps shall be constructed to ensure retention of silt on site and cut-off ditches shall be constructed to ensure no run-off from the SITE except at points where silt traps are provided.
- If applicable, the *Contractor* shall be responsible for collection, management, and containment within the Site boundaries of all dewatering from all general Site preparation activities. The dewatering water shall be contained within the Site boundaries by sequentially pumping or routing water to and from sub-areas within the Site as the construction activities proceed. No discharge of dewatering water to off Site land or surface water bodies will be allowed
- On Site drainage shall be accomplished through gravity flow. The surface drainage system shall consist of mild overland slopes, ditches, and culverts. The graded areas adjacent to buildings shall be sloped away with a 5% slope. Other areas shall have a minimum slope of 0,2% or as otherwise indicated.
- Ditches shall be designed to carry a 25-years storm event with velocities in accordance to minimise erosion. Erosion protection shall consist of suitable stabilising surfaces in all ditches
- Culverts shall be designed to ensure passage of the 25-year storm peak run-off flow.

- Both structural and non-structural (vegetative) erosion control measures will be designed, implemented, and properly maintained in accordance with best management practices which will include the following:
- Scheduling of activities to minimise the amount of disturbed area at any one time
- Implementation of re-vegetation as early as feasible
- Limiting construction traffic and/or avoidance thereof on access roads and areas to be graded to the extent feasible at drainage ditches.
- Compacting loose soil as soon as possible after excavation, grading, or filling
- Using silt fences, geo-textiles, temporary riprap, soil stabilisation with gravel, diversionary beams or swales, small sedimentation basins, and gravelled roads to minimise transport of sediment.
- Implementing the erosion and sedimentation control plan and ensuring that construction personnel are familiar with and adhere to the plan
- Managing run-off during construction
- The *Contractor* shall be responsible for checking and maintaining all erosion and sedimentation controls

Rehabilitation

Objective

To ensure that all areas affected by the project are appropriately rehabilitated and revegetated in a manner congruent with the surrounding biophysical environment. The prevention of the spread of alien invasive species.

Scope

All areas affected by the project including laydown areas.

Rehabilitation

The *Contractor* shall rehabilitate their laydown area upon Completion of work on Site. A rehabilitation plan will be submitted to the EO for approval at least six weeks before Completion. The following are critical issues to be included in that rehabilitation plan:

- Details of soil preparation procedures including proposed fertilisers or other chemicals being considered for use.

- A list of the plant species that will be used in the rehabilitation process. Note that these should all be indigenous species, and preferably species that are endemic to the area. The assistance of an appropriately qualified botanist should be sought in developing this list.
- Procedures for watering the planted areas (frequency of watering, methodology proposed).
- An indication of the monitoring procedures that will be put in place to ensure the successful establishment of the plants (duration and frequency of monitoring, proposed criteria for declaring the rehabilitation successful).
- Procedures for the prevention of the establishment and spread of alien invasive species.

Noise Management

Objective

To maintain construction noise at the Site within required limits.

Scope

Construction noise at the construction Site.

Noise Management

- Keep all Equipment in good working order
- Operate Equipment within its specification and capacity and don't overload machines
- Apply regular Maintenance, particularly with regards to lubrication
- Operate Equipment with appropriate noise abatement accessories, such as sound hoods

Noise control measures for incorporation by the *Contractor* in its noise control plan shall include the following:

- Ensure that the potential noise source will conform to the South African Bureau of Standards recommended code of practice, *SABS Code 0103:1983*, so that it will not produce excessive or undesirable noise when it is released.
- All the *Contractor*s' Equipment shall be fitted with effective exhaust silencers and shall comply with the South African Bureau of Standards recommended code of practice, *SABS Code 0103:1983*, for construction plant noise generation.
- All the *Contractor*s' vehicles shall be fitted with effective exhaust silencers and shall comply with *Road Traffic Act* (Act 29 of 1989) when any such vehicle is operated on a public road.
- If on Site noise control is not effective, protect the victims of noise (e.g., earplugs) by ensuring that all noise-related occupational health provisions are met. (*Occupational Health and Safety Act* (Act 85 of 1993).

- Normal machine working hours will be 06:00 – 22:00 Monday to Saturday. Outside these hours machine operations will be subject to approval. This does not define shift hours

Protection of heritage resources

Objective

To ensure the protection of archaeological, historical artefacts, or heritage resources discovered during construction activities.

Scope

Archaeological, historical artefacts or heritage resources discovered on or near the Site.

Archaeological Sites

If an artefact on Site is uncovered, work in the immediate vicinity shall be stopped immediately. The *Contractor* shall take reasonable precautions to prevent any person from removing or damaging any such article and shall immediately upon discovery thereof inform the engineer of such discovery. The South African Heritage Resources Agency is to be contacted who will appoint an archaeological consultant. The *work* may only resume once clearance is given in writing by the archaeologist.

Discovery of an item of historical value or stopping the works would fall under compensation events 60.1(4) and/or (7), despite the manner in which the Works Information is written here.

Graves and middens

If a grave or midden is uncovered on Site, or discovered before the commencement of *work*, then all *work* in the immediate vicinity of the graves/middens shall be stopped and the engineer informed of the discovery. The National Monuments Council should be contacted and in the case of graves, arrangements made for an undertaker to carry out exhumation and reburial. The undertaker will, together with the National Monuments Council, be responsible for attempts to contact family of the deceased and for the Site where the exhumed remains can be re-interred.

Fire prevention

Objective

To minimise the risk of uncontrolled fires.

Scope

All activities on or near the Site that could initiate an uncontrolled fire.

Fire control

Fires shall only be allowed in facilities or Equipment specially constructed for this purpose. A firebreak shall be cleared and maintained around the perimeter of the camp and office Sites. All conditions incorporated in the requirements of the Occupational Health and Safety Act shall also be implemented.

Supply of water for human use

Objective

To ensure that there is an adequate, safe water supply for all personnel on Site.

Scope

Managing the water supply on Site and controlling the abstraction of water from natural resources in the area.

Collection of water from natural resources

No water for domestic use (drinking water or for bathing or washing) shall be abstracted from any water resource (stream, river, or dam) without the express permission of the *Project Manager*. Such permission shall only be granted once it can be shown that the water is safe for use that there is sufficient water in the resource to meet the demand, and once permission has been obtained from the Department of Water Affairs in accordance with the requirements of the Water Act.

Provision of drinking water

Water for human consumption shall be available at the Site offices and at other convenient locations on site. The generally acceptable standard is that a supply of drinking water shall be available within 200m of any point on the construction Site.

Protection of livestock or game and the collection of firewood

Objective

To prevent illegal activities potentially perpetrated by Site staff and to prevent the killing of any animals trapped in construction *works* or discovered on the construction Site or surroundings.

Scope

Managing the activities of Site staff during and after hours

Poaching of livestock or game

On no account shall any hunting or fishing activity of any kind be allowed. This includes the setting of traps, or the killing of any animal caught in construction *works*.

Killing of animals

On no account shall any animal, reptile or bird of any sort be killed. This specifically includes snakes or other creatures considered potentially dangerous discovered on Site. If such an animal is discovered on Site an appropriately skilled person should be summoned to remove the creature from the Site. Consideration should be given to selection and nomination of such a person prior to Site establishment. Where appropriate, training should be provided to at least two Site staff members.

Collection of firewood

The *Contractor* shall provide adequate facilities for all his staff so that they are not encouraged to supplement their comforts on Site by accessing what can be taken from the natural surroundings. The *Contractor* shall ensure that energy sources are available at all times for construction and supervision personnel for heating and cooking purposes.

Environmental Awareness Training

An Environmental Awareness Program is considered a necessary part of the Construction Environmental Management Plan for the Project. Training of the appropriate construction personnel will help ensure that all environmental regulations and requirements are followed to be defined in the relevant Method Statement to be prepared by the *Contractor*.

Objectives of environmental awareness training are:

- Environmental Management – protecting the environment from the effects of construction by making personnel aware of sensitive environmental resources
- Regulatory compliance – complying with requirements contained in project – specific permit conditions, also complying with requirements in regional and local regulations
- Problem recognition and communication – training personnel to recognise potential environmental problems, i.e., spills, and communicate the problem to the proper person for solution
- Liability control - non-compliance with regulatory requirements can lead to personal and corporate liability.

All individuals on the Project construction Site will need to have a minimum awareness of environmental requirements and responsibilities. However, not all need to have the same degree of awareness. The required degree of knowledge is greatest for personnel in the Safety, Health, and Environmental Sections and the least for the manual personnel.

The *Contractor* shall keep a record of all the environmental related training of the personnel.

6.5 Quality assurance requirements

6.5.1 The *Contractor* shall have, maintain, and demonstrate its use to the *Project Manager* (and/or the *Supervisor* as appropriate) the documented Quality Management System to be used in the performance of the works. The *Contractor's* Quality Management System shall conform to International Standard ISO 9001 (or an equivalent standard acceptable to the *Project Manager).*

6.5.2 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:

- Quality Plan for the contract
- Quality Policy
- Index of Procedures to be used; and
- A schedule of internal and external audits during the contract

6.5.3 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.

6.5.4 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*.

6.5.5 The Quality Plan means the *Contractor*'s statement, which outlines strategy, methodology, resources allocation, QA and Quality Control co-ordination activities to ensure that the *works* meet the standards stated in the *Works* Information.

6.5.6 Where specified, the *Contractor* shall submit a project quality plan to Transnet Property within 14 working days after the Contract start date. The quality plan shall detail how the *Contractor's* Quality System will be applied to the Scope of Work specified in the Contract, and shall address the following:

- Satisfying the technical and quality requirements of the Contractor's Scope of Work, and relevant elements of the applicable ISO 9001 standard,
- Include all quality activities relevant to the Scope of Work, identifying all procedures, reviews, audits, controls, and records used to control and verify compliance with the specified Contractual requirements,
- List of all applicable codes, standards, and specifications,
- Include a listing of all special processes (e.g., welding, and non-destructive testing, cube testing etc.) envisaged for use, including confirmation of personnel certification as required,
- Include all proposed method statements (for site-based work activities),
- Include a description of the Contractor's project organization, with key positions and responsibilities identified and individuals named. The organization structure shall also indicate the resources committed to the management/coordination of QA/QC activities,
- Include a listing of all Quality Control Plans (QCP's), and associated Field Inspection Checklists (FIC's), as applicable,
- Identify in the Project Quality Plan any Sub-Contractor work,
- Include the proposed Authorised Inspection Authority (where applicable - for pressurised equipment and systems),
- Include a schedule / index of proposed quality records.

6.5.7 The Project Quality Plan shall be controlled and re-submitted for approval when required to incorporate any change necessary during the Contract duration to ensure that the document is maintained as an effective control, change management and records. The change management will be done to an agreed policy or procedure.

6.5.8 The Quality Policy mean the overall intentions and directions of the *Contractor* related to quality as formally expressed by top management.

6.5.9 The Index of Procedures means a list or schedule of the *Contractor's* Quality Control procedures that will be employed during the contract.

6.5.10 The *Contractor* shall provide material certificates for all materials supplied under this contract, in addition test certificates for all lifting and rigging equipment which is part of the gravity take up unit shall be provided. Certificates recording the balancing of the pulleys shall be provided.

6.6 Programming Constraints

6.6.1 The *Contractor* presents his first programme and all subsequently revised programmes (see ECC Clauses 31.2 and 32.1) in hard copy format printed in full colour in A3 size and in soft copy 'Native' format with activity layout files (Note that PDF soft copy versions are not acceptable). Within seven days of award of contract, the *Contractor* submits his Level 4 Programme to the *Project Manager* for acceptance, together with the associated works method statements and a supporting Basis of Schedule document.

6.6.2 The *Contractor* shows on each programme he submits to the *Project Manager,* the requirements as outlined in the ECC (Clause 31 and associated contract specific clauses). Additionally, the *Contractor* shows on each programme he submits all internal procurement activities conducted by himself as well as associated works and/or deliveries of materials and/or services the *Contractor* procured via external parties.

6.6.3 The *Contractor* uses Primavera version 6 for his programme submissions or a similar programme software package equivalent to Primavera version 6 subject to the prior written notification and acceptance by the *Project Manager*.

6.6.4 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.

6.6.5 The *Contractor's* programme shows duration of operations in working days. A normal working week comprises five working days, each of eight working hours. Alternative working hours are to be submitted to the *Project Manager* for approval.

6.6.6 The *Contractor*'s programme shows the following levels:

Level 1 Master Schedule – defines the major operations and interfaces between engineering design, procurement, fabrication and assembly of Plant and Materials, transportation, construction, testing and pre-commissioning, commissioning, and Completion.

Level 2 Project Schedule – summary schedules 'rolled up' from Level 3 Project Schedule described below

Level 3 Project Schedule – detailed schedules generated to demonstrate all operations identified on the programme from the starting date to Completion. Individual operations will be assigned codes as agreed with the *Project Manager*, this will be agreed post Contract award. The *Project Manager* notifies any subsequent layouts and corresponding filters on revised programmes

Level 4 Project Schedule – detailed discipline speciality level developed and

maintained by the *Contractor* relating to all operations identified on the programme representing the daily activities by each discipline

6.6.7 The *Contractor* shows on each revised programme he submits to the *Project Manager* a resource histogram showing planned progress versus actual, deviations from the Accepted Programme and any remedial actions proposed by the *Contractor.*

6.6.8 The *Contractor* submits progress tracker sheet information to the *Project Manager* at least 1 (one) full working day prior to progress meetings at weekly intervals. Tracker reports are to have back-to-back relationships with Fabrication and GA Drawings with the works detailed such that all aspects of the works can be monitored and tracked though its fabrication/construction sequence. Sheets to have work steps and weight factor percentages utilized to develop the progress tracking sheets. Where necessary multiple tracking sheets may be required to track each assembly member throughout is development.

- The *Contractor* submits programme report information to the *Project Manager* at least 1 (one) full working day prior to progress meetings at fortnightly intervals in addition to the intervals for submission of revised programmes stated under Contract Data Part One.

6.6.9 **The *Contractor's* weekly 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.
- 3-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.
- Manpower Histogram – reflecting actual, forecasted and planned activities
- Progress Tracker Sheets for Fabrication, Erection, Installation, Construction & Commissioning.
- S-curves – reflecting the actual percentage complete versus the planned percentage for the overall contract utilising the earned values as calculated by the detailed progress report.
- Detailed narrative status and performance of operations on the Site and Working Areas.
- Detailed narrative status and performance of operations outside the Working Areas.
- Deviation from the Accepted Programme register with associated action plans to rectify.
- Critical action items (Top 10)

- Key Risks (Top 10)
- Others (Will be advised after award) will operate on Site during the course of the Contract.

6.7 *Contractor*'s management, supervision, and key people

6.7.1 *Contractor's* Project Manager

- The *Contractor* employs a Project Manager (CPM) as a key person under ECC3 Clause 24.1.
- The CPM is employed on a full-time basis and shall be site-based for the duration of the construction activities.
- The CPM must be familiar with, and have a solid understanding of, the operation of the NEC3 ECC and will have at least eight years' experience gained in a similar position on projects operating the NEC3 suite of contracts. Where the CPM cannot demonstrate the required level of experience in the NEC3 suite of contracts, the *Contractor* arranges for training to be given by an experienced independent trainer in the understanding and application of those management procedures contained in the NEC Contracts.

6.7.2 *Contractor's* planner

- The *Contractor* employs a Planner as a key person under ECC3 Clause 24.1.
- The Planner is employed and shall be on-site for progress measurements and in attendance at progress meetings to present programme and tracking sheet updates to the *Project Manager* for the duration of the contract.
- The Planner must be familiar with, and have a solid understanding of, the operation of the NEC3 ECC and Primavera Software Suite with at least five years' experience gained in a similar position on projects operating the NEC3 suite of contracts. Where the Planner cannot demonstrate the required level of experience in the NEC3 suite of contracts or the Primavera Software Suite, the *Contractor* arranges for training to be given by an experienced independent trainer in the understanding and application of those management procedures contained in the NEC Contracts & Primavera Software Suite.

6.7.3 Contractor's Safety Health and Environmental Officer

- The *Contractor* employs a CSHEO as a key person under ECC Clause 24.1
- The CSHEO reports to the SHEC on the Site. The CSHEO ensures that the works (to include any part thereof) are subject to a prior environmental method statement(s) approved by the Construction Manager and ensures that the CEMP is implemented by the *Contractor* in a timely and proper manner. The CSHEO provides the *Project Manager* with all environmental method statements.

6.7.4 The CSHEO tasks are:

- Daily, weekly, and monthly inspections of the Site and Working Areas. The *Contractor is* referred to Annexure 1 and 3 of the CEMP.
- Monitor compliance with the CEMP (to include the SES and PES) and the environmental method statements submitted to the *Project Manager*
- Reporting of an environmental incident (as defined in paragraph 6.4 of the CEMP) to the *Project Manager.*
- Attendance at all SHE meetings, toolbox talks, and induction programmes as envisaged in the Standard Environmental Specification.
- Litter control and ensuring the *Contractor* clears litter from the Site and Working Areas and ensuring that environmental signage and barriers are correctly placed.
- The CSHEO submits daily, weekly, and monthly checklists to the SHEC. Report templates are included in the Starter Pack issued to the *Contractor* at the Kick-off Meeting hours, conditions of employment, work permits, etc. The *Contractor* shall further adhere to the requirements of any Industrial Relations Policy of the *Employer* applicable to the particular area, detail of which would be made available by the *Project Manager* when requested.
- The *Contractor* employs a CIRP as a key person under ECC Clause 24.1.
- The CIRP is based on the Site and ensures that all reports and IR requests are submitted accurately and in a timely manner to *Project Manager*, CM, PIRM, PSIRM or SIRM].
- The CIRP tasks are:
    - Dedicated to human resources, industrial relations, and any other *Contractor's* employee related function,
    - Resolve all human resources and industrial relations matters arising from the *Contractor's* employees,
    - Represent the *Contractor* on the IRCC
- The *Contractor* employs an HSR as a key person under ECC Clause 24.1

The *Contractor* provides an Organogram of all his key people (both as required by the *Employer* and as independently stated by the *Contractor* under Contract Data Part Two) and how such key people communicate with the *Project Manager* and the S*upervisor* and their delegates of C3.1 *Employer's* Works Information.

6.8 Training workshops and technology transfer

6.8.1 Safety and Environmental Awareness

a) Inductions

The *Contractor* facilitates the following requirements for training workshops:

- The *Employer's* Site Induction - All personnel must complete the Project Site Induction prior to working on the site. The purpose will be to ensure that all personnel are made aware of and are conversant with the requirements of this Safety Plan, site rules, environmental requirements, cultural heritage, and community relations.
- *Contractor* Job Specific Induction - All personnel shall complete Job Specific Inductions for the contracted works prior to commencing work. These inductions will be the responsibility of specific contractors
- Visitors - A Visitors Safety Induction program will be established at all sites explaining the site, the conditions applicable to their entry onto site and the necessary PPE they will be required to wear.
- Site Pass - All personnel who attend and satisfactorily complete each induction shall be issued with a photo identification site pass. The site pass will record information in acknowledgment that they have attended the induction program. The site pass is to be carried at all times on site.

b) Contractor's Training Programs

Contractor's training programs will include coverage of the following where relevant to individual's duties:

- The Project's Safety Plan
- Contractor's Safety Plans
- Fitness for Work
- Operating mobile plant
- Slinging and moving loads and using lifting devices
- Manual handling
- Working at height
- Purpose of inspections and inspection reports
- Contractor's site-specific inductions
- Confined space
- Hot work
- Prestart checks
- PPE use and training
- Isolation

- Scaffolding; and
- Hazardous substance handling, storage, and use

At the completion of all training, competency of individuals shall be validated by the trainer. This will be by means of an examination (written, oral or practical) or an assessment of the trained person's performance during the training. A record of safety training undertaken by each employee will be documented and retained permanently on a database and the employee's site identification and security card.

c) Competency

All personnel engaged to carry out work on the Project must have the necessary skills and knowledge and be competent to perform the tasks for which they have been employed. *Contractors* and new employees will be required to furnish proof by way of licences, permits, certificates or by recognition of prior learning (RPL) or by written certification by a qualified assessor of their skills, competencies, and knowledge of their work tasks.

No person may carry out any work on the Project unless proof of competency has been provided to the *Project Manager*.

d) Training Workshops and Technology Transfer for the Owner's personnel

The installation of the new plant will make a significant change in the operation and maintenance requirements. Both Operations and Maintenance personnel will be exposed to new technology

6.8.2 It is therefore essential that the *Contractor* provides comprehensive training (both theoretical and practical) to the *Employer's* staff members in the operation and maintenance of the works. On completion of the training, it is expected that the *Employer's* personnel will be able to deal competently with any out-of-course situation that may arise during daily operation

6.8.3 The *Contractor* compiles a Training Manual containing easy-to-understand notes on all the subject matter covered in the training courses. Separate manuals may be prepared for Operations training and Maintenance training. Each Learner must receive a copy of the Training Manual for the course that he/she has attended. In addition, three copies of the Training Manual must be handed to the *Employer* for reference purposes.

6.8.4 All training must be completed before the commencement of hot commissioning. The *Employer* will not accept responsibility for the Operation and Maintenance of the conveyor until the training has been satisfactorily completed.

6.8.5 The *Contractor* submits a Training Programme to the *Project Manager* for review no later than two weeks before the commencement of the cold commissioning. Because the *Employer's* personnel are engaged on shift work, it may be necessary to schedule a number of training courses at different times in the day.

6.8.6 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, but not be limited to, details of the Trainer, the scope of the training, the duration of training on each topic and the *Employer's* personnel who received training.

6.9 Insurance provided by the *Employer*

6.9.1 Insurance provided by the *Employer* is contained in the Contract Data – Part 1.

6.10 Contract change management

6.10.1 No additional requirements apply to ECC Clause 60 series.

6.11 Provision of bonds and guarantees

6.11.1 The form in which a bond required by the conditions of contract (if any) is to be provided by the *Contractor* is given in Part 1 Agreements and Contract Data, document C1.3, Sureties.

6.11.2 The *Contractor* provides a bond or guarantee as required by the conditions of contract concurrently with the execution by the Parties of the form of agreement for the ECC contract.

6.12 Records of Defined Cost, payments & assessments of compensation events kept by Contractor

6.12.1 The *Contractor* keeps the following records available for the *Project Manager* to inspect:

- Records of design employee's location of work (if appropriate); and
- Records of Equipment used, and people employed outside the Working Areas (if applicable).

6.13 Procurement

6.13.1 Code of Conduct

The *Employer* aims to achieve the best value for money when buying or selling goods and obtaining services. This however must be done in an open and fair manner that supports and

drives a competitive economy. Underpinning our process are several acts and policies that any supplier dealing with the *Employer* must understand and support. These are:

- The Transnet Procurement Procedures Manual (PPM),
- Section 217 of the Constitution - the five pillars of Public PSCM (Procurement and Supply Chain Management): fair, equitable, transparent, competitive, and cost effective,
- The Public Finance Management Act (PFMA),
- The Broad Based Black Economic Empowerment Act (B-BBEE), and
- The Anti-Corruption Act.

This code of conduct has been included in this contract to formally apprise the *Employer's* Suppliers of the *Employer's* expectations regarding behaviour and conduct of its Suppliers.

Prohibition of Bribes, Kickbacks, Unlawful Payments, and Other Corrupt Practices

Transnet is in the process of transforming itself into a self-sustaining State-Owned Enterprise, actively competing in the logistics industry. Our aim is to become a world class, profitable, logistics organisation. As such, our transformation is focused on adopting a performance culture and to adopt behaviours that will enable this transformation.

1. *Transnet will not participate in corrupt practices and therefore expects its suppliers to act in a similar manner.*
   - Transnet and its employees will follow the laws of this country and keep accurate business records that reflect actual transactions with and payments to our suppliers.
   - Employees must not accept or request money or anything of value, directly or indirectly, to:
     - Illegally influence their judgement or conduct or to ensure the desired outcome of a sourcing activity,
     - Win or retain business or to influence any act or decision of any decision stakeholders involved in sourcing decisions, or
     - Gain an improper advantage.
   - There may be times when a supplier is confronted with fraudulent or corrupt behaviour of Transnet employees. We expect our Suppliers to use our "Tip-offs Anonymous" Hot line to report these acts. (0800 003 056).
2. *Transnet is firmly committed to the ideas of free and competitive enterprise.*
   - Suppliers are expected to comply with all applicable laws and regulations regarding fair competition and antitrust.

- Transnet does not engage with non-value adding agents or representatives solely for the purpose of increasing B-BBEE spend (fronting)

3. *Transnet's relationship with suppliers requires us to clearly define requirements, exchange information and share mutual benefits.*

- Generally, Suppliers have their own business standards and regulations. Although Transnet cannot control the actions of our suppliers, we will not tolerate any illegal activities. These include, but are not limited to:
  - Misrepresentation of their product (origin of manufacture, specifications, intellectual property rights, etc),
  - Collusion,
  - Failure to disclose accurate information required during the sourcing activity (ownership, financial situation, B-BBEE status, etc.),
  - Corrupt activities listed above, and
  - Harassment, intimidation, or other aggressive actions towards Transnet employees.
- Suppliers must be evaluated and approved before any materials, components, products, or services are purchased from them. Rigorous due diligence is conducted, and the supplier is expected to participate in an honest and straight forward manner.
- Suppliers must record and report facts accurately, honestly, and objectively. Financial records must be accurate in all material respects.

Conflicts of Interest

1. *A conflict of interest arises when personal interests or activities influence (or appear to influence) the ability to act in the best interests of Transnet.*

- Doing business with family members
- Having a financial interest in another company in our industry

6.13.2 **The *Contractor's* Invoices**

a) 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.

b) The invoice must correspond to the *Project Manager's* assessment of the amount due to the *Contractor* as stated in the payment certificate.

c) 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.

6.13.3 The invoice is presented either by post or by hand delivery.

6.13.4 Invoices submitted by post are addressed to:

Transnet SOC Ltd
Level 200,
Carlton Centre,
150 Commissioner St, Cbd,
Johannesburg,
2001
For the attention of The Contract Administrator, Transnet Property

6.13.5 Invoices submitted by hand are presented to:

Transnet SOC Ltd
Level 200,
Carlton Centre,
150 Commissioner St, Cbd,
Johannesburg,
2001
For the attention of The Contract Administrator, Transnet Property

6.13.6 The invoice is presented as an original.

6.14 People

6.14.1 Minimum requirements of people employed on the Site:

a) Direct employment of all labour is preferred.

b) Wherever possible, general labour shall be recruited from the communities that are local to the Port of Richards Bay.

c) Recruitment of labour in and around the site is not permitted.

d) Recruitment of personnel already employed within the Port of Richards Bay is expressly prohibited.

e) All personnel shall provide proof of competency appropriate to their appointment.

f) All personnel shall undergo medical examination prior to undergoing site induction and be certified fit to work on the site, with particular reference to working at heights.

6.14.2 The *Contractor* complies with the following PIRPMP

a) Contractor Liability

1. The *Contractor* warrants that it will be liable to Transnet for any loss or damage caused by strikes, riots, lockouts, or any labour disputes by and/or confined to the *Contractor's* employees, which loss will include any indirect or consequential damages.
2. The *Contractor* warrants that no negotiations or feedback meetings by the *Contractor's* employees shall take place on Transnet premises, whether owned or rented by Transnet.
3. The *Contractor* shall give notice to Transnet of any industrial action by the *Contractor's* employees immediately upon becoming aware of any actual or contemplated action that is or may be carried out on Transnet's premises, whether owned or rented, and shall notify Transnet of all matters associated with such action that may potentially affect Transnet.
4. The *Contractor* is responsible for educating its employees on relevant provisions of the Labour Relations Act which deal with industrial action processes, and the risks of non-compliance.
5. The *Contractor* is required to develop a Contingency Strike Handling Plan, which plan the *Contractor* is obliged to update on a three-monthly basis. The *Contractor* must provide Transnet with this plan and all updates to the Plan. The *Contractor* is responsible to communicate with its employees on site details of the plan.

b) Industrial Action by Contractor Employees

1. In the event of any industrial action by the *Contractor's* employees, the *Contractor* is required to provide competent contingency resources permitted in law to carry out any of the duties that are or could potentially be interrupted by industrial action in delivering the Service.
2. The *Contractor* warrants that it will compensate Transnet for any costs Transnet incurs in providing additional security to deal with any industrial action by the *Contractor's* employees.
3. In the event of any industrial action by the *Contractor's* employees, the *Contractor* is obliged:
    - To prepare and deliver to Transnet, within two (2) hours of the commencement of industrial action an Industrial Action Report. If the industrial action persists the *Contractor* is required to deliver the report at 8h30 each day.
    - The Industrial Action Report must provide at least the following information:
        - Industrial incident report,

- Attendance register,
- Productivity / progress to schedule reports,
- Operational contingency plan,
- Site security report,
- Industrial action intelligence gathered.

- The final Industrial Action Report is to be delivered 24 hours after finalisation of the industrial action.
- The management of the Contractor is required to hold a daily industrial action teleconference with personnel identified by Transnet to discuss the industrial action, settlement of the industrial action, security issues and the impact on delivery under the contract.

4. The resolution of any disputes or industrial action by the Contractor's employees is the sole responsibility of the Contractor.
5. Access to Transnet premises by the Contractor and its employees is only provided for purposes of the Contractor delivering its services to Transnet. Should the Contractor and its employees not, for any reason, be capable of delivering its services Transnet is entitled to restrict or deny access onto its premises and unless otherwise authorized; such person will be deemed to be trespassing.

c) The Contractor performs the works having due regard to the PLA that are negotiated between the Employer and the appropriate trade unions on this contract.

d) The Contractor complies with the requirements of the IRCC involving the engineering construction Contractors engaged (including all future Contractors) by the Employer

e) The roles and responsibilities of the various personnel acting on behalf of the Project Manager with respect to IR issues are stated in the paragraphs following:

f) The PIRM is responsible for ensuring that the Contractor complies with the PIRPMP. The PIRM acts on behalf of the Project Manager.

g) The PIRM specific tasks are:

1. To complete the PLA prior to the Contract Date; and
2. To assign specific duties to the PSIRM.

- The PIRM specific tasks are:
  - The PSIRM is responsible for IR (to include the PLA) on the Site and Working Areas and reports to the *Project Manager*.

- The SIRM is responsible, inter alia, for day-to-day IR on the Site and Working Areas through the implementation of the PIRPMP. The SIRM reports directly to the PSIRM and the Project Manager.
- The SIRM specific tasks are:
  - To liaise with the Contractor prior to the commencement of construction activities (as per the Contractor's programme accepted by the Project Manager) with respect to IR issues under the SIP

6.15 Subcontracting

6.15.1 Preferred subcontractors

There are no preferred sub-Contractors.

6.15.2 Subcontract documentation, and assessment of subcontract tenders

The use of subcontracts from the NEC suite of contracts (i.e., Engineering and Construction Subcontract (ECS) or Engineering and Construction Short Subcontract (ECSS)) is strongly recommended. It is not necessary for subcontracts to be awarded on the basis of competitive tendering. The *Contractor* submits the proposed conditions of contract for each subcontract to the *Project Manager* for acceptance.

6.15.3 Where the aggregate value of a sub-contract (or any other contract) placed by the *Contractor* with a Subcontractor exceeds the project budget in Rands or its equivalent in another foreign currency, the *Contractor* shall procure that the Subcontractor follows the requirements of the National Industrial Participation Programme as described under paragraph 4.1 of the Works Information.

6.15.4 Where the *Contractor* employs a Subcontractor who constructs or installs part of the works or who supplies Plant and Materials for incorporation into the works which involves a Subcontractor operating on the Site and/or Working Areas, then the *Contractor* ensures that any such Subcontractor complies with the CEMP, SES and PES (described under paragraph 6.4 of the Works Information) as appropriate and that the subcontract documentation places back-to-back obligations on the Subcontractor which reflect the *Contractor's* obligations under the CEMP, SES and PES, all within the *Contractor's* Quality Management System as per paragraph 6.5 of the Works Information.

6.15.5 Where the *Contractor* employs a Subcontractor who constructs or installs part of the works or who supplies Plant and Materials for incorporation into the *works* which involves a Subcontractor operating on the Site and/or Working Areas, then the *Contractor* ensures that any such Subcontractor complies with the PIRPMP (described under

paragraph 7.3.2 of the Works Information) as appropriate and that the subcontract documentation places back-to-back obligations on the Subcontractor which reflect the *Contractor's* obligations under the PIRPMP, all within the *Contractor's* Quality Management System as per paragraph 6.5 of the Works Information. Note from Compiler to reviewers: this is the reference stated in the template.

6.15.6 The *Contractor* requires a Subcontract, where an NEC3 contract is used, to state the same main option A as this contract between the Contractor and the *Employer*. For all elements of the *works.*

6.15.7 Limitations on subcontracting

The *Contractor* may not subcontract more than 25% [twenty-five per cent] of the value of the contract to any other enterprise that does not have an equal or higher B-BBEE status level than the *Contractor*, unless the contract is subcontracted to an EME that has the capability and ability to execute the subcontract.

6.15.8 Attendance on Subcontractors

- The *Contractor* shall ensure that the quality assurance requirements placed on him under this Contract are transferred into any subcontracts.
- Quality system requirements shall be applied on all subcontracts to the point where the acceptability of supplies can be demonstrated solely by the conduct of inspection and/or examination of goods upon receipt at the designated point of delivery.
- The *Contractor* must notify the *Project Manager* of all inspections at his sub-*Contractors* at least 3 working days in advance of such inspections. The *Contractor* must ensure that his sub-Contractor has the relevant quality management plans available at such inspections. The *Supervisor* will give the Contractor 24-hour notice in writing of his intention to be present at the inspections.

6.16 Plant and Materials

6.16.1 **Quality**

The *Contractor* provides Plant and Materials for inclusion in the works in accordance with SANS 1200A sub-paragraph 2.1, unless otherwise stated elsewhere in the Works Information provided by the *Employer*. All Plant and Materials are new, unless the use of old or refurbished goods and/or Materials are expressly permitted as stated elsewhere in this Works Information or as may be subsequently instructed by the *Project Manager.*

Where Plant and Materials for inclusion in the works originate from outside the Republic of South Africa, all such Plant and Materials are new and of merchantable quality, to a recognised national standard, with all proprietary products installed to manufacturers' instructions.

The *Contractor* replaces any Plant and Materials subject to breakages (whether in the Working Areas or not) or any Plant and Materials not conforming to standards or specifications stated and notifies the *Project Manager* and the *Supervisor* on each occasion where replacement is required.

6.16.2 **Plant & Materials provided "free issue" by the *Employer***

a) The *Employer* provides the following Plant and Materials for the *Contractor* to use in the works:

- Nil

b) The *Contractor* provides all other Plant and Materials necessary for the works

6.16.3 ***Contractor's* Procurement of Plant and Materials**

The *Contractor* performs the following with respect to Plant and Materials procured for the works:

a) Submit manufacturers' certificates of origin,
b) Submit manufacturers' test certificates detailing the international standard or code of practice under which the testing was performed,
c) Ensure that the English language is used for data plates attached to components
d) Arrange for all manufacturer and vendor warranties to be vested in the *Employer,*
e) Any shipment originating from outside the Republic of South Africa is inspected immediately prior to shipment to confirm its condition and a condition report delivered to the *Project Manager.*
f) All shipments are to be opened on site and inspected for transit damage in the presence of the *Supervisor*. The *Contractor* compiles a damage report, signed and countersigned by the *Contractor* and *Project Manager*, and submits this to the *Contractor's* insurance broker (see notes at Contract Data - Part One) with copies to the *Project Manager* and the *Employer.*
g) All warranties provided by manufacturers of Plant and Materials procured by the *Contractor,* either directly or through sub-contracts, for incorporation in the works are to be in favour of the *Employer.*
h) Provides a waiver of lien in respect of goods that have been supplied but not yet incorporated in the *works* and for which the *Contractor* claims payment.

6.16.4 **Schedule of spares and consumables**

The Contractor provides a schedule of recommended spare parts for the complete conveyor system, including ancillary equipment. The recommended spare parts list should cover the anticipated requirement for a minimum of 12 months operation of the plant from hand-over.

The following data is to be listed for each item:

- Part Description,
- Positional Assembly Indication,
- Part/Drawing Number,
- Quantity Used,
- Quantity Recommended,
- Delivery Time and Price,
- Vendor Details.

6.16.5 The *Contractor* identifies on the schedule those spare parts which are regarded as essential for the continuous operation of the plant.

6.16.6 The *Contractor* submits the schedule of spares and consumables as indicated in the CDS.

6.16.7 **Provision Of Spare Parts and Consumables**

The *Contractor* provides the first fill of lubricants. All lubricants must comply with the Original Equipment Manufacturer's specifications and requirements. Wherever possible, lubricants that are already in use by Transnet Port Terminals should be selected to minimise stock holding and inventory costs.

The *Contractor* provides all spare parts and consumables that may be required during commissioning of the plant, including the performance test.

The *Contractor* does not supply any other spare parts or consumables. However, the *Contractor* must guarantee availability within 24 hours of all parts that may be required for breakdown repairs during the Defect Period.

6.17 Tests and Inspections before Delivery

The Supervisor may, at his discretion, perform surveillance inspection at the *Contractor's* premises, Sub-Contractor's premises or at the location of the Scope of Work.

Dependent on the nature of the Scope of Work and the frequency of inspections the *Supervisor* may elect to have inspection personnel resident at the place of manufacture, fabrication, or assembly.

The *Contractor* shall ensure free entry and access is given to the *Supervisor* (or his representative), certifying authorities and statutory authorities to inspect the Scope of Work and review procedures and quality records at all parts of the *Contractor's* and Sub- Contractor's premises, or at the location of the Scope of Work while any work or test is in progress.

The *Contractor* shall provide the Supervisor with all necessary tools, calibrated measuring equipment, safety equipment and workspace to verify or witness tests in progress.

Where the *Supervisor* cannot easily visit the *Contractor's* or Sub-contractor's premises for any reason, the *Supervisor* may direct that the tests and inspections be undertaken by an approved inspection authority or independent nominated consultant.

Where inspections and test are carried out by such inspection authority, the Contractor submits to the *Supervisor* details to certify that tests and inspections have been carried out on Plant and Materials by Others.

6.18 Marking Plant and Materials outside the Working Areas

The *Contractor* prepares and marks items of Plant and Materials outside the Working Areas with 'Property of Transnet SOC Ltd' and the Contract number.

Plant and Material outside the Working Areas are to be clearly and indelibly marked using hard stamping, or security tags. The *Contractor* provides designated areas sealed off from the rest of the manufacturer's production run in which to store Plant and Material that complete and is awaiting delivery to site.

The *Contractor* delivers digital photographs to the *Supervisor* as proof of marking and storage in designated areas.

6.19 Contractor's Equipment (including temporary works).

The *Contractor* provides all Equipment necessary to provide the works in a safe and efficient manner.

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.

The *Contractor* shall notify the PSSM 24 hours in advance prior to bringing any new mobile equipment on site. All required documentation and certificate of fitness (COF) issued by a competent person shall accompany the equipment.

The *Contractor* shall inspect Equipment on a daily basis prior to use in accordance with statutory regulations and legislation.

The *Contractor* shall ensure that all Equipment complies with statutory requirements (Construction Regulations / Occupational Health and Safety Act) and with the Health and Safety Standards.

ANNEXURES

ANNEXURE 1: TECHNICAL SPECIFICATION FOR THE NATIONAL SMART METERING SYSTEM

ANNEXURE 2: NATIONAL AREA DISTRIBUTION FOR THE INSTALLATION OF SMART METERS