PART 3: SCOPE OF WORK

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C3.1: EMPLOYER'S WORKS INFORMATION

Contents

1 Description of the *works*

1.1 Executive overview

The *Employer* requires the *Contractor* to perform the Engineering, Procurement, Construction and Management of a large-scale project to perform a comprehensive upgrade, refurbishment, and replacement of infrastructure and systems (as applicable) at a high-capacity Jet-A1 bulk Jet-A1 fuel storage tank depot. This tank depot is located on landside, next to the southern airside security checkpoint of O. R. Tambo International Airport. The total estimated contract value is ZAR 1 billion managed by an EPCM contractor (the *Contractor*) on behalf of the *Employer*.

The tank depot is comprised of tank farms (bunded areas where storage tanks are located), fuel receipt metering and filtration stations, sampling and certification stations, apron pump, metering, and supply filtration area, a workshop, fire management systems, emergency shutdown systems, a storage facility, product containment infrastructure, plant and equipment access devices, environmental management facilities, control rooms, server rooms and the administration office block. Tank Farm 1 contains operational storage tanks 1, 2, 3, 4, and 7, and product recovery tanks 5, and 6. These tanks were commissioned between 1967 and 1993 and has a total design capacity of 22,6 million litres. Tank Farm 2 contains operational storage tanks 8, 9, 10, and 11 which were commission as per the table provided below at a total design capacity of 24 million litres. Tank Farm 3 contains operational (and self-bunded) storage tanks 12 and 13 which were commissioned between 2010 and 2014 at a total design capacity of 12.6 million litres. A summary of the details of the tank farms is provided in the following table:

Tank number	**Year of construction**	**Design Capacity (m^3)**
Tank farm # 1		**22 640**
Tank 1	1971	4 400
Tank 2	1971	4 400
Tank 3	1971	4 400
Tank 4	1977	4 400
Tank 5	1967	320
Tank 6	1972	320
Tank 7	1993	4 400
Tank farm # 2		**24 000**
Tank 8	2000	6 000
Tank 9	2000	6 000
Tank 10	2006	6 000
Tank 11	2006	6 000
Tank farm #3		**12 600**
Tank 12	2014	6 300
Tank 13	2010	6 300
	TOTAL	**59 240**

The tank depot has a total design capacity of 59.2 million litres and throughputs to customers at a rate of more than 1.3 billion litres per annum.

The apron pump bay (which also contains filter-water separators, the suction header that receives from all tanks, and the discharge header through which fuel is pumped to the apron) is located to the West of and is adjacent to Tank Farm 1. The pumps can deliver a maximum combined flow rate of 27,000 litres/minute to the apron hydrant system (i.e., 6 pumps @ 4,500 litres/minute).

The project is mission-critical to the airport's aviation fuel supply chain and must be executed to the highest safety, operational, and regulatory standards, with zero to minimal disruption to ongoing site operations.

The *works* comprise multiple concurrent workstreams across civil, mechanical, electrical, instrumentation, and control disciplines. The primary objective is to upgrade aging infrastructure to improve reliability, capacity, compliance, and safety. Key work areas at a high-level include:

a) Tank Farm Works:
   i. Replacement of existing Jet-A1 bulk storage tanks in tank farm 1 (namely tanks 1 through 7), including testing, structural integrity and compliance certifications, coating and painting.
   ii. Decommissioning of aged tanks and salvage of disposed materials.
   iii. Modifications to bunding, fire protection, and drainage systems where necessary.
b) Piping and Hydraulics:
   i. Replacement and rerouting of all fuel piping networks, including integration with existing operational systems.
   ii. Installation of new valves, flow meters, pigging systems, and high-integrity pressure protection systems.
c) Pump and Filtration Systems:
   i. Upgrades to receipt and apron supply systems.
   ii. Replacement of filtration units to meet international aviation fuel quality standards.
d) Electrical & Instrumentation:
   i. Upgrade of electrical reticulation, motor control centres (MCCs), and standby power systems.
   ii. Installation of instrumentation for flow, temperature, pressure, and conductivity monitoring and control.
   iii. Integration with SCADA systems for automated control and remote monitoring.
e) Fire Protection and Safety Systems:
   i. Upgrading foam-based fire suppression systems, detection systems, and emergency shutdown (ESD) mechanisms.
   ii. Compliance with ICAO and local hazardous area classification requirements.
f) Administration Buildings, Control Rooms and Automation:
   i. Refurbishment of facilities and upgrade of automation and communication systems.
   ii. Implementation of cyber-secure, fail-safe control systems with backup redundancies.
g) Civil and Structural Works:
   i. Replacement of all paved areas
   ii. Refurbishment and upgrade of drainage and separation systems
   iii. Demolition and reconstruction of supporting infrastructure such as tank bases, pipe racks, roads, drainage, containment bunds, and hardstands.
   iv. New structural platforms for pumps, valves, and E&I equipment.

The project requires an integrated, multi-disciplinary team with extensive experience in brownfield petroleum infrastructure upgrades, particularly in high-security, high-risk operational environments. The key disciplines and services include:

- Mechanical (fuel systems, tanks, piping, pumps)
- Civil & Structural Engineering
- Electrical (including hazardous area compliance)
- Control & Instrumentation (SCADA, PLC, telemetry, instrumentation)
- Fire Protection Engineering
- Health, Safety, Security and Environmental (HSSE) Compliance
- Quality Assurance / Quality Control (QA/QC)
- Project Management & Construction Supervision
- Commissioning and Handover Specialists
- Specialist Subcontractors (e.g., NDT, tank cleaning, hazardous demolition)

1.2 *Employer*'s objectives and purpose of the *works*

The *Employer* requires that the following business benefits be achieved from at Completion of this project:

- To reinstate or (where possible) improve the service life of all infrastructure included in the scope of work,
- Gain improved reliability of the system which ensures lower probability of catastrophic failures which could result in the realisation of interruptions to fuelling operations,
- Installed equipment will achieve compliance to international best practise which will reduce operational safety risks,

- Obsolescence of aged equipment will be eliminated resulting in improved spares availability, asset maintainability and specialist technical support,
- Wholistic risk assessment will re-assess spares holding requirements according to operational criticality of equipment resulting in reduced lead time to repairs, and
- improved system redundancy will reduce the exposure to the risk of interruptions to fuelling operations and improve equipment maintainability.

1.3 Interpretation and terminology

The following abbreviations and terms are used throughout this Works Information and shall have the meanings assigned herein unless otherwise specified:

Abbreviation	**Meaning given to the abbreviation**
4IR	Fourth Industrial Revolution
ACSA	Airports Company South Africa
AFC	Approved for Construction
API	American Petroleum Institute
API 2610	API Standard for Design, Construction, Operation, and Maintenance of Terminal and Tank Facilities
API 520	API Standard for Pressure-Relieving Devices
API 650	API Standard for Welded Steel Tanks for Oil Storage
API RP	American Petroleum Institute Recommended Practice
ASAQS	Association of South African Quantity Surveyors
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASME B31.3	American Society of Mechanical Engineers standard for Process Piping
ASME B31.4	ASME standard for Pipeline Transportation of Liquid Hydrocarbons
ASME VIII Div 1	ASME Rules for Construction of Pressure Vessels
ATEX	Equipment for Explosive Atmospheres (Directive 94/9/EC)
CE	Civil Engineering
EC&I	Electrical, Controls and Instrumentation
EI	Energy Institute
HVAC	Heating, Ventilation, and Air Conditioning
IEC	International Electrotechnical Commission
IEC 60364-7-714	IEC Low-Voltage Electrical Installations – Transformer Room Requirements
IEC 62443	Industrial Automation and Control Systems Security
IEEE 802	Institute of Electrical and Electronics Engineers networking standards
ISO	International Organization for Standardization
ISO 14644 (Parts 1-3)	Cleanroom standards
IT	Information Technology
JIG	Joint Inspection Group (aviation fuel quality and operating standards)
JIG 2 Standard	Aviation Fuel Quality and Operating Standards
MHI	Major Hazard Installation
NEC3 ECC	New Engineering Contract, Edition 3 – Engineering and Construction Contract
NEMA	National Environmental Management Act
NFPA	National Fire Protection Association

NFPA 30	National Fire Protection Association Flammable and Combustible Liquids Code
NFPA 70B	Recommended Practice for Electrical Equipment Maintenance
NFPA 75	Fire Protection for Information Technology Equipment
OEM	Original Equipment Manufacturer
OHS Act	Occupational Health and Safety Act (Act 85 of 1993)
PER	Pressure Equipment Regulations
PER (OHS Act)	Pressure Equipment Regulations under OHS Act
PM	Project Manager
QA/QC	Quality Assurance / Quality Control
SACAA	South African Civil Aviation Authority
SANS	South African National Standards
SANS 10089-1	Petroleum Industry – Storage and Distribution Facilities
SANS 10089-2	Petroleum Industry – Electrical and Mechanical Installations
SANS 10100-1	Structural Use of Concrete – Design
SANS 10100-2	Structural Use of Concrete – Materials
SANS 10108	Classification of Hazardous Locations
SANS 10114-1	Interior Lighting
SANS 10114-2	Emergency Lighting
SANS 10142-1	Wiring of Premises – Electrical wiring standards
SANS 10160 Series	Structural Design Actions
SANS 10252	Water Supply and Drainage for Buildings
SANS 10254	Installation and Maintenance of Fixed Electric Storage Water Heating Systems
SANS 10292	Earthing of Low-Voltage Installations
SANS 10313	Protection Against Lightning
SANS 10389-1	Exterior Lighting
SANS 10400 Parts A, B, C, D, O, T, XA, P	National Building Regulations and related subparts
SANS 1475	Fire Extinguishing Equipment
SANS 1779	Security Systems Standards (Alarm systems, CCTV, access control)
SANS 241	Potable Water Quality
SCADA	Supervisory Control and Data Acquisition
SCADA	Supervisory Control and Data Acquisition

2 Management and start up.

2.1 Management meetings

Regular meetings of a general nature may be convened and chaired by the *Project Manager* as follows:

Title and purpose	Approximate time & interval	Location	Attendance by:
Risk register and compensation events	Weekly on Mondays at 10:00, And upon request by either *Employer, Contractor*, *Supervisor*, and *Project*	Virtually on Microsoft Teams, or in person at the Site, subject to prior arrangement	*Contractor*, *Supervisor*, and *Project Manager*

	Manager		
Overall contract progress and feedback	Weekly on Wednesdays at 10:00	Virtually on Microsoft Teams, or in person at the Site, subject to prior arrangement	*Contractor*, *Supervisor*, and *Project Manager*

Meetings of a specialist nature may be convened as specified elsewhere in this Works Information or if not so specified by persons and at times and locations to suit the Parties, the nature and the progress of the *works*. Records of these meetings shall be submitted to the *Project Manager* by the person convening the meeting within five days of the meeting.

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

2.2 Documentation control

2.2.1 Document Identification and Numbering

All project documentation shall be uniquely identified using a structured alphanumeric document numbering system that clearly indicates the document's origin (source), intended recipient, document type, sequential communication number, and project reference. The numbering format shall be:
[Project Code]-[Discipline Code]-[Document Type Code]-[Originator Code]-[Sequential Number]-[Revision]

Where:

- Project Code = 6511
- Discipline Code = Code representing the discipline (e.g. "CIV", "MEC", "ELE", "HSE", "INSTR")
- Document Type Code = Code for the document type (e.g. "DRW", "RPT", "MOM", "CE", "RFQ")
- Originator Code = Code representing the originating organization (e.g. "EMP", "CON", "DES")
- Sequential Number = 4-digit number (e.g. "0025")
- Revision = Alphanumeric revision (e.g. "A", "01")

A list of the abbreviations above are tabulated below:

Abbreviation	Full Form	Description
DRW	Drawing	Technical or engineering drawings (e.g. civil, mechanical, electrical plans, etc.).
RPT	Report	Formal written documents, including progress reports, design reports, etc.
MOM	Minutes of Meeting	Records of meetings including attendees, discussions, and action items.
CE	Compensation Event	As defined in core clauses.
RFQ	Request for Quotation	Documents issued to suppliers, manufacturers or subcontractors to obtain pricing or proposals for goods or services.
EMP	*Employer*	As defined in contract data.
CON	*Contractor*	As defined in contract data.
DES	Designer	the *Contractor's* appointed designer

For example, a first revision of a civil engineering drawing number 25 that is issued by the *Contractor* shall be identified as "6511-CIV-DRW-CON-0025-01".

2.2.2 Format and Submission

All contractual and technical communications, including instructions, responses, reports, and other submittals, shall be compiled into formal correspondence (letters or contractual forms) and submitted as PDF

attachments via email. The body of the email may be used for notification only and must not contain substantive information intended to form part of the contract.

Emails must include the document number in the subject line and be addressed to the designated document control email address. All attachments must be properly titled and include the document number, title, and revision.

2.2.3 Document Management System (DMS)

The *Employer* shall maintain a central Document Management System (DMS) to which the *Contractor* and key stakeholders will be granted access. All formal documentation shall be uploaded to the DMS within 24 hours of transmission via email. The DMS shall serve as the official repository of project records. The *Contractor* must ensure consistent alignment between email transmissions and DMS uploads.

2.2.4 Routing and Distribution

- The *Project Manager* shall issue all *Project Manager* instructions and communications under clause 13.1 directly to the *Contractor*'s authorised representative, with copies to the *Employer* and sub-contractor/sub-consultant where relevant.
- The Contractor shall direct all formal communications to the *Project Manager*, copying the *Employer* where necessary.
- All sub-consultants, sub-contractors and suppliers shall not bypass the *Contractor* when issuing documentation, unless expressly authorised by the *Project Manager*.

2.2.5 Retention and Archiving

All project documentation must be retained in both soft and hard copy formats in accordance with the *Employer*'s records retention policy (minimum 10 years). The *Contractor* shall provide a complete document handover pack upon Completion, including all "as-built" records, quality dossiers, inspection and test results, and signed acceptance certificates, indexed in accordance with the project's Master Document Register (MDR).

2.3 Health and safety risk management

2.3.1 General Obligations

The *Contractor* shall plan, manage, and execute the Works in compliance with the Occupational Health and Safety Act, No. 85 of 1993 (as amended), and all its applicable regulations, including but not limited to:

- Construction Regulations, 2014
- Major Hazard Installation Regulations
- Electrical Installation Regulations
- General Safety Regulations
- Environmental Regulations for Workplaces

Compliance shall also be ensured with all Ekurhuleni Metropolitan Municipality by-laws pertaining to construction, fire safety, waste management, noise control, and hazardous substances.

The *Contractor* shall complete, sign and comply with the terms of the agreement in terms of section 37(2) of the Occupational Health and Safety Act and Construction Regulation 5.1(k) contained in Annexure A to this Works Information.

2.3.2 Site-Specific Requirements and Particular Risks

Due to the nature of the *works* and the operational sensitivity of the site, the following site-specific health and safety measures are mandatory:

a) Major Hazard Installation (MHI) Environment

The site is located within a registered Major Hazard Installation. No deviation from the approved risk assessment and safety file shall occur without the prior written approval of the *Employer*'s Health and Safety Agent (HSA) and the relevant local authority.

The *Contractor* must ensure that all personnel entering the Working Areas are trained in MHI-specific emergency procedures, evacuation protocols, and are familiar with the location and use of firefighting and spill response equipment either already provided by the facility operator or provided by the *Contractor*.

b) Jet-A1 Fuel Handling Hazards

No open flames, hot work, or spark-generating equipment may be used in fuel-adjacent areas without a Hot Work Permit, which must be approved by the Project Manager and Employer's Fire Officer.

Static electricity mitigation (e.g. bonding and grounding) must be verified before conducting any work near fuel tanks, pipelines, or loading arms/vehicle loading/unloading infrastructure.

Flammable vapours, confined spaces, and fuel-contaminated equipment must be monitored and tested using gas detectors before access.

Where necessary, the *Contractor* is to ensure that all tools, devices and equipment used for any activity taking place in the facility is intrinsically safe, ATEX-/IECEX-rated and/or pneumatically driven. The facility operator will require proof of any ATEX-/IECEX-certification of devices, tools and equipment in advance of allowing their use before a permit-to-work is issued.

c) Permit-to-Work (PTW) System

The *Contractor* must comply with the site-specific permit-to-work system of the facility operator, which applies to high-risk activities such as:

- Confined space entry
- Hot works
- Electrical isolations and terminations
- Excavations and trenching
- Working at height
- Lifting operations using cranes or hoists

The *Contractor* shall not be allowed to conduct any activity at the facility unless the facility operator has issued a PTW. The Contractor is issued a PTW upon approval of the risk assessment and method statement (RAMS) submitted by the *Contractor* to the facility operator for that activity, and that a toolbox-talk has been conducted for that activity prior to the commencement of that activity.

d) Traffic restrictions

Vehicle movement within and near the Working Areas shall comply with:

- The Ekurhuleni Metropolitan Municipality traffic by-laws and regulations
- The airport-specific traffic management and access control plans
- The facility operator’s internal rules and logistics protocols, including speed limits, designated delivery times, and access routes
- All applicable provisions of the National Road Traffic Act, 1996 (Act No. 93 of 1996) and its Regulations

Where there is any inconsistency or conflict between these requirements, the most stringent standard shall apply, as determined by the *Project Manager*.

2.3.3 Construction Health and Safety Plan and File

- The *Contractor* shall prepare, submit, and maintain an approved Construction Health and Safety plan, aligned with Regulation 5(1)(h) of the Construction Regulations.
- The Health and Safety plan must be approved by the Employer's appointed Health and Safety Agent prior to site mobilization.
- A site-specific Health and Safety file must be established and kept up to date. It shall always be available for inspection by the *Employer*, *Project Manager*, and regulatory authorities.

2.3.4 Training and Competence

All *Contractor-, s*ub-contractor-, sub-consultant-, and supplier-employed personnel shall receive:

- Site-specific induction
- Task-specific training (e.g. confined space, electrical lockout, hot work)
- Ongoing toolbox talks (at least weekly)

Proof of competency certificates, medicals, and legal appointments (e.g. Construction Manager, SHE Rep, Scaffold Inspector, etc.) shall be included in the Safety File.

2.3.5 Incident Reporting and Emergency Response

All health and safety incidents (including near misses) must be reported to the Employer and *Project Manager* within one hour of occurrence. A full written investigation report must be submitted within 48 hours. The *Contractor* shall participate in joint emergency drills with the fire and safety personnel of either the *Employer* or the facility operator and shall maintain an up-to-date emergency response plan tailored to Jet-A1 fuel-related and construction hazards during execution of the *works*.

2.3.6 Monitoring and Auditing

The *Employer* (or their duly appointed representative, or the *Project Manager*) reserves the right to carry out:

- Weekly site safety audits
- Unannounced inspections
- Safety file reviews

Non-conformances shall be rectified within the period prescribed by the *Project Manager* or Health and Safety Agent. Persistent or grievous violations may result in removal from site at the *Contractor*'s cost.

2.4 Environmental constraints and management

2.4.1 General Obligations

The *Contractor* shall plan, manage, and execute the *works* in accordance with all applicable environmental legislation, including but not limited to:

- National Environmental Management Act, No. 107 of 1998 (NEMA)
- National Environmental Management: Waste Act, No. 59 of 2008 (NEM:WA)
- National Environmental Management: Air Quality Act, No. 39 of 2004 (NEM:AQA)
- National Water Act, No. 36 of 1998
- Hazardous Substances Act, No. 15 of 1973
- Applicable Environmental Impact Assessment (EIA) Regulations issued under NEMA
- Ekurhuleni Metropolitan Municipality environmental and waste management by-laws

In addition, the *Contractor* shall:

- Adhere to the ISO 14001 Environmental Management System (EMS) principles, whether formally certified or not,
- Apply relevant sections of the Joint Inspection Group (JIG) Environmental Guidelines for Jet Fuel Storage and Handling,
- Observe applicable American Petroleum Institute (API) standards and recommended practices, especially those relating to aboveground storage tanks (e.g., API 650, API 653), leak detection, and secondary containment.

The *Contractor* shall complete, sign and comply with the ACSA Environmental Terms and Conditions contained in Annexure B

2.4.2 Site-Specific Environmental Risks and Controls

The *Contractor* shall be particularly mindful of the environmental sensitivity of the site, which operates as a Major Hazard Installation (MHI) and handles Jet-A1 fuel. The following site-specific risks and controls shall apply:

a) Fuel and Chemical Spill Prevention and Response

- All fuel storage tanks, transfer lines, and fittings shall be subject to daily visual inspections for signs of leakage.
- Bunded areas and secondary containment systems must be in place and maintained in accordance with API 2610 and local regulatory requirements.

- No hydrocarbons, chemicals, or construction materials may be discharged into stormwater systems or onto permeable ground.
- The *Contractor* shall maintain on-site spill response kits suitable for hydrocarbon containment and cleanup and ensure that trained personnel are always available during fuel-related activities.
- Any spill, regardless of volume, shall be immediately reported to the *Project Manager* and *Employer*'s Environmental Officer.

b) Waste Management

- A Waste Management Plan (WMP) shall be submitted and approved by both the *Employer*'s Environmental Officer and the facility operator prior to site mobilisation. The plan must align with the Waste Classification and Management Regulations (GN R634 of 2013).
- Hazardous waste, including hydrocarbon-contaminated materials, must be stored in clearly marked, secure containers and removed by a licensed waste handler to an approved facility and a safe disposal certificate shall be issued to both the *Project Manager* and *Employer*'s Environmental Officer
- No burning, burying, or uncontrolled dumping of waste shall be permitted.

c) Water and Soil Protection

- Dewatering activities shall comply with the National Water Act and may only proceed with written approval from the Employer's Environmental Officer.
- Construction in areas near stormwater inlets, retention ponds, or aquifer protection zones shall include silt fencing, drip trays, and temporary containment barriers.
- Excavated or contaminated soils must be assessed, tested (where applicable), and handled in accordance with the Contaminated Land provisions of NEMA Section 36–41.

d) Air Quality and Dust Suppression

- The Contractor shall ensure dust suppression measures are in place during excavation, demolition, and vehicle movement using non-polluting methods (e.g., water misting).
- Emissions from machinery and generators must be minimised and comply with the NEM:AQA minimum emission standards.
- No idling of vehicles or equipment shall be allowed beyond 5 minutes in any designated area.

e) Noise Control

- Construction activities must comply with the Noise Control Regulations of the Ekurhuleni Metropolitan Municipality and SANS 10103.
- Noise-generating activities (e.g., jackhammering, heavy equipment use) must be confined to normal working hours unless approved in writing by the Project Manager.

f) Volatile Organic Compounds (VOCs) and Emission Control

- The *Contractor* shall identify all activities with potential to release volatile organic compounds (VOCs), including but not limited to:
    - Tank opening, cleaning, degassing or de-sludging
    - Fuel line disconnection or purging
    - Handling or disposal of hydrocarbon-contaminated materials
- Where VOCs are likely to be released, the *Contractor* shall:
    - Conduct baseline air quality monitoring before and during the activity
    - Implement engineering controls such as vapour recovery systems, floating roof seals, or activated carbon filtration, as appropriate to the activity
    - Limit the duration of open-tank or open-line exposure and schedule such works for low-temperature periods where feasible
- All VOC emissions must comply with the relevant provisions of the National Environmental Management: Air Quality Act (Act 39 of 2004), the Minimum Emission Standards (GN R893 of 2013), and applicable API guidelines (e.g., API 2517 and API 2610)
- The *Contractor* shall document VOC mitigation measures and monitoring results in the environmental file and notify the *Employer*'s Environmental Officer if action levels are exceeded

2.4.3 Environmental Management Plan (EMP) and File

The *Contractor* shall:

- Submit a site-specific Environmental Management Plan (EMP) prior to commencing any site activities. The EMP must align with any existing environmental authorisation conditions or basic assessment report, where applicable.
- Incorporate environmental method statements for high-risk activities (e.g., de-sludging, tank cleaning, fuel line pressure testing).
- Maintain an environmental file on-site, containing approved plans, permits, monitoring records, spill reports, waste disposal certificates, and training registers. The file shall always be accessible to the *Employer*, *Project Manager*, and regulatory inspectors.

2.4.4 Training and Awareness

All personnel under the control of the Contractor, including subcontractors and suppliers, shall receive:

- A site-specific environmental induction,
- Task-specific training (e.g., spill response, hazardous waste segregation),
- Weekly toolbox talks covering relevant environmental topics.

Training records and proof of competency shall be included in the environmental file.

2.4.5 Incident Reporting and Emergency Preparedness

All environmental incidents or near misses (including spills, overfills, equipment leaks, or wildlife impacts) must be reported within 1 hour of occurrence to the *Project Manager* and the *Employer*'s Environmental Officer. A detailed investigation report shall be submitted within 48 hours.

The *Contractor* shall maintain and test a site-specific Environmental Emergency Response plan and shall participate in any joint drills required by the *Employer* or the facility operator.

2.4.6 Monitoring, Inspections and Audits

The *Employer* (or their appointed Environmental Officer or the Project Manager) reserves the right to conduct:

- Weekly environmental site inspections,
- Unannounced audits,
- Sampling and testing (e.g., water, soil, or air quality) as deemed necessary.

Any non-conformances shall be addressed within the period stipulated by the *Project Manager* or Environmental Officer. Persistent or grievous environmental violations may result in penalties, suspension of work, or removal from site at the *Contractor*'s cost.

2.5 Quality assurance requirements

2.5.1 General Obligations

The *Contractor* shall establish, implement, and maintain a Quality Management System (QMS) that ensures all aspects of the *works* are planned, performed, and verified in accordance with the contract, applicable regulations, and best industry practices. The *Contractor*'s QMS shall conform to the requirements of:

- ISO 9001:2015 – Quality Management Systems – Requirements
- Relevant American Petroleum Institute (API) standards, including but not limited to:
  - API 650 – Welded Tanks for Oil Storage
  - API 653 – Tank Inspection, Repair, Alteration, and Reconstruction
  - API 2610 – Design, Construction, Operation, Maintenance, and Inspection of Terminal and Tank Facilities
- Applicable South African National Standards (SANS)

The *Contractor* must submit a Contract-specific Quality Plan (CQP) for acceptance by the *Project Manager* no later than 15 working days before mobilisation. No work may commence until the Quality Plan is accepted in writing.

2.5.2 *Contractor*'s Quality Plan Requirements

The *Contractor*'s Quality Plan (CQP) shall include, but not be limited to, the following:

a) Organisation and Responsibility
- Quality roles and responsibilities of key personnel (e.g., QA Manager, QC Inspectors)
- Organogram indicating QA/QC reporting structure, including subcontractors

b) Document Control Procedures:
- Method for tracking and revising quality documentation, drawings, procedures, and records

c) Inspection and Test Plans (ITPs):
- Activity-by-activity breakdown including:
    - Acceptance criteria
    - Hold points (HP) and witness points (WP)
    - Reference to standards/specifications
    - Responsible party for each verification step

d) Material Control:
- Verification of materials on delivery (certificates of conformity, batch traceability, etc.)
- Storage and handling requirements for fuel-system sensitive components (e.g. seals, gaskets, pipe sections)

e) Construction Work Procedures:
- Detailed method statements and work procedures for critical tasks (e.g., tank cleaning, welding, NDT, hydrotesting, leak testing)
- Calibration and maintenance of measuring and testing equipment

f) Non-Conformance Management:
- System for identifying, documenting, reporting, rectifying and tracking non-conformances
- Procedures for root cause analysis and corrective/preventive action

g) QA/QC Records Management:
- Clear system for indexing and storing inspection/test records, material certifications, as-built data, welding logs, etc.
- All quality records to be retained for a minimum of 12 years

h) Allowance for cost:
- All costs pertaining to the purchase and supply of fuel and water, as well laboratory tests, for all attempts to run soak tests on installed tanks and piping reticulation shall be included for in pricing provided by the *Contractor* and carried the *Contractor*.

2.5.3 Witness and Hold Points

The following general Hold Points (HP) and Witness Points (WP) are required as a minimum. These must be reflected in the ITPs and adhered to:

Activity	Type	Description	Party to Release/Attend
Incoming material inspection	HP	Review of material certificates and batch traceability	*Project Manager*
Tank foundation preparation	WP	Compaction tests and blinding approval	*Project Manager* and *Employer*'s Representative
Tank floor plate layout	HP	Pre-weld inspection and dimensional control	*Project Manager*
Shell erection alignment checks	WP	Visual inspection prior to next course	QC Inspector

Internal coating application	HP	Surface preparation and DFT measurement prior to overcoating	*Project Manager*
Weld NDT and acceptance	HP	Radiography/UT/MPI/Dye penetrant reports review	Independent NDT Authority
Hydrostatic testing	HP	Witness of test, review of test procedures and results	*Project Manager* & facility operator
Commissioning and system integrity checks	HP	Fuel line flushing, leak testing and instrumentation calibration	*Project Manager*, facility operator, *Employer*

The *Contractor* shall not proceed beyond a hold point without written release from the *Project Manager* or the *Employer's* nominated representative.

2.5.4 QA Requirements Outside Working Areas

The following shall apply to QA activities beyond the physical working area:

- All off-site fabrication, coating, and equipment testing must be subject to the same QMS requirements and applicable ITPs.
- The *Contractor* shall notify the *Project Manager* at least 10 working days in advance of any off-site inspection/testing activities.
- Equipment suppliers and sub-contractors involved in critical work shall be subject to QMS audits by the *Employer* or the *Project Manager*.

2.5.5 QA Documentation Submission and Acceptance

QA documentation shall be submitted via the Document Management System (DMS) specified by the *Employer*. Each submission shall include a Document Transmittal Form referencing the Work Breakdown Structure (WBS) and associated drawing or specification numbers. Final QA handover dossiers shall include:

- Completed and signed ITPs
- Material certificates and test reports
- Calibration certificates
- As-built drawings
- Weld maps and NDT reports
- Commissioning test records

All QA deliverables must be reviewed and accepted by the *Project Manager*. Acceptance of documentation does not relieve the *Contractor* of its responsibility for the conformity of the *works*.

2.5.6 ISO Compliance

Compliance with ISO 9001:2015 is a mandatory requirement for this contract. The *Contractor* shall:

- Provide a copy of its valid ISO 9001 certification from an accredited body,
- Ensure all sub-contractors conducting critical works (welding, NDT, coating, fabrication) operate under an equivalent ISO 9001-compliant QMS or are otherwise subject to enhanced supervision and audit by the *Contractor*.

2.5.7 Quality Audits

The *Employer*, *Project Manager*, or an appointed third-party QA auditor reserves the right to carry out scheduled and unannounced quality audits at any time during the contract period. The *Contractor* shall facilitate such audits and provide full access to personnel, records, plant, and off-site facilities. Any findings shall be addressed through a Corrective Action Plan within a period specified by the *Project Manager*.

2.5.8 Non-Conformance and Penalties

Repeated or unrectified non-conformances may result in the suspension of the relevant *works*. Persistent failure to adhere to the approved Quality Plan may constitute a defect under Clause 11.2(5) and lead to recovery of associated costs by the *Employer*.

2.6 Programming constraints

The *Contractor* shall develop, maintain, and regularly update a detailed project program using Microsoft Project, or equivalent software which must be compatible with the *Employer*'s project management systems to facilitate effective coordination and reporting.

In accordance with NEC3 ECC Clause 31.2, the program shall clearly identify and incorporate the scope of work, including:

- The activities and milestones to be executed by the *Contractor*.
- The work to be undertaken by the *Employer* and Others, which includes but is not limited to:
  - Site access and handover timings.
  - Provision and installation of any *Employer*-supplied equipment, materials, or services.
  - Scheduled utility shutdowns or diversions critical to project progress.
  - Any other interdependent works affecting the *works*.

Additional information to be included in the program, as per the last bullet of Clause 31.2, shall comprise:

- Key approval points such as design submissions, stage gate reports, quality assurance inspections, and statutory certifications.
- Critical dependencies and interface points with other contractors or stakeholders.
- Planned testing, commissioning, and handover milestones.
- Risk mitigation activities related to safety, environmental compliance, and operational continuity of the fuel storage facility.

The *Contractor* shall also consider and integrate the following specific programming constraints:

- All refurbishment, replacement, and upgrade works must be coordinated to ensure uninterrupted operation and safety of the bulk Jet-A1 fuel storage depot, with any required shutdowns or isolations subject to prior *Employer* approval and scheduled to minimize operational impact. Due to the criticality of fuelling operations to the *Employer*, the extent to which outages may be incurred for construction works at the facility are limited. The *Contractor* is to note and plan for, at least, the following as the *Employer* will not be held liable for standing time:
  - That no more than 2 above-ground bulk Jet-A1 fuel storage tanks may be simultaneously taken out of service at any time.
  - That no interruptions to airport apron hydrant supply, facility fuel stock receipt, facility electrical supply, or any facility operations may be incurred due to the works unless based on prior written approval by the *Employer* and the facility operator.
- Compliance with operational hours and security protocols of the site, including restrictions on noise, deliveries, and access during peak periods.
- Sequencing of works must accommodate phased handover requirements and progressive commissioning to enable timely project closeout.
- The *Contractor* must allow for contingency periods to address unforeseen technical, regulatory, or environmental delays.
- Coordination with external agencies (e.g., airport authorities, environmental regulators) for timely approvals and inspections.

Failure to reflect these constraints and required *Employer* work in the program will be grounds for the *Employer* to reject submitted programs until compliance is achieved. The approved program will form the basis for progress monitoring, resource allocation, and assessment of any compensation events.

2.7 Key Performance Indicators

2.7.1 Purpose and Scope

This section sets out the Key Performance Indicators (KPIs) against which the Contractor's performance will be assessed under the contract. These KPIs reflect the Employer's critical expectations regarding design and documentation quality, procurement efficiency, health and safety performance, environmental compliance, schedule adherence, and overall contract execution quality.

The provisions of this section are linked to secondary Option X17 – Low Performance Damages, and failure to meet the Minimum Acceptable Performance levels specified herein may result in the application of Low Performance Damages.

Performance measurement is managed and verified by the Project Manager on behalf of the Employer, in accordance with the NEC3 ECC. Where performance falls below the agreed minimums, the Project Manager shall calculate the applicable Low Performance Damages and implement these via the relevant payment certificate, subject to the Employer's agreement.

2.7.2 Contractor Responsibilities

The Contractor shall:

- Comply with the performance criteria described in the Defined KPI Table in clause 2.7.3 below;
- Establish internal systems and procedures necessary to monitor, track, and report KPI performance;
- Submit verified performance data at the frequency required as per section 2.7.3;
- Proactively warn the Project Manager of any emerging risks that could jeopardize KPI performance via Early Warning Notices and Risk Reduction Meetings as required by Clause 16.1;
- Cooperate fully with performance audits, inspections, and data validation exercises as may be initiated by the Project Manager or Employer.

KPI performance does not limit or reduce the Contractor's obligations in this contract.

2.7.3 Defined KPI Table

The Contractor's performance will be assessed by the Project Manager against these KPIs and will inform the application of low performance damages under Option X17. The Project Manager shall monitor, measure, and report compliance and non-compliance to the Employer. Non-compliance will be subject to rectification periods as directed by the Project Manager.

Key Performance Area (KPA)	Key Performance Indicator (KPI)	Measurement Method	Performance Target	Minimum Acceptable Performance
1. Documentation Control	% of documents submitted on time per MDR	Monthly submission logs	≥ 95%	85%
	% of documents correctly formatted and numbered	Quality check sample of 10 per week	100%	95%
	% of DMS uploads within 24 hours of email submission	DMS audit report	≥ 98%	90%
2. Health and Safety	Number of recordable incidents (LTIs) per 100,000 hrs worked	H&S reports; incident logs	0	≤ 1
	% of toolbox talks held on time	H&S file records	100% weekly	90% weekly
	% compliance with H&S Plan and PTW system	Weekly audits	100%	≥ 95%
3. Environmental Compliance	Number of reportable environmental incidents	Environmental log	0	≤ 1 per quarter
	% timely submission of spill/incident reports (within 48 hrs)	Audit of environmental file	100%	90%
	% compliance with approved EMP	Weekly inspection reports	≥ 98%	90%
4. Quality Assurance	% of ITPs submitted and approved on schedule	QA submission register	≥ 95%	85%
	% of hold/witness points adhered to	Project Manager's QA checklist	100%	95%

Key Performance Area (KPA)	Key Performance Indicator (KPI)	Measurement Method	Performance Target	Minimum Acceptable Performance
	Average days to close NCRs	NCR log	≤ 5 days	≤ 10 days
5. Programme Management	% of activities completed on schedule (baseline vs actual)	Schedule variance report	≥ 90%	≥ 80%
	% of early warnings submitted within required timeframe	Early warning register	100% within 24 hrs	90%
	% of risk reduction meetings attended with valid updates	Attendance register and minutes	100%	90%
6. Procurement and Delivery	% of procurement packages awarded on schedule	Procurement plan vs actual	≥ 95%	85%
	% of long-lead items delivered as per schedule	Delivery tracker	100%	95%
7. Communication and Reporting	Timeliness of weekly and monthly reports	Delivery timestamps	100% on or before due date	90%
	Accuracy of data in reports (e.g. progress, cost, HSE)	PM's verification	≥ 98%	≥ 90%
8. Contractor Responsiveness	Average time to respond to PM queries and instructions	Response log	≤ 2 working days	≤ 4 working days

2.7.4 Reporting Requirements and Timing

The Contractor shall provide:

- A Weekly KPI Summary containing:
  - Brief update on performance status across all KPI categories;
  - Identification of any trends or risks affecting KPI achievement;
  - Notification of any new non-conformances or incidents.
- A Monthly KPI Performance Report including:
  - Full assessment against each KPI listed in Clause X.7.3;
  - Tables, graphs, or dashboards showing actual vs. target performance;
  - Supporting documents (e.g. inspection logs, NCR registers, document transmittal summaries, H&S logs);
  - Corrective Action Plans for any KPIs falling below the minimum level;
  - Explanation of any delays in recovery or persistent poor performance.

Submissions must be made through the Project Document Management System (DMS), with proper file references and version control, and shall be clearly marked as contractual performance reports.

2.7.5 Performance Enforcement

Where performance in any KPI falls below the Minimum Acceptable Performance for the period under review:

- The Project Manager shall record the failure, request clarification from the Contractor (if needed), and calculate the applicable Low Performance Damages in line with Contract Data Part Two – Option X17.
- These damages will be implemented by the Project Manager in the relevant payment certificate as a deduction from the amount due.
- The Employer shall have final approval over the implementation of any such deduction.

Persistent failure to meet performance targets may also trigger a review of the Contractor's method statements, resourcing, or subcontractor arrangements, and where applicable, may constitute a breach of contract.

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

The *Contractor* shall ensure that competent and suitably qualified personnel are assigned to the management, supervision, and execution of the works, with appropriate experience in the planning, design management, procurement, and construction oversight of large-scale, multi-disciplinary petrochemical infrastructure refurbishment and upgrade projects within safety-critical, regulated, and operationally sensitive environments, such as major aviation fuel storage and handling facilities.

The *Contractor* shall provide and maintain a clear, structured management and supervision framework for the duration of the contract. This framework shall include, at least, the following:

- An organogram of the *Contractor*'s team showing key people, their roles, reporting lines, and communication pathways. This shall include all individuals responsible for project leadership, discipline-specific engineering, construction management, health and safety, quality management, and environmental management.
- Identification of key people as listed in the Contract Data Part Two, along with their respective CVs, detailing qualifications, accreditations (e.g. with ECSA, SACPCMP, etc.), and relevant experience in similar projects.
- A description of the governance and communication structure within the *Contractor*'s team, as well as between the *Contractor,* the *Project Manager*, and the *Employer*, and other project stakeholders, including the facility operator and any sub-contractors, specialists or sub-consultants engaged by the *Contractor*.
- In the case of a Joint Venture, the organogram must clearly indicate the allocation of roles and responsibilities among the JV partners, the leading partner, the decision-making structure, and the mechanism for dispute resolution within the JV. The *Contractor* shall include a copy of the JV agreement as an addendum to the *Contractor's* Works Information and provide one copy to the *Project Manager*.
- The *Contractor* shall nominate a single point of accountability (e.g., the Project Director) empowered to represent the *Contractor* in all matters relating to the performance of the contract.

The *Contractor* shall ensure continuity of key personnel for the duration of the project and shall not remove or replace any key person without the prior written approval of the *Employer*, except where required by law or for reasons of misconduct, incapacity, or resignation.

The *Contractor* shall also demonstrate that there is adequate site-based presence and supervision capacity appropriate to the nature and scale of the works being managed at any given time, including interfaces with live operations, hazardous work zones, and critical project milestones.

The *Employer* reserves the right to interview and approve key personnel before commencement of the contract or during its execution.

2.9 Invoicing and payment

Within two working days of receiving a payment certificate from the *Project Manager* in terms of core clause 51.1, the *Contractor* issues a notification to the *Employer* that payment is due via e-mail with the payment certificate attached. The *Employer* then issues to the *Contractor* a receipt number against the purchase order under which the *Contractor* did work. The *Contractor* provides the *Employer* with a tax invoice showing the amount due for payment equal to that stated in the *Project Manager's* payment certificate.

The *Contractor* shall address the tax invoice to Invoices.Acsa@airports.co.za for payment and include on each invoice the following information:

- Name and address of the *Contractor* and the *Project Manager.*
- The contract number and title.
- Purchase Order number
- Receipt number
- *Contractor*'s VAT registration number.

- The *Employer*'s VAT registration number 4930138393
- Description of work done by cross reference to *Project Manager*'s certificate.
- Total amount invoiced excluding VAT, the VAT and the invoiced amount including VAT.

2.10 Contract change management

This section sets out the standard requirements and procedures for managing changes to the contract, including but not limited to Compensation Events, as well as the communication of *Project Manager* delegations, early warnings, and issue of formal certificates. These procedures are supplementary to the provisions of Section 6 of the NEC3 ECC Core Clauses (Compensation Events) and are intended to standardise and streamline the administration of changes across the multi-disciplinary scope of the EPCM project.

2.10.1 Use of Standard Forms

To ensure consistency, traceability and clarity in contractual communications, the following standard forms shall be used by the Contractor, Project Manager, and Supervisor for the respective contract management functions. All forms shall be submitted electronically in editable PDF or MS Word format via the project document management system (DMS), and a signed PDF copy filed in the official project record.

Change Management Process	**Standard Form Reference**	**Responsible Party**
Notification of a Compensation Event (Clause 61.1)	Form CE-001	*Contractor* / *Project Manager*
Submission of Quotation (Clause 62.3)	Form CE-002	*Contractor*
Project Manager's Instruction (Clause 14.3)	Form PM-001	*Project Manager*
Delegation of Duties (Clause 14.2)	Form PM-002	*Project Manager*
Early Warning Notification (Clause 16.1)	Form EW-001	Any Party
Early Warning Meeting Record	Form EW-002	*Project Manager*
Notification of Completion (Clause 30.2)	Form COC-001	*Project Manager*
Takeover Certificate (Clause 35.3)	Form TOC-001	*Project Manager*
Access to site confirmation	Form ACC-001	*Project Manager*
Notification of Termination (Clause 90.1)	Form TC-001	*Project Manager* / *Contractor*
Termination Certificate (Clause 90.5)	Form TC-002	*Project Manager*

All standard forms shall include at minimum:

- Date of issue
- Contract reference and relevant clause number(s)
- Unique form number or tracking ID
- Description of the subject matter
- Parties involved and contact information
- Signature block with designation and date

The latest version of all standard forms will be maintained and made available by the *Project Manager* within the DMS. The *Contractor* shall ensure that all communications relating to change management comply with these formats unless expressly agreed otherwise in writing by the *Project Manager*.

2.10.2 Communication Protocols

- Tracking and Logging: All change-related communications must be logged by both parties in a central change register maintained by the *Project Manager* and regularly updated in coordination with the *Contractor*.
- Change Coordination Meetings: Regular coordination meetings shall be held (frequency to be defined in Section 3 of the Works Information) to review and update the status of Compensation

Events, Early Warnings, and delegated instructions. Meeting minutes shall record all decisions and actions and refer to the associated standard forms.

2.11 Provision of bonds and guarantees

The form in which a bond or guarantee required by the *conditions of contract* (if any) is to be provided by the *Contractor* is given in Part 1 Agreements and Contract Data, Annexure B of the *Employer*'s Works Information.

The *Employer* may withhold payment of amounts due to the *Contractor* until the bond or guarantee required in terms of this contract has been received and accepted by the person notified to the *Contractor* by the *Project Manager* to receive and accept such bond or guarantee. Such withholding of payment due to the *Contractor* does not affect the *Employer*'s right to termination stated in this contract.

2.12 Records of Defined Cost, payments & assessments of compensation events to be kept by the *Contractor*

If Option C, D, E or F applies first read clause 52.2 and then state whether the *Contractor* is required to keep any other records. Include any other constraint which may be required in regard to format and filing of the records, and whether access for the *Project Manager* shall be provided in hard copy or electronically.

Could delete if Options A & B apply unless the *Employer* requires some form of control over the *Contractor*'s record keeping.

The *Contractor* shall keep detailed, accurate and up-to-date records of Defined Cost, payments made, and assessments of compensation events in accordance with the provisions of Clause 52.2 of the Conditions of Contract.

In addition to the requirements of Clause 52.2, the Contractor shall:

- Maintain records in a format that allows clear identification of costs incurred by work package, subcontractor, activity, or functional cost code, and that differentiates between Defined Cost and Disallowed Cost.
- Ensure that all supporting documentation (e.g., timesheets, invoices, payment certificates, equipment logs, and subcontractor accounts) is stored in the Document Management System (DMS) maintained by the *Project Manager*, in accordance with Section 2.2.3.
- Upload all formal cost-related records to the DMS within five (5) working days of their creation or receipt and ensure alignment between such uploads and any parallel communications issued via email, as per the routing protocols in Section 2.2.4.
- Maintain a continuously updated compensation event register, recording each event's reference number, description, notification date, status, and associated cost/time impacts. This register shall also be stored in the DMS and updated no less frequently than weekly.

2.12.1 Access and Format Requirements

All records related to Defined Cost shall be available for inspection by the *Project Manager* and/or the *Employer*'s nominated auditors at any time during normal working hours, either in hard copy (upon request) or electronically via the DMS.

Where physical records exist that are not natively digital, they shall be scanned and uploaded to the DMS in legible PDF format.

Audit trails, including revisions and version histories, must be preserved within the DMS to provide traceability and transparency of all cost-related records.

2.12.2 Retention and Format

Records shall be retained in the DMS for at least six (6) years after Completion of the whole of the *works*.

The *Contractor* shall follow the document naming conventions, metadata tagging, and folder structures as agreed with the *Project Manager* within four (4) weeks of the Contract Date.

Monthly Defined Cost summary reports, formatted as agreed with the *Project Manager*, shall be submitted via the DMS and accompanied by detailed cost breakdowns and supporting evidence.

2.13 Training workshops and technology transfer

Describe type and frequency of on job training workshops, as well as any obligation for technology transfer being included as part of the contract on Completion of the *works*.

The *Contractor* shall plan, coordinate, and deliver structured training workshops and provide comprehensive technology transfer to ensure that the operational, administrative, and management staff of the facility operator are fully capable of operating, maintaining, and optimising the modernised infrastructure and systems introduced under this contract.

2.13.1 Training Obligations

The *Contractor* shall provide a training programme that includes, but is not limited to, the following focus areas:

- SCADA and Distributed Control System (DCS) operations
- Field device operation and diagnostics and maintenance
- Advanced instrumentation calibration and maintenance
- CMMS (Computerised Maintenance Management System) integration and workflows
- Condition monitoring and predictive maintenance tools
- 4IR/Smart infrastructure functionalities, including remote access, data analytics, and automation interfaces
- System security protocols, including user access control, failover, and cybersecurity basics

2.13.2 Delivery of Training

- Training shall be delivered through a combination of on-the-job training, classroom sessions, and hands-on system demonstrations using live or simulated environments.
- Training sessions shall be held monthly during the installation and commissioning phases, and at increased frequency (weekly or bi-weekly) during the final three months before Completion.
- All training shall be conducted on site, unless otherwise agreed with the *Project Manager* and the *Employer*.
- The *Contractor* shall issue a training plan for approval by the *Project Manager* no later than twelve (12) weeks after the Contract Date.
- A training log shall be maintained and uploaded to the Document Management System (see Section 2.2.3), with records of attendance, subject matter covered, and competency sign-off for each participant.

2.13.3 Training Materials

The *Contractor* shall prepare and provide all necessary training manuals, quick-reference guides, SOPs (standard operating procedures), and video demonstrations.

Materials shall be customised to the operational environment of the facility operator and submitted to the *Project Manager* and facility operator for review and acceptance prior to use.

All training materials shall be provided in English and in both digital (PDF, editable format) and hard copy formats.

2.13.4 Technology Transfer on Completion

On Completion of the whole of the *works*, the *Contractor* shall provide a formal Technology Transfer Package, including:

- As-built system architecture documentation, data sheets, and network diagrams

- Configuration files, source code (where applicable), and access credentials
- Operating manuals and lifecycle maintenance requirements for installed systems and devices
- A summary of all training completed, outstanding competency gaps, and recommendations for further development
- Handover of any simulation/training environments established for learning purposes
- Copies of all software licences, warranties, and service level agreements

2.13.5 Additional Requirements

The *Contractor* shall ensure that all training aligns with the operating policies and safety procedures of both the *Employer* and the facility operator. Where these differ, the more stringent requirement shall apply.

A minimum of four (4) complete sets of all final training and handover documentation shall be submitted to the *Employer*.

The *Contractor* shall be available for post-Completion technical support and refresher training, if required, for a period of up to six (6) months following Completion.

3 Engineering and the *Contractor*'s design

3.1 *Employer*'s design

The *Employer* has previously undertaken partial design and procurement activities relating to the refurbishment, replacement, and upgrade of the infrastructure at the tank depot. As part of a prior attempt to deliver the project, several work packages were developed to Stage 3 (Final Design), and a quantity of long-lead and project-specific spare parts were procured and delivered to site.

3.1.1 Use of Existing Designs and Documentation

The *Contractor* shall review, assess, and where appropriate integrate the previously developed design documentation, reports, and specifications into its own detailed design deliverables.

These existing designs shall be treated as reference inputs only, and the *Contractor* shall assume full responsibility for the adequacy, completeness, integration, and performance of the final design.

The *Employer* does not warrant or accept liability for the accuracy, completeness, or suitability of the previously completed design work.

3.1.2 User Requirement Specification and Performance-Based Approach

The *Employer*'s requirements for each work package are defined through a combination of:

- Performance targets
- Operational and safety performance criteria

These specifications are intended to guide the *Contractor*'s engineering and design obligations in accordance with the EPCM scope under this contract.

The *Contractor* shall ensure that the final design meets or exceeds the specified functional, performance, and lifecycle requirements.

3.1.3 Previously Procured Spares

The *Contractor* shall identify, inspect, and assess all previously procured spare parts, components, and materials currently in storage or on site.

The Contractor shall determine whether each item can be:

- Certified for use in accordance with the Contractor's final design
- Assigned an appropriate remaining service life
- Compliant with current statutory and technical requirements

Items deemed unsuitable or non-compliant shall be identified in a spares assessment report, with recommendations for reuse, modification, or disposal. This report shall be submitted to the *Project Manager* for review and to the *Employer* for acceptance.

3.1.4 Design Responsibility and Standard

The *Contractor* shall be fully responsible for the detailed design, integration, and coordination of all disciplines within the scope of the works.

The Contractor shall ensure that all designs:

- Are prepared in accordance with applicable South African legislation, technical codes, and industry best practices
- Comply with the performance targets issued by the *Employer* in the Annexure D of the Works Information
- Incorporate learnings and efficiencies where practical from the previous design effort, without replicating deficiencies

Where the previously completed designs were developed by third-party consultants, the *Contractor* may reference these for information only. The primary obligation remains on the *Contractor* to deliver a coordinated and compliant final design.

3.1.5 Information to be Provided by the Employer

The *Employer* shall provide access to:

- All existing design documentation (Stage 3)
- Records of previously procured spares, including delivery notes and manufacturer data sheets
- Any available reports on previous testing, surveys, or inspections

The *Contractor* shall notify the *Project Manager* and *Employer* within four (4) weeks of the Contract Date of any gaps, inconsistencies, or risks identified in the provided design inputs or specifications.

3.2 Parts of the *works* which the *Contractor* is to design

The *Contractor* is responsible for the full engineering, design, integration, and coordination of the Works in accordance with the EPCM scope of this contract. This includes, but is not limited to, the following:

3.2.1 Permanent Works Design – Mechanical Works

3.2.1.1 Work Package A – Replacement of Bulk Storage Tanks

The Contractor shall be responsible for the mechanical design and engineering of the replacement of Bulk Storage Tanks 1 through 7 in Tank Farm 1. These tanks have reached the end of their operational service lives and shall be replaced on a like-for-like basis in terms of capacity and footprint, while incorporating all mechanical system improvements required by the Employer's User Requirement Specification (URS). The tanks shall be designed in compliance with relevant international codes and standards, including API, Energy Institute (EI), Joint Inspection Group (JIG), NFPA, and applicable South African regulations.

The Contractor's mechanical design responsibilities include:

a) Tank Shell, Floor, and Roof Fabrication: Design of fixed dome roof tanks to achieve a minimum 50-year mechanical service life, with 100% defect-free welds, confirmed via NDT.
b) Hydrostatic Integrity: All tanks must demonstrate no leakage under full hydrostatic head for a continuous 24-hour test period, in accordance with API 650.
c) Floating Suctions and Nozzles: The Contractor shall review the size and configuration of floating suctions and upgrade them where necessary to meet apron fuelling demand. Preference is to integrate existing 24-inch floating suctions delivered to site. All floating suction systems must achieve a maximum fuel draw-off level of ≤ 150 mm from the surface.
d) Top Foam Pourers: Design and integrate top-entry foam pourers to replace the legacy base injection system. These shall be capable of effective full-surface application and extinguishment of tank fires, with application rates meeting or exceeding the URS and NFPA guidance.
e) Fire Deluge and Cooling System: A deluge cooling system shall be designed for each tank, capable of limiting fuel temperature rise to ≤ 1°C/hour under full fire exposure conditions, in compliance with NFPA 15 and API 2030.
f) Overfill Protection and Surge Arrestors: Mechanical integration of overfill prevention components and surge arrestor hardware (e.g. valves, detectors) to enable 100% overfill protection functionality and ≥ 99.9% flow surge detection effectiveness.
g) Tank Venting: Design of mechanical venting systems (normal and emergency) shall meet flow capacity requirements in accordance with API 2000 and operator specifications.
h) Foam and Firewater Systems: Mechanical layout and integration of foam concentrate lines, storage tanks, and delivery systems at each tank and within apron pump/filter bays. Foam systems shall meet or exceed URS specifications for application rate, foam type (AFFF/FFFP), and minimum concentrate shelf-life of 5 years.
i) Sampling and Product Slopping: The Contractor shall incorporate mechanical sampling points at the upper, middle, and lower levels of each tank, and where feasible, shall include systems for slopping off-specification Jet-A1 product using drains, flexible hoses, or stripper pumps.

All aspects of the mechanical design must be fully aligned with the *Employer*'s requirements and applicable performance targets. The Contractor shall produce a URS compliance report, including test and validation methods, to demonstrate full conformity with the required mechanical performance guarantees.

3.2.1.2 Work Package B – Jet Fuel Lines and Systems

The *Contractor* shall undertake the full Engineering, Procurement, Construction and Management (EPCM) for the complete mechanical design, fabrication, installation, testing and commissioning of the Jet-A1 fuel lines and systems. This includes the removal of the existing fuel inlet filter station (currently located south of the apron pumps) and the design and construction of three discrete new inlet filter stations for the dedicated pipeline (NATREF), railcar supply lines, and multiproduct pipeline supply respectively.

Each inlet filter station shall retain and improve the functionality of the existing system and incorporate the following: primary and standby pre-filters, primary and standby fuel water separators, and strainers upstream of each pre-filter. All filters, separators, strainers, valves, nozzles, and associated pipework must be sized for the expected maximum design flow and aligned with the *Employer*'s technical performance targets. Specifically, all mechanical systems and components must be designed and selected to:

a) Achieve pipe service life of ≥ 50 years, validated by coating adhesion and wear testing,
b) Provide piping supports and brackets with load-bearing capacity ≥ 1.5x operational load, validated through load deflection tests,
c) Ensure no visible leakage over 72 hours during pressure tests,
d) Guarantee cavitation margin (NPSHA ≥ NPSHR +1.0 m)

The inlet filter stations shall be automated to reduce operator burden and risk of fuel supply interruption. Pre-filters and fuel water separators shall feature automated changeover functionality triggered by high corrected differential pressure and high-high water levels respectively. This includes automatic actuation of outlet DBB (double block and bleed) valves, while inlet DBB valves will remain manually operated. Operator alarms are to be provided for each high-limit event.

All fuel water separators and pre-filters must comply with the latest applicable API/EI specifications. A closed sampling system for fuel receipt, traceability, and certification must be designed and installed for each supply line inlet station, complying with Employer-mandated quality assurance and operational traceability standards. Sampling systems must support flowmeter accuracy of ±0.5% or better, and level sensor accuracy within ±5 mm, with full calibration and verification protocols in place.

The Contractor shall also install pipework and filtration to enable Jet-A1 receipt from the multiproduct line into all operational tanks in Tank Farm 1. All mechanical systems shall be designed for a minimum 50-year service life and facilitate ease of maintenance, including the installation of upstream and downstream isolation valves on the D1 and D2 main feeder valves to support safe isolation and replacement.

All systems shall be designed and implemented in a manner that maximises resilience and redundancy, in particular:

- Ensuring redundant filtration paths (duty/standby) maintain full flow with one unit offline,
- Supporting a dual suction/discharge header system to retain ≥ 80% flow during header or equipment failure,
- Designing to facilitate integration with redundant power and SCADA/PLC systems, enabling failover without visibility/control loss exceeding 2 seconds.

All specified performance targets will be validated through factory acceptance tests (FAT), site acceptance tests (SAT), and commissioning protocols, with appropriate penalties or incentives applied per the Employer's performance regime.

3.2.1.3 Work Package C – Apron Pump Bay, and the Suction and Discharge Headers

The *Contractor* shall be responsible for the detailed engineering design, procurement, construction, installation, and commissioning of the apron pump bay and associated suction and discharge header systems, forming part of the permanent mechanical works. This includes all mechanical works necessary to ensure the system meets the performance requirements of the upgraded fuel distribution network and aligns with operational continuity requirements at the airport.

This work package encompasses the replacement of all suction lines from Tank Farm 1 and common suction lines, as well as all discharge piping. Existing bellows must be removed or replaced where practical. The

apron pump suction and discharge manifolds shall be redesigned to ensure operational redundancy in line with resilience targets, specifically achieving 100% flow retention in the event of a single failure.

The *Contractor* shall confirm the required dimensions of the replacement floating suctions and related piping, ensuring compliance with suction performance requirements (≤ 150 mm from fuel surface) and pipe service life standards (≥ 50 years certified life). The performance of current apron pumps shall be evaluated, and new pumps – compliant with API 610 – shall be specified and installed to achieve a hydrant system supply rate of ≥ 2,000 m³/hr, at a redundancy of N+1. These pumps shall meet or exceed mechanical performance targets including ≤ 2.8 mm/s vibration (ISO 20816-3), NPSHA ≥ NPSHR + 1.0 m at the lowest operational level of the fuel storage tank, ≤ 40°C casing temperature rise, and ≥ 75% efficiency at BEP (Best Efficiency Point).

Piping designs shall ensure isolation capability from each of the three tank farms, and the final design must support dual headers for redundancy and future apron feed expansions. Fuel water separators and associated instruments must be reviewed for adequacy at new flow rates and replaced or upgraded as needed to meet discharge flow and filtration capacity targets.

Minimum-flow protection and no-flow cut-out functionality must be incorporated and interlocked with tank controls. EC&I work shall also include installation of proximity switches, temperature, vibration, and cavitation sensors, with DCS (Distributed Control System) integration and VPN (Virtual Private Network) access as per client data security protocols. The relocation of discharge manifolds away from the existing MCC room is preferred and must be implemented where practical.

Additional works include:

- Replacement of apron feed isolation valves with full-bore, double block-and-bleed plug valves (to support future pigging),
- Installation of two 20” blanked-off future flushing connection tie-ins on the apron feeder pipelines,
- Upgrades to fuel water separator isolation facilities (valves, spectacle blinds),
- Fire risk mitigation through pump/filter layout optimisation,
- Assessment of two additional apron feed pumps to meet projected demand and maintain redundancy (N+1 configuration),
- Mechanical and structural supports capable of sustaining ≥ 1.5x operational loads, validated by load testing.

All designs, fabrication drawings, and equipment data sheets shall be submitted for to the *Project Manager* for review and to the *Employer* for approval prior to manufacture, and the *Contractor* must prepare and issue detailed workshop drawings, pipe routing plans, and equipment layouts. Validation testing will be conducted via system flow tests, thermography, and vibration analysis during FAT/SAT. Any deviations from the specified performance must be corrected by the *Contractor*.

The *Contractor* is to note that no interruption to ongoing operations is permitted. Phased commissioning and integration of new systems, including temporary tie-ins and bypass arrangements if required, shall be planned to allow full continuity of airport fuel hydrant-supply operations, and facility operations throughout the construction period.

3.2.1.4 Work Package D – Truck Loading and Meter Proving Bays

The *Contractor* shall undertake the full mechanical design, including detailed workshop drawings and construction documentation, for the truck loading and meter proving bays in accordance with the EPCM (Engineering, Procurement, Construction and Management) obligations of this Contract. This includes the design of all permanent mechanical systems, integration of existing and new equipment, and provision for system interfaces necessary to ensure functional, safe, and compliant fuel loading and meter proving operations.

The scope includes the mechanical design and relocation of two truck loading bays, enabling bottom-loading operations for refuellers and road tankers, with supply sourced from both the apron pump discharge manifold and from Tanks 5 and 6 in Tank Farm 1. The design must allow one bay to accommodate the testing of aviation fuelling vehicles and incorporate reuse of the existing Gorman Rupp transfer pump where feasible, subject to condition assessment. The existing unloading pump is to be replaced with a unit matching performance and compatibility with the current closed sampling system pumps.

The design shall include all mechanical equipment, piping, valves (including double block and bleed arrangements at all tie-ins), and instrumentation associated with the meter proving and testing station. The system must maintain the current operational functionality while allowing for safe calibration, including the reuse and annual water calibration of the 4,000-litre calibration tank. This requires the provision of ergonomic and safety-compliant access infrastructure (platforms, ladders, hoists) and a potable water supply.

Mechanical design responsibilities also include:

- Replacement of the existing Filter/Water Separator (FWS) with a new, adequately rated FWS and provision for a by-pass system designed to avoid operational dead legs and accidental bypass flow.
- Installation of electronically actuated deadman valves to replace current mechanical types, ensuring enhanced operational safety.
- Provision of side-specific loading/offloading interfaces (for e.g., right side for trucks, left for road tankers) and associated control systems, including the loading computer.
- Integration of the new loading systems with the facility operator's existing stock management system/software.
- Installation of emergency stop systems for each loading bay, designed to immediately isolate fuel sources upon activation.
- Installation of compliant earthing, adequate lighting, and lightning protection systems at all loading bays.

In compliance with project-wide performance targets, the mechanical systems associated with this work package shall meet the following minimum requirements:

- Pump vibration level: ≤ 2.8 mm/s RMS (ISO 20816-3:2022) or lower.
- Cavitation margin: NPSHA ≥ NPSHR + 1.0 m.
- Pump efficiency at BEP: ≥ 75%.
- Seal and bearing leakage: No visible leakage over 72 hours.
- Pump duty compliance: ±5% of design point.
- Flowmeter accuracy: ±0.5% or better.
- Pressure and temperature instrumentation: Accuracy within ±0.5% and drift ≤ 0.5%/1°C per year respectively.

Where existing infrastructure or equipment (e.g., calibration tank, Gorman Rupp pump) is proposed for reuse, the *Contractor* must undertake a detailed condition and suitability assessment, and document findings and justifications as part of the design submission. Alternatives to the traditional calibration tank for meter proving may be proposed, subject to compliance with aviation fuel handling standards and approval by the *Project Manager* and the *Employer*.

The mechanical design must also address client preferences, including closed sampling system integration, elimination of the collection tank where appropriate, and direct routing of fuel transfer lines into Tanks 5 and 6. All systems and components must be designed for full compatibility with aviation fuel and must maintain the safety, reliability, and traceability standards applicable to Jet-A1 fuel operations at international airport facilities.

3.2.1.5 Work Package E – Tank Farm 1 Sampling and Flushing Systems

As part of the permanent works design – mechanical works, the *Contractor* shall undertake the complete mechanical design, specification, integration, and optimisation of the Tank Farm 1 Sampling and Flushing Systems. This forms part of the *Contractor*'s scope.

The scope includes the detailed mechanical design of all new associated piping, pumps, valves, instrumentation, and structural interfaces required for the replacement and upgrade of the existing tank sampling, flushing, and stripping systems. The system shall be capable of flushing and sampling Jet-A1 fuel down to the minimum operating level of each storage tank, utilising gravity flow where practicable. The design must conform to or exceed the latest applicable Joint Inspection Group (JIG) standards, with specific attention to closed-loop sampling practices, pump protection measures, and operator safety requirements.

The *Contractor* shall evaluate and optimise the system configuration, including the number of storage tanks served per flush tank, and assess the feasibility of shared or separate pump configurations to perform flushing and stripping operations. All pumps shall be mechanically designed for low vibration levels (≤ 2.8 mm/s RMS) and shall achieve a minimum efficiency of 75% at their best efficiency point (BEP), with

standardisation of pump types across the system being preferred. Pump and suction line design for stripping operations shall ensure complete stripping of each tank within a maximum duration of four (4) hours. Mechanical accommodation for mobile stripping pumps shall also be considered and integrated.

Designs shall incorporate appropriate pump protection features, including low-flow and high-temperature safeguards, as well as overflow containment with suitable alarm systems and mechanical backup solutions. Flush tanks and associated pumps shall be sized to overcome the maximum tank pressure head and shall be designed for full drainage under normal operating conditions.

Sampling systems shall provide mechanical isolation between sample levels (e.g., Upper-, Middle-, and Lower-Level sampling), and enable single-operator functionality in accordance with the *Employer*'s operational preferences. Instrumentation shall be specified and calibrated to provide accurate and repeatable readings, with example performance targets including: ±0.5% for flowmeters and ≤ 1°C/year for temperature sensor drift.

The system design must provide for the return of samples to designated recovery tanks (Tanks 5 and 6) and support simultaneous flushing and sampling operations. All permanent works shall be designed in full coordination with other engineering disciplines, with deliverables including mandatory workshop drawings, in accordance with NEC3 ECC Clause 21.1.

Design considerations shall further include:

- Full compliance with overfill prevention and surge protection requirements
- Provision for safe and ergonomic operator access (e.g., flush tank handrails, manhole safety grids)
- Integration of adequate task lighting, lightning protection, and earthing systems

3.2.1.6 Work Package F – Firewater and Foam Systems

The *Contractor* shall be responsible for the full Engineering, Procurement, Construction, and Management (EPCM) of the firewater and foam fire suppression systems for the fuel storage depot. This includes the detailed design, specification, integration, and commissioning of all mechanical works relating to fire protection infrastructure, in accordance with SANS, NFPA and applicable international standards. The *Contractor* shall ensure that the design accommodates current and future operational requirements, integrates seamlessly with the facility's broader fire and emergency response strategy, and is resilient to high-risk fire scenarios associated with Jet-A1 fuel storage and distribution.

The scope includes replacement of the existing HDPE underground firewater ring main with a new above-ground steel ring main that shall connect to both existing and new hydrant points across the facility. Strategic isolation valves and water curtains (manual dump valve activated) are to be installed at critical locations including Tank Farms, the reservoir, MCC room, pump bays, and gantries, to enable sectional shutdowns and to eliminate the risk of fire-spread. The system must ensure full hydraulic loop functionality with bi-directional water flow capability via reconfigured fire pump headers, redundant water supply pipelines from Jones Road, and a suction ring main capable of drawing from either or both firewater reservoir compartments.

The *Contractor* shall design all firewater and foam delivery infrastructure required to protect Tank Farm 1 and associated bunds, including foam deluge and pourer systems, proportioning equipment, and fixed storage capacity for compliant foam concentrates (AFFF/FFFP). The *Contractor* must ensure that the foam concentrate specified and provided for this work is compliant with the latest environmental, safety, and performance standards, particularly SANS, NFPA 11, and ICAO standards for aviation fuel facilities. The *Employer's* preference is to use fluorine-free fire foam. These systems shall be responsive to detected pressure and temperature changes and be designed to trigger appropriate pump responses automatically. The tank cooling systems shall be designed and installed solely for emergency fire scenarios to limit the rate of Jet-A1 storage tank temperature rise to ≤ 1°C/hour, protecting both the tank involved in the fire and adjacent tanks, as validated by thermal simulation. Pumping systems must meet mechanical performance metrics, including ≤ 2.8 mm/s vibration, ≥ 75% efficiency at BEP, no visible leakage over 72 hours, and cavitation margins of NPSHA ≥ NPSHR + 1.0 m. All fire pumps must be sized and installed to satisfy flow and pressure requirements while maintaining redundancy (N+1) and compliance with specified net positive suction head (NPSH) requirements.

The design shall also accommodate fixed fire suppression systems for the MCC and apron pump areas, firewalls between pumps and filters, and separation of spare and main filter bays for fire resilience. Firewater

foam dosing, mimic panel integration, SCADA/PLC failover reliability, and the full commissioning of control systems shall also be completed. The foam application rate, concentration capacity (in litres), and shelf life must all meet the target performance values, with operational testing to verify delivery rate compliance.

All designs must incorporate sufficient pipe support and bracketry with a load-bearing capacity of ≥ 1.5x operational load and ≥ 20-year coating durability, with validation through standard mechanical testing. Workshop drawings, fabrication details, and interface definitions with civil and electrical works (including power redundancy and UPS backups) shall be developed and submitted for Employer acceptance in accordance with Clause 21.1. The *Contractor* shall ensure all systems are fully integrated, compliant, and commissioned to a standard that meets or exceeds the performance thresholds set out in Annexure D to the Works Information.

Design considerations shall further include:

- Service life of 50 years for pipework
- Maximal storage life of foam concentrate, ≥ 5 years

3.2.1.7 Work Package G – Diesel System

The *Contractor* shall undertake the detailed mechanical design, engineering, procurement, construction, and management of the diesel dispensing and storage system associated with the bulk Jet-A1 fuel storage facility upgrade. This scope includes the relocation and potential re-use (subject to condition assessment and compliance) of the existing diesel storage tank to Bund A6 within Tank Farm 1. The tank and associated components shall comply with applicable standards, including SANS 10131 for tank design, EI 1542 for colour coding, API 2000 and SANS 10089 for vent sizing and safety compliance, and the facility operator standard for venting redundancy.

The diesel system shall incorporate a new dispenser system comprising: a fuel loading pump for truck loading, a flow meter located at the loading bay with both local and remote volume displays (linked to the fleet fuel management system), and two dispenser nozzles mounted on both sides of the third loading bay. The dispenser shall operate via manual initiation and incorporate automatic shut-off upon tank full detection. A keypad system shall be integrated to enable driver and vehicle identification, odometer logging, and diesel volume pre-setting. Overfill protection shall be achieved through both a float-valve mechanical system and a visual/audible alarm system activated locally at the tank and the loading bays. A local tank level indication device must also be installed.

Performance targets specific to this package include: no leakage over 24 hours during hydrostatic integrity testing (per API 650), venting capacity in accordance with API 2000 requirements (validated through simulation or pressure testing), and ≥ 98% defect-free welds as confirmed by 100% NDT of tank shell and floor welds. All piping and supports must be rated to at least 1.5x the operational load, with no visible deflection under test conditions. The diesel pump(s) must comply with ISO 10816-3 Zone B, with a vibration limit of ≤ 4.5 mm/s RMS, achieve ≥ 75% efficiency at Best Efficiency Point (BEP), and demonstrate no seal or bearing leakage under a continuous 72-hour test. The NPSHA of the pump system must exceed NPSHR by at least 1.0 m. Pump casing temperature rise must not exceed 40°C over ambient during operations.

Instrumentation shall meet the following targets: flowmeter accuracy of ±0.5% or better, level sensor accuracy within ±5 mm (validated by dip test), and full functional reliability of the overfill protection system during simulation. The system shall be designed to ensure 100% operability of overfill protection and 99.9% surge protection effectiveness.

The *Contractor* shall prepare and submit detailed workshop drawings, fabrication details, P&IDs, isometrics, and mounting/support schematics for approval, including compliance evidence for all standards and performance metrics listed herein. All permanent works are to be executed to meet or exceed the project's performance targets, and the *Contractor* remains responsible for the rectification of any deficiencies as specified in core clause 21.1.

3.2.1.8 Work Package H – Contaminated Water Unloading

The *Contractor* shall undertake the full Engineering, Procurement, Construction and Management responsibilities for the design and implementation of the contaminated water unloading facility, including all associated mechanical works.

The facility shall enable efficient and environmentally secure offloading of contaminated water from pit cleaner trucks into the updated separator system, which is to be proposed and designed by the *Contractor* in accordance with applicable environmental regulations and airport safety protocols. The unloading system must include an appropriately rated unloading pump and associated piping, with performance parameters meeting or exceeding a cavitation margin of NPSHA ≥ NPSHR + 1.0 m, pump vibration levels not exceeding 2.8 mm/s RMS (ISO 10816-3 Zone B), and pump casing temperature rise ≤ 40°C over ambient conditions. The pump shall operate within ±5% of the design duty point for flow and head and achieve a minimum efficiency of 75% at Best Efficiency Point (BEP). The mechanical design shall incorporate robust piping supports and brackets rated for ≥ 1.5 times the operational load and ensure no visible leakage from seals or bearings over a 72-hour operational test period.

All equipment shall be specified and arranged to facilitate ease of maintenance, safe operation, and integration with the broader fuel depot systems. Flowmeters, pressure sensors, and any level instrumentation associated with the unloading process shall be selected to achieve accuracy within ±0.5%, ±0.5%, and ±5 mm respectively, and must be calibrated prior to commissioning. The *Contractor* shall provide detailed workshop drawings for all mechanical systems associated with this facility and shall be responsible for the design of all temporary works necessary for construction, commissioning, and tie-in activities.

3.2.1.9 Work Package I – Boundary Receipt Battery Limit Isolation Valves

The *Contractor* shall be responsible for the detailed mechanical design, engineering, procurement, installation, and commissioning of the battery limit isolation valve on the multiproduct receipt pipeline at the relocated filtration stations. This valve forms the critical interface between the incoming receipt pipelines and the upgraded Jet-A1 fuel storage system. The design must incorporate a Safety Integrity Level 3 (SIL-3) rated automated shut-off valve, integrated into the facility's overfill protection system, ensuring full compliance with applicable international standards for aviation fuel safety and reliability. The valve and associated actuators shall be capable of achieving complete shut-off within the response time dictated by the overfill protection logic, as demonstrated through functional system testing.

All mechanical works within this work package must also ensure conformance with the overall project performance targets, particularly:

- minimum pipe coating durability of 20 years (validated via adhesion and wear testing),
- piping supports designed to sustain at least 1.5 times the operational load (verified by load deflection testing),
- and contribution to achieving the minimum Jet-A1 hydrant fuel supply capacity of 2,160 m³/hour as tested during system commissioning.

The *Contractor* shall ensure compatibility of materials, valve automation, and integration with the SCADA and control systems, and shall produce all workshop-level fabrication and installation drawings necessary to execute these works.

3.2.1.10 Work Package J – Compressed Air Distribution

The *Contractor* shall undertake the complete Engineering, Procurement, Construction, and Management of the compressed air generation and distribution system for the facility. The system shall be designed to provide a continuous, clean, dry, and reliable compressed air supply to all designated end-use points across the facility. These include, but are not limited to:

a) pneumatic actuation of the firewater and foam suppression systems.
b) pneumatic return pumps for tank sampling.
c) Visijar emptying pumps.
d) pneumatically operated flushing valves.
e) meter proving overfill protection switches; and
f) general utility applications such as vehicle tyre inflation.

The system shall include mechanical drive system suitable for the environment in which it will operate (namely a Jet-A1 fuel storage facility), as well as air receivers, filtration and drying equipment (such as desiccant dryers), and an integrated distribution network constructed from corrosion-resistant materials, such as aluminium or stainless steel. The compressed air quality shall conform to ISO 8573-1:2010 standards, with a minimum classification of Class 2.2.2 or better for particulate, moisture, and oil content, suitable for critical control applications such as fire suppression.

The *Contractor* shall ensure the compressors are appropriately sized and configured to meet system demands with sufficient redundancy and allow for maintenance access and fire safety clearance. The system shall be designed and commissioned to demonstrate air tightness with no visible leakage during a 72-hour pressure test. Compressor assemblies shall be factory-balanced and installed to meet accepted vibration limits under ISO 10816-3.

All elements of the compressed air system shall comply with the latest applicable South African National Standards (SANS), International Organization for Standardization (ISO) standards, and Original Equipment Manufacturer (OEM) specifications, including but not limited to:

- SANS 10198 — Specification for compressed air and gas piping systems.
- ISO 8573-1:2010 — Compressed air quality classification (particulate, water, oil contamination).
- ISO 7183 — Compressed air dryers — Test methods and performance requirements.
- ISO 10816-3 — Mechanical vibration — Evaluation of machine vibration by measurements on non-rotating parts (for compressor vibration limits);
- API 618 (if applicable) — For rotary compressors used in industrial applications.
- OEM compressor and dryer manufacturer installation and operational guidelines.

The system shall undergo comprehensive commissioning performance tests including:

- Pressure integrity testing to confirm leak-tightness over a continuous 72-hour period at the designated operating pressure.
- Airflow delivery verification ensuring the system meets or exceeds specified volumetric flow rates at all critical points of use.
- Air quality validation through laboratory analysis confirming compliance with ISO 8573-1:2010 Class 2.2.2 or better for particulate, moisture, and oil content.
- Control functionality tests to demonstrate correct pneumatic actuation of fire suppression systems, sampling pumps, and other pneumatic devices under operational conditions.

3.2.1.11 Work Package K – Potable Water Distribution

This work package covers the detailed engineering, procurement, construction, and management of the potable water distribution systems throughout the fuel storage tank depot facility. The *Contractor* shall review and upgrade the potable water infrastructure to improve availability and reliability for operational and maintenance activities, including cleaning of vehicles, equipment and tanks, calibration of the meter proving bay, operation of safety showers, and supply to the administrative building. Potable water supply will primarily rely on municipal water pressure; however, pumping systems shall be designed, installed, and commissioned where necessary to maintain adequate pressure and flow for operational requirements.

The potable water system shall incorporate metering for all incoming potable water supplies. This facility may have multiple potable water incomers; therefore, each incomer shall be individually metered to enable accurate monitoring, control, and reporting of potable water consumption. All metering equipment shall comply with SANS 990 (ISO 4064) – Water meters for cold potable water and hot water, shall be SABS certified for metrological accuracy and durability, and shall include features for remote reading and integration with the facility's instrumentation systems where applicable.

All potable water installations shall comply with South African National Standards (SANS), specifically SANS 241: Drinking Water, SANS 10252-1: Water Supply Installations for Buildings, and SANS 10106: Installation of Pipelines for Potable Water, ensuring hygienic, safe, and reliable distribution. The meter proving bay's potable water system must comply with all relevant SABS certification requirements, including water quality per SANS 241, volumetric and measurement accuracy as per SANS 990 (ISO 4064) and SANS 1394, and installation standards as outlined in SANS 10252-1. All calibration tanks and related equipment shall be certified for volumetric accuracy and traceability by SABS or an equivalent accredited body. Appropriate backflow prevention and safety devices shall be installed and certified wherever applicable or necessary in accordance with SANS 10106 and SANS 1732 (Backflow prevention devices) to prevent contamination and cross-connection risks within the potable water system.

A dedicated reservoir within the facility supplies the firefighting and foam suppression systems. The potable water system shall provide reliable supply to this reservoir in accordance with operational demands, including maintaining adequate pressure, flow, and water quality suitable for firefighting support to both the operational areas and office blocks. Necessary connections, valves, and control equipment shall be

designed to ensure uninterrupted potable water feed to the reservoir under all normal and emergency operating conditions.

The mechanical scope includes design and installation of pipework, valves, pumps (where required), backflow prevention devices, pressure regulators, fittings, instrumentation, and metering systems to maintain system integrity and provide accurate measurement under variable supply conditions. The *Contractor* shall prepare workshop detail drawings derived from employer-provided overall drawings and shall design any temporary works necessary to facilitate installation and commissioning, in compliance with NEC3 ECC core clause 21.1.

Validation and testing of potable water systems shall include pressure and leakage tests per SANS 5864 and SANS 1253 requirements, as well as compliance with occupational health and safety standards such as SANS 10400-O. The potable water system shall be designed for durability, maintainability, and operational safety within the fuel depot context. All defects or non-compliances identified during testing shall be rectified at the contractor's expense.

3.2.1.12 Work Package L – Upgrade of Rail Decanting Facility

The *Contractor* shall undertake a comprehensive upgrade of the rail decanting facility in accordance with current industry best practices and relevant standards, ensuring full compliance with the mechanical performance targets outlined herein and in Annexure D. These targets include achieving pump efficiency of at least 75% at the Best Efficiency Point (BEP), maintaining vibration levels within ISO 10816-3 Zone B limits (≤ 2.8 mm/s RMS), ensuring a cavitation margin with net positive suction head available (NPSHA) at least 1.0 meter greater than net positive suction head required (NPSHR), and limiting pump casing temperature rise to no more than 40°C above ambient temperature. The upgrade shall include the on-site laboratory, office, and ablution facilities, designed and executed to meet applicable occupational health and safety regulations, including ISO 45001 and local building codes, thereby enhancing operational functionality and worker welfare.

A detailed review and necessary upgrade of the pumping systems will be conducted, adhering to Hydraulic Institute guidelines and ISO 5199 standards. The filter water separators will be assessed and upgraded to comply with API 1581 and ASTM D1655 standards to guarantee continuous fuel quality protection.

All replacement piping reticulation shall restore full service-life, conforming to NACE SP0169 and ISO 12944 coating durability requirements of at least 20 years. Pipe supports shall be engineered to sustain a minimum of 1.5 times the operational load, in compliance with ASME B31.3 and AWS D1.1 structural standards.

All mechanical works must comply with applicable fuel handling safety regulations, including NFPA 30 and API 1621, and meet rigorous test, validation, and performance guarantee criteria aligned with ISO 17025 standards. This is essential to mitigate penalties and optimize contractual incentives. The *Contractor* is responsible for detailed mechanical design, including preparation of workshop drawings following ASME Y14 standards, temporary works design, and full coordination of EPCM activities.

3.2.2 Permanent Works Design – Civil Works

3.2.2.1 Work Package A – New tank construction

This work package covers the detailed civil design and construction of new above-ground Jet-A1 bulk storage tanks, entailing full demolition and replacement of existing deteriorated tank and bund foundations within Tank Farm 1. The *Contractor* shall perform comprehensive site investigations and geotechnical assessments in accordance with SANS 1936 and relevant geotechnical best practice guidelines to verify soil stability and confirm foundation bearing capacity, ensuring compliance with project-specific load requirements. All foundation design and construction shall adhere to the durability and performance criteria outlined in SANS 1935 for concrete structures and SANS 10400 for building regulations, achieving a minimum certified concrete durability of 50 years verified by laboratory testing and quality assurance documentation.

The impermeable bund lining shall be replaced with a maintenance-free alternative compliant with SANS 10089 and industry best practice for hydrocarbon spill containment, ensuring a bund wall containment capacity of at least 110% of the largest tank volume as per API 650 and NFPA 30 standards. The *Contractor* shall conduct detailed inspections of bund walls to identify corrosion, structural wear, and unevenness of the

bund floor, with corrective measures — refurbishment or replacement — undertaken in accordance with SANS 10160 for structural loading and durability. The bund drainage system shall be assessed and designed to prevent flooding or ponding, meeting performance standards through rain simulation and visual inspections consistent with SANS 1936 drainage design criteria.

All workshop details and temporary works designs shall comply strictly with core clause 21.1 of the NEC3 ECC contract and align with applicable standards for temporary works such as BS 5975 (Code of Practice for Temporary Works Procedures). The *Contractor* shall ensure that foundation settlement does not exceed a differential maximum of 5 mm/year, with initial settlement monitoring to be coordinated and conducted during the hydrostatic testing phase of the new tanks, in accordance with *Employer*'s preference and relevant geotechnical best practices. Any exceedance shall be promptly rectified at the *Contractor*'s cost.

The *Contractor*'s civil design and construction methodology shall integrate seamlessly with mechanical, structural, and process systems, meeting all relevant performance targets while ensuring safe, durable, and regulatory-compliant tank infrastructure within the overall refurbishment, replacement, and upgrade programme.

3.2.2.2 Work Package B – Concrete Trafficked Areas, Roads and Parking Areas

This work package encompasses the full replacement and upgrade of all existing concrete trafficked areas, internal roads, and parking surfaces within the Jet-A1 bulk fuel depot. The existing pavements have reached the end of their serviceable life due to structural deterioration and will be demolished and reconstructed to reinstate maximum service life. All new surfaces shall be designed and constructed in accordance with applicable standards such as SANS 1200 for rigid and flexible pavements and engineered to support full operational loading under fuel tanker traffic and site-specific environmental conditions. The *Contractor* shall undertake the detailed design, procurement, construction, and management of these permanent works, including associated sub-base layers, expansion joints, kerbing, fire water and Jet-A1 pipeline trench crossings, stormwater drainage systems, and civil interfaces with above- and below-ground services and structures.

The scope also includes the design and construction of new paved and covered areas for the following:

- A new loading bay and meter proving area, with heavy-duty concrete surfacing and structural roofing designed for local wind loads per SANS 10160.
- A new pump bay, including bunded hardstand, fire-rated dividing walls, and overhead canopy, in accordance with SANS 10400-T and NFPA 30.
- New filter bays, wash bay, and sample laboratory, including reinforced plinths, integrated drainage, and roofing systems.
- New parking areas with suitable concrete or block paving and either permanent canopies or shade-net structures.
- Structural and access modifications to the existing MCC Room and pump house.
- Review of the service life of the current 40-m³ underground effluent containment tank and, if necessary, the design and installation of a replacement underground effluent containment tank for capturing fuel-contaminated runoff from operational areas.
- Structural refurbishment or civil works upgrades to existing assets including the administrative building, workshop, storage areas, and vehicle bays.

All concrete works under this package shall be designed for a minimum certified service life of 50 years, in accordance with SANS 10100, ACI 318, or EN 1992. Mix designs shall be laboratory tested and submitted for approval, with durability performance substantiated by documented QA and inspection processes. The paving and drainage design shall ensure zero flooding or ponding under operational rainfall conditions, verified by simulated stormwater testing or visual inspection. Areas such as the apron pump bay, vehicle bays, and filter plinths shall incorporate localised bunding or drainage systems routed to the effluent containment tank, to ensure compliance with environmental and safety regulations.

Where applicable and practicable, foundation elements and heavy-duty pavement bases shall be designed to limit differential settlement of structures to ≤ 5 mm/year, validated through geotechnical monitoring. The *Contractor* is responsible for the full civil and structural design of all permanent works under this package, including preparation of detailed construction drawings and specifications, and for the design and execution of all temporary works in accordance with NEC3 ECC Core Clause 21.1. All design and construction activities shall meet the performance targets and long-term serviceability criteria set out in the Works Information.

3.2.2.3 Work Package C – Upgrade Current and Provision of New Stormwater Infrastructure

The *Contractor* shall be responsible for the complete Engineering, Procurement, Construction, and Management of the permanent stormwater drainage infrastructure within the Jet-A1 bulk fuel depot. This work package is a critical component of the project, intended to eliminate persistent flooding and surface ponding in operational areas and structures due to deteriorated or undersized drainage systems. The upgraded network shall ensure safe, reliable and legally compliant stormwater collection, conveyance, treatment and discharge, with separation of clean and potentially contaminated flows.

The design shall include the refurbishment, replacement, or expansion of existing infrastructure and the provision of new systems as required. Existing API oil-water separators shall be reviewed in detail, hydraulically assessed, and upgraded or replaced to meet the assessed performance targets and/or capacity requirements. API separators must comply with API Publication 421, SANS 1086, and current best practice under the US EPA Stormwater BMP Manual, with demonstrated removal efficiencies suitable for hydrocarbon-contaminated runoff typical of aviation fuelling facilities.

The *Contractor*'s design must address the following infrastructure zones and elements:

- Bunded and non-bunded areas: Installation of compliant drainage interfaces that prevent cross-contamination, incorporating isolation valves and emergency shut-off capabilities.
- Stormwater discharge points: Upgrades must include outfall energy dissipation, monitoring points, and treatment measures to meet effluent quality criteria prescribed under the Ekurhuleni Metropolitan Municipality Stormwater Management By-laws, 2015, as well as applicable Water Use Licence (WUL) conditions under the National Water Act, 1998 (Act No. 36 of 1998).
- Clean water catchment infrastructure: For uncontaminated surfaces such as roofs and open-air aprons, including infiltration and discharge systems.
- Dirty water collection systems: Including collection from vehicular refuelling and maintenance zones, with sedimentation and hydrocarbon separation provisions.
- Fuel spill diversion and containment: Facilities to safely divert and contain accidental spills, equipped with manual or automated controls.
- Parking areas and vehicle wash bay drainage: To be provided with oil/silt separators and grit chambers, with easy-access maintenance points.
- Flow attenuation and regulation infrastructure: Including detention ponds, sub-surface tanks, or equivalent hydraulic structures sized for the relevant design storm return periods and in compliance with municipal flood risk management policies.

All designs shall comply with the following statutory and technical standards, codes and regulations:

- Ekurhuleni Metropolitan Municipality Stormwater Management By-laws, 2015
- Ekurhuleni Municipal Design Guidelines for Civil Engineering Services (latest version)
- National Water Act, 1998 (Act No. 36 of 1998)
- Occupational Health and Safety Act, 1993 (Act No. 85 of 1993)
- SANS 1200 and SANS 2001 series for civil works
- SANS 10252-1 (Water supply and drainage for buildings)
- SANS 1086 (Oil/water separation systems)
- SANS 241 (Drinking water standards, where applicable to reuse or infiltration scenarios)
- API Publication 421 (Design and Operation of Oil–Water Separators)
- US EPA Stormwater Best Management Practices (BMPs)
- ICAO Annex 14 and South African Civil Aviation Authority (SACAA) infrastructure guidelines for airside drainage
- National Building Regulations (SANS 10400: Part R and Part T) for stormwater disposal and safety access

The minimum performance criteria for the permanent stormwater system shall ensure:

- No localised flooding or ponding under the 1:10-year return period storm
- Resilience and controlled overflow management for events up to the 1:50-year return period
- Full hydraulic separation of clean and dirty water streams
- Safe containment and treatment of any first-flush or accidental hydrocarbon release
- Service life of 50 years for civil equipment, trenching and pipework, and 20 years for mechanical equipment (for e.g., sluice gates)

- Accessibility and maintainability by minimal operational staff.

All temporary works (e.g., trench supports, bypass channels, dewatering) required to execute the permanent stormwater upgrades must be designed and certified by a professionally registered civil engineer (PrEng) and comply with relevant provisions of SANS 10096, the OHS Act, and the Construction Regulations, 2014.

As part of the permanent works, the *Contractor* shall prepare and submit all final civil design deliverables, including:

- Full workshop and construction drawings
- Hydraulic calculations and stormwater simulation reports
- Pipe and structure schedules, invert levels, HGL profiles
- As-built records and operations and maintenance manuals
- Risk mitigation plans for storm and spill events
- Asset registration data to municipal format (GIS-compatible)

The *Contractor* remains wholly responsible for the detailed design of this work package, including ensuring full integration with related services and facilities across the project.

3.2.2.4 Work Package D – Segregation of the Stormwater and API Separator Systems

The existing API separator systems discharge effluent of substandard quality, failing to meet municipal and environmental discharge standards. The *Contractor* is responsible for upgrading the separator technology to specialist systems capable of meeting or exceeding these regulatory requirements. Hydrocarbon detectors shall be replaced with devices certified to meet SANS 10131 and API RP 421 standards, ensuring reliable early detection and monitoring.

This work package requires the detailed civil design and construction for the segregation of the stormwater and API separator systems within the Jet-A1 fuel storage tank depot, ensuring full compliance with the following applicable standards, guidelines, and legislation:

- International Best Practice Guidelines: API Recommended Practice 421 (RP 421) for hydrocarbon detection and separator design; BS EN 858-1 for the design and performance of oil separators; ISO 14001:2015 for Environmental Management Systems (EMS); ISO 14031:2013 for Environmental Performance Evaluation; and ISO 14040:2006 for Environmental Management – Life Cycle Assessment principles and framework.
- South African Standards: SANS 1936 (Stormwater Drainage), SANS 10131 (Hydrocarbon detection systems), SANS 10228 (Water quality – sampling and analysis), and SANS 10400 (National Building Regulations relating to drainage and environmental controls).
- Legislation and Regulations: The National Water Act (Act No. 36 of 1998), the National Environmental Management Act (NEMA, Act No. 107 of 1998), and the Ekurhuleni Metropolitan Municipality Water Services By-law.

The design shall ensure complete hydraulic segregation of stormwater and hydrocarbon-contaminated water to prevent cross-contamination, facilitating effective surface drainage with no flooding or ponding at any location, verified through rain simulation tests and visual inspection. Foundation settlements shall not exceed 5 mm/year differential as confirmed by geotechnical monitoring, with rectification at the *Contractor*'s cost for any exceedances. All civil infrastructure either modified, refurbished or installed new shall meet or exceed a design service life of 50 years.

The *Contractor* shall develop detailed workshop drawings and design temporary works as necessary to support the safe execution of the permanent works. Coordination with mechanical and process systems is critical to ensure overall operational performance targets are met or exceeded, particularly regarding effluent quality, structural integrity, and environmental compliance.

3.2.2.5 Work Package E – Provision of Waterborne Sanitation System

The *Contractor* shall undertake full Engineering, Procurement, Construction, and Management responsibilities for the replacement of the existing septic tank installations with a fully reticulated, municipal-compliant waterborne sanitation system. This system shall serve the administrative building, MCC control room, wash bays, guard house, and all eye-wash and emergency shower facilities within the depot. The

design and construction of all civil infrastructure shall ensure a minimum design service life of 50 years, in line with the *Employer*'s requirement for robust, low-maintenance utility systems.

The design shall comply with all applicable legislation and technical standards, including the National Building Regulations and Building Standards Act (Act 103 of 1977), SANS 10400 Part P (Drainage), SANS 10252-2 (Waterborne Sewerage Installations), the City of Ekurhuleni Water Services By-law, 2023, and the Ekurhuleni Water and Sanitation Department Sewer Reticulation Design Guidelines (2024). The design must also comply with the provisions of the National Water Act, 1998 (Act 36 of 1998), including Sections 19, 21, 22, and 24, particularly where the disposal or discharge of treated effluent may impact water resources. In such cases, the *Contractor* shall ensure all necessary registrations or licences for water use, as required by the Department of Water and Sanitation (DWS), are obtained prior to implementation.

The *Contractor* shall design the system to connect to existing municipal sewerage infrastructure wherever feasible. A fully compliant, self-contained alternative solution (e.g. a package plant) may only be proposed where connection to existing municipal sewerage infrastructure is not technically or legally viable. Where an on-site alternative is proposed, the design shall include full effluent quality specifications and demonstrate compliance with applicable effluent discharge limits set by the DWS and the National Water Act. Any such deviation shall require clear justification and written approval from both the *Employer* and the local authority and shall include evidence of compliance with national authorisation or licensing requirements.

To support operational sustainability, the system must be fully accessible and maintainable within the facility boundary, with careful coordination to avoid conflict with paved areas and preserve existing or future load-bearing surfaces. This is to maintain the structural integrity and usability of the site for future upgrades to the Jet-A1 fuel storage capacity.

All buried and above-ground infrastructure (pipes, manholes, chambers, pump bases, etc.) shall be designed to achieve a 50-year service life using appropriate corrosion-resistant materials, engineered trench bedding, and protective coatings. All civil works shall comply with SANS 2001-CS1, SANS 1200 DB/DM, and relevant South African National Standards applicable to sewerage works.

Concrete elements exposed to wastewater or aggressive ground conditions shall be specified for high durability (≥50 years), with supporting certified mix designs and laboratory test data. The *Contractor* shall submit full design documentation including hydraulic profiles, trench details, pipe schedules, manhole configurations, and access provisions, all in accordance with core clause 21.1 of the NEC3 ECC. No construction shall commence prior to written acceptance by the Ekurhuleni Water and Sanitation Department, and where applicable, the Department of Water and Sanitation. The completed system must reflect international best practices for sanitation infrastructure within a hazardous, mission-critical aviation fuel storage tank facility, with emphasis on durability, hygiene, environmental compliance, and long-term resilience.

The *Contractor* is fully responsible for identifying, managing, and mitigating all risks associated with water use licensing and registration under the National Water Act, 1998 (Act 36 of 1998). This includes obtaining any required water use licences or registering the water use activity under a relevant General Authorisation issued by the Department of Water and Sanitation (DWS) for activities related to the treatment, discharge, or disposal of wastewater generated by the waterborne sanitation system.

Where the system connects to municipal sewer infrastructure, the *Contractor* shall confirm that no additional water use licensing is required. Where alternatives to the implementation of a waterborne sanitation system is necessary, the *Contractor* must:

- Prepare and submit all documentation and applications for licensing or registration to the DWS.
- Coordinate with the *Employer* and relevant authorities to obtain timely approvals before construction and commissioning.
- Implement the system in strict accordance with any conditions or limitations stipulated in the water use licence or authorisation.
- Maintain all relevant records and compliance reports required by the licensing authority.
- Bear all costs, delays, and liabilities arising from failure to obtain or comply with water use licences or authorisations.

Failure to secure and comply with necessary water use licences or authorisations will constitute a breach of contract, with the *Contractor* liable for all resultant penalties, remediation costs, and any consequential losses incurred by the *Employer* or third parties.

3.2.2.6 Work Package F – Various Structural Works

This work package covers the engineering, procurement, construction, and management of various civil and structural elements critical to the refurbishment, replacement, and upgrade of the Jet-A1 fuel storage tank depot. The scope includes the construction of new pedestrian bridges, walkways, and access ladders within Tank Farm 1; installation of overhead canopy structures servicing filtration bays, vehicle bays, and pump bays; refurbishment of the administration and MCC buildings' roof structures, including waterproofing and rain gutter systems; and interior renovations such as painting and re-flooring of internal spaces where applicable.

The *Contractor* is required to develop detailed workshop drawings and design documentation and to undertake the design of all necessary temporary works to ensure safe and compliant construction practices.

All works shall comply with applicable South African legislation, including the Occupational Health and Safety Act (No. 85 of 1993), the National Building Regulations and Building Standards Act (No. 103 of 1977). Furthermore, design and execution shall adhere to recognized industry standards such as the SANS 10160 series for structural loading, the SANS 10400 series for building regulations, the SANS 1200 series construction specifications, and API standards pertinent to fuel storage and handling facilities, ensuring a world-class facility upon completion.

Key technical performance targets for this section of the works are listed below. The *Contractor* shall ensure all works meet or exceed these performance targets:

- Achieving concrete durability with a minimum design life of 50 years for all new and refurbished structural elements, supported by certified mix designs and rigorous laboratory testing and quality assurance.
- Ensuring the integrity of waterproofing systems on roof and canopy structures, including roof rain gutter refurbishment, with zero leakage, validated by thorough visual inspections and waterproofing performance testing.
- Implementing corrosion protection measures for all steel and metallic components in accordance with applicable SANS standards to guarantee a minimum 25-year service life.
- Delivering high-quality interior renovations such as painting and re-flooring to ensure durability, aesthetic quality, and compliance with applicable standards and specifications.
- Designing and constructing surface drainage systems to prevent any flooding or ponding at all new and refurbished structures, verified through rain simulation testing and site inspections.

3.2.3 Permanent Works Design – Electrical, Controls and Instrumentation

3.2.3.1 Work Package A – Move Apron Pumps – Extend Power and Control Cables

As part of the relocation of three of the six apron pumps, the *Contractor* shall undertake the full electrical design, procurement, installation, and management of all power and control cabling associated with these pumps. This includes replacement of all six pump feeder cables with new, appropriately rated power cables, installation of new control and thermistor cables for the relocated pumps, and retention of existing control and thermistor cabling for stationary pumps, all terminating in the main Motor Control Centre (MCC). Cable routing shall utilize existing ducts with the installation of suitable cable ladders and supports where practicable, complying fully with SANS 10142-1, IEC 60364, and NFPA 70, ensuring electrical safety, reliability, and maintainability.

In addition to the existing flow monitoring systems, this project shall incorporate enhanced condition monitoring for the apron pumps, including vibration, temperature, and cavitation sensors. The *Contractor* is responsible for the design and installation of all electrical, network and instrumentation cabling required to support these upgraded monitoring functions. This includes providing suitable power supply and control cabling, ensuring appropriate EMC (electromagnetic compatibility) and mechanical protection to maintain signal integrity and durability in the high-vibration operational environment. These enhancements must align with best practices such as IEC 61914 (cable installation) and relevant industry standards governing sensor integration and data transmission.

While vibration compliance and analysis remain within the mechanical scope, the electrical design must account for the mechanical effects of vibration on cable routing and terminations, implementing robust mechanical supports and protection measures to prevent damage and signal degradation. The system

design shall allow for seamless integration of these monitoring inputs into the SCADA and DCS of the facility, adhering to IEC 61131 standards for programmable controllers and communication protocols.

All electrical works shall comply with South African legislation, including the Occupational Health and Safety Act (Act 85 of 1993) and the Electrical Installation Regulations (2014). Installation and certification must be performed by registered and competent persons as mandated, with certificates of compliance (CoCs) issued upon completion to verify adherence to SANS 10142-1 and associated standards.

Detailed workshop drawings, cable termination schedules, and testing protocols shall be submitted per Clause 21.1 of the NEC3 ECC (April 2013), including factory acceptance testing (FAT) and site acceptance testing (SAT) to verify cable continuity, insulation integrity, and EMC performance. The *Contractor*'s design and execution shall deliver a world-class, fully compliant electrical system supporting the safe, resilient, and maintainable operation of the apron pump facilities.

3.2.3.2 Work Package B – Relocation, Reconfiguration and Upgrade of Electrical, Controls and Instrumentation Systems

This work package involves the detailed design, engineering, procurement, construction, and commissioning of electrical, control, and instrumentation (EC&I) works necessary for the refurbishment, expansion, and upgrade of the Jet-A1 bulk fuel storage depot. The scope includes relocation and reconfiguration of existing Basic Process Control System (BPCS), Emergency Shutdown System (ESDS), Remote Input/Output (RIO) panels, power distribution boards (DB), junction boxes (JB), actuators, and related instrumentation to align with revised mechanical and civil layouts as described in Sections 3.2.1 and 3.2.2.

All works must comply with South African standards including SANS 10142-1 (Electrical Wiring), SANS 60079 series (Explosive Atmospheres), IEC 61511 (Functional Safety for Process Industries), and other relevant legislation such as the Occupational Health and Safety Act and Electrical Installation Regulations.

The *Contractor* shall submit an Instrumentation and Control Design Basis document detailing design assumptions, communication protocols, instrument specifications, UPS requirements, and integration strategies supporting 4IR readiness and cloud-compatible SCADA, DCS, and graphical user interface (GUI) upgrades.

In general, the *Contractor* is responsible for the following:

3.2.3.2.1 Replacement of Existing Distribution Boards and Panels

Review the existing field power distribution panels and DB's. Where required and subject to design, propose replacement or reconfiguration to support new layouts and system requirements. Final scope shall be based on detailed fault level assessments, load studies, and system coordination outcomes.

Subject to design and load studies, confirm that all replacement boards maintain redundant power feeds with no power outage exceeding 10 seconds during simulated failures.

3.2.3.2.2 Upgrading of Emergency Shutdown System (ESDS)

Assess and redesign ESDS architecture to align with revised process layout and valve locations. Propose modifications, panel upgrades, or RIO installations based on IEC 61511 compliance and SIL assessments. All changes are to be supported by system logic validation and mechanical interface coordination.

The ESDS shall achieve failover performance targets in Annexure D of the Works Information with no loss of visibility or control exceeding 2 seconds under tested failover scenarios.

3.2.3.2.3 Basic Process Control System (BPCS) Expansion

Evaluate existing BPCS I/O capacity and system architecture. Based on new instrumentation, actuators, and valve arrangements, develop and propose expansion requirements including JB, RIO, and cabinet modifications. Ensure system compatibility and integration.

All field instrumentation connected to the BPCS must meet the following:

- Flowmeter accuracy of ±0.5% or better
- Level sensor accuracy within ±5 mm
- Pressure sensor accuracy of ±0.5%
- Temperature sensor drift not exceeding 1°C/year

All performance targets shall be verified through calibration and testing during commissioning.

3.2.3.2.4 UPS Systems Review and Upgrade

Undertake a review of the existing UPS systems supplying EC&I critical infrastructure. Propose system upgrades or redundancy strategies based on load analysis, availability requirements, and integration with new EC&I layouts.

The UPS system shall support N+1 configuration and provide backup for critical EC&I loads for at least 30 minutes. This shall be confirmed by load bank testing.

3.2.3.2.5 New Field Distribution Board for Natref-Rail Filter Station

Propose, design, and install a field distribution board (DB) at the Natref-Rail Filter Station, subject to the outcome of load studies, hazard classification, and actuator requirements. All works shall conform to the applicable hazardous area standards.

The installed board must support uninterrupted operation with no power loss greater than 10 seconds during simulated MV feed failure.

3.2.3.2.6 New Site Lighting for Operational Areas and Parking Areas

Review and design additional site lighting installations for operational and safety areas as indicated in the lighting layout drawings. All lighting to be confirmed by lux level studies, site walkthroughs, and hazard assessments.

- Review site lighting and supply and install additional lighting as per design drawings for new or relocated operational areas. These include but are not limited to the following:
    - Natref-Rail Filter station.
    - Apron Pump Bay area.
    - Multi-product Filter station area.
    - New parking area for fuel dispensing trucks.
    - Tank farm areas 1, 2, and 3, including lighting on top of tanks and access routes.
    - Car park area.
- All lighting installations to comply with electrical safety and hazardous area requirements.

Lighting performance shall be verified by lux level studies and must prevent any areas of operational significance from falling below the defined illumination threshold. Wherever light poles are to be installed, light pole foundations must prevent water ingress or pooling.

3.2.3.2.7 Natref-Rail Filter Station EC&I

Design and install EC&I systems for the Natref-Rail Filter Station. Final requirements for panels, junction boxes, cabling, and field instrumentation shall be based on detailed process and instrument diagrams (P&IDs), mechanical layouts, and Design Basis documentation.

All instrumentation (flow, level, pressure) shall comply with the same calibration accuracy requirements as per paragraph 3.2.3.2.3 and be tested accordingly.

3.2.3.2.8 Multi-Product Station EC&I

Design and implement EC&I systems for the Multi-Product Filter Station. The exact scope, including cabling, panels, and interface connections, shall be based on final mechanical and process layouts and coordinated across disciplines.

Instrumentation and control panels shall meet the same functional and calibration performance criteria noted in BPCS expansion. SCADA response times during control transitions must remain within 2 seconds.

3.2.3.2.9 Relocation of Actuators

Relocate identified actuators subject to updated piping and mechanical layouts. Design associated power and control cabling modifications, ensuring alignment with ESDS and BPCS systems.

Updated actuator locations must integrate with the ESDS and BPCS with no visibility or control interruption of more than 2 seconds during system tests. Where actuators are fitted with condition monitoring, actuators shall comply with vibration limits of ≤ 4.5 mm/s RMS.

3.2.3.2.10 Test-Rig Station EC&I

Design and install EC&I systems for the Test-Rig Station in accordance with finalised process requirements. All control and safety systems shall be reviewed for integration with central BPCS and ESDS architectures.

All EC&I installations to be fully integrated with the main BPCS and tested to achieve failover response times within the 2-second threshold.

3.2.3.2.11 Fire Water System EC&I

Assess existing Fire Water systems and associated cabling at the MCC and pump house. Develop a proposal for upgrade or replacement based on fault level studies, coordination with the fire protection system design, and voltage classification outcomes.

Associated pump systems must comply with:

- Vibration limits of ≤4.5 mm/s RMS
- Pump casing temperature rise ≤40°C above ambient
- Best Efficiency Point (BEP) efficiency ≥75%
- No leakage from seals/bearings for 72 hours post-commissioning

Compliance to performance targets is to be validated during system operational testing.

3.2.3.2.12 Level Switch High-High (LSHH) Installation on Tanks

Design and install high-high level detection systems for tanks in Tank Farms 1 and 3. The design shall include the selection and placement of LSHH switches, termination into ESDS systems, and documentation for functional safety verification.

LSHH devices shall achieve detection accuracy within ±5 mm of setpoints and integrate with ESDS logic for immediate response. Calibration to be validated by manual dip testing.

3.2.3.2.13 Own-Use Diesel EC&I

Develop and implement the EC&I system for the Own-Use Diesel facility. Final designs must reflect pump configurations, field instrumentation layout, and applicable zone classifications.

All diesel pump instrumentation shall meet applicable sensor accuracy and pump vibration, thermal, and efficiency performance targets.

3.2.3.2.14 Tank Farm 1 and 2 Flushing Pumps EC&I

Design and install EC&I infrastructure for flushing pumps at Tank Farms 1 and 2. Scope to be based on mechanical interface points and control requirements defined in the Design Basis.

Flushing pump systems shall maintain:

- ±5% of rated flow/head
- NPSHA ≥ NPSHR +1.0 m to prevent cavitation
- Casing temperature rise ≤ 40°C
- Efficiency ≥75% at BEP

All performance targets to be confirmed during FAT and SAT.

3.2.3.2.15 Security Gate EC&I

Assess power and control requirements for the existing and new electrically operated security gate. Design and implement EC&I systems accordingly, ensuring interface with access control and communications systems.

Ensure redundant power and control pathways prevent outages longer than 10 seconds during fault simulations.

3.2.3.2.16 Boksburg MV Connection

Review the existing MV connection from Boksburg. If required, propose relocation or reconfiguration options based on load studies, mechanical expansion layouts, and engagement with the *Employer*'s electrical engineering representatives. No relocation is to be presumed and must be design-led.

Any revised MV connection shall provide redundant power continuity with simulated outages not exceeding 10 seconds.

3.2.3.2.17 Actuators Monitoring System

Evaluate the need and feasibility for implementing an actuator condition monitoring system. If determined viable, design, supply and integrate the system with the BPCS for predictive maintenance and alarm management. Scope and technology selection to be subject to the Design Basis document.

All monitored actuators shall comply with the following performance criteria:

- Rotating or gear-driven actuators, if specified by the *Contractor*'s design, shall maintain vibration levels ≤4.5 mm/s RMS as per ISO 20816-1 (Zone B).
- Enclosure surface temperature shall not exceed 40°C above ambient under full-load operation.
- No visible leakage from seals, bearings, or enclosures shall be observed during a continuous 72-hour functional test.
- Actuators equipped with condition monitoring shall provide real-time status, diagnostics (position, torque, fault alarms), and performance data integrated into the SCADA system, with polling intervals not exceeding 10 seconds.

3.2.3.2.18 Additional Control Panels

Determine the need for additional RIO or control panels based on I/O availability, signal segregation needs, and future expandability. Final panel requirements and locations shall be defined during detailed design.

Control panels must be designed with sufficient I/O redundancy and meet UPS backup requirements with at least 30 minutes runtime.

3.2.3.2.19 Upgrade of the SCADA System

Assess the existing SCADA system's limitations. Propose software and hardware upgrades based on operational feedback, redundancy requirements, and compliance with industry best practices. Integration with existing BPCS and network architecture is required.

The upgraded SCADA shall:

- Maintain full visibility and control during failover with response time ≤2 seconds
- Achieve ≥99.9% uptime with redundant architecture

Compliance to these performance targets is to be validated through FAT/SAT including failover and load testing.

3.2.3.2.20 Tank Farm Actuators – EC&I Upgrade

Perform an assessment of actuators and associated EC&I systems in all tank farms. Propose replacements or modifications subject to mechanical equipment upgrades, control system compatibility, and hazardous area compliance.

All actuators shall conform to vibration, temperature, and leak performance criteria and be tested with full integration to ESDS/BPCS.

3.2.3.2.21 Bund Liquid Level Switches

Design and install level detection switches in bunds to differentiate water and hydrocarbon liquids. Final switch types and placements are to be based on bund layouts and environmental compliance reviews.

Switches must differentiate hydrocarbon and water presence accurately and reliably. Calibration to validate sensor response accuracy.

3.2.3.2.22 Backup Power (UPS Systems)

Evaluate the adequacy of existing UPS infrastructure for critical loads. Propose new UPS configurations and power backup strategies based on load criticality classification, changeover reliability, and integration with distribution systems.

Critical loads must be supported for ≥ 30 minutes by N+1 UPS configuration. Compliance to these performance targets is to be validation by full load testing.

3.2.3.2.23 Small Power Installations

Assess and design small power outlets in operational and administrative facilities (control room, guard house, admin building, yard offices). Final locations and load capacities to be determined in coordination with *Employer* requirements and civil layouts.

Outlets must be powered by redundant feeders with failover performance maintaining continuity during 10-second simulated outages.

3.2.3.2.24 Transformer and Fire Pump Control Panel Replacement

Assess existing transformer infrastructure and Fire Water pump control panels. Where deemed necessary and justified by condition assessment and fault studies, propose designs for replacement or upgrade.

Electrical and control systems shall meet defined electrical load capacity and fault level performance. Pumps to comply with duty point, vibration, and leakage requirements.

3.2.3.2.25 Cable Management and Routing

Design cable routes, trays, and trenching systems for all EC&I cables. Final designs to coordinate with structural supports, civil trench layouts, and hazardous area zoning.

Cable trays, supports, and brackets must be rated for ≥1.5x operational load and tested for to ensure minimal structural deflection under simulated load.

3.2.3.2.26 Earthing and Lightning Protection Systems

Review and design appropriate earthing and lightning protection systems for EC&I installations. Final configurations to be compliant with SANS 10199 and aligned with updated equipment layout.

Earthing systems shall be tested to comply with SANS 10199, and lightning protection must protect all EC&I systems with no disruption to instrumentation, controls or control visibility.

3.2.3.2.27 Interface with Civil and Mechanical Systems

Provide ongoing input to ensure EC&I interfaces (e.g., junction box placement, valve interlocks, cable routing) are coordinated with *Contractor's* civil and mechanical designs. Design shall reflect agreed interface points and access provisions.

Ensure interface items (JBs, actuators, cabling, valve interlocks) meet all relevant performance standards, including flow, temperature, and instrumentation accuracy.

3.2.3.2.28 Digitalisation, Cloud Integration, and 4IR Enablement

The *Contractor* shall design, procure, install, and commission a robust communications backbone to support upgraded Electrical, Control and Instrumentation (EC&I) systems. This backbone must comply with the final Instrumentation and Control Design Basis document and integrate seamlessly into the facility's Supervisory Control and Data Acquisition (SCADA) and Distributed Control System (DCS) architecture. The upgraded system must enable digital transformation aligned with Fourth Industrial Revolution (4IR) principles, supporting cloud computing, secure remote access, real-time analytics, condition monitoring, and cybersecurity for the safe, efficient operation of the Jet-A1 bulk fuel storage depot.

The *Contractor* is required to assess the current infrastructure—including SCADA, DCS, Basic Process Control System (BPCS), Emergency Shutdown System (ESDS), and graphical operator interfaces (GUI/HMI: Graphical User Interface / Human-Machine Interface)—to determine upgrade requirements for compatibility with cloud-based systems and 4IR integration. Based on this assessment, the *Contractor* must design a secure and resilient system architecture that enables:

- Enhancements to SCADA/DCS systems via cloud integration,
- Predictive maintenance through condition monitoring of key field assets (e.g., pumps, motors, actuators),
- Centralised data collection and reporting,
- Secure remote access and control with strict access policies,
- Long-term scalability to accommodate future growth or system upgrades.

All necessary hardware and software—including servers, edge devices, industrial gateways, virtualisation platforms, and cybersecurity tools—must be procured, configured, and installed by the *Contractor*. All solutions must comply with local and international data privacy and security standards, and shall incorporate system redundancy, firewalls, and secure connectivity measures without degrading system response times or operational safety.

The *Contractor* shall ensure that new systems are fully interoperable with existing BPCS, ESDS, and IT/OT networks. Where required, the *Contractor* is responsible for procuring and managing licenses for proprietary software platforms (e.g., SCADA, HMI, condition monitoring, network management), ensuring compatibility, support contracts, and long-term maintainability.

Training and documentation must be provided for the Employer's operations and maintenance personnel. This includes practical instruction on cloud-based platforms and interfaces, ensuring operational readiness. Additionally, the *Contractor* must coordinate closely with the Employer's designated IT and Operational Technology (OT) teams to implement cybersecurity protocols, including virtual private network (VPN) access controls, multi-factor authentication, and proper data segmentation between IT and OT domains.

All digital infrastructure must comply with the following technical standards and guidelines:

- IEC 62443 – Industrial Communication Networks: IT Security,
- IEC 62264 and ISA-95 – Enterprise-Control System Integration,
- ISO/IEC 27001 – Information Security Management,
- The *Employer*'s internal IT and cybersecurity policies,
- Any additional digital transformation standards mandated by the Employer.

The digital infrastructure must be capable of supporting cloud-based SCADA/DCS capability, real-time actuator and pump diagnostics, failover within two seconds, secure remote access, and achieve a minimum of 99.9% data uptime and availability. These performance targets shall be verified during commissioning through integration testing and validation reports. To support this, the *Contractor* shall produce detailed electrical and instrumentation design deliverables, including:

- Instrument Loop Diagrams,
- Cable and Wiring Schedules,
- Hazardous Area Classification and Compliance Documentation,
- Termination and Wiring Details,
- Factory and Site Acceptance Test (FAT/SAT) Procedures,
- Commissioning and Calibration Plans.

All design and equipment installation must comply with relevant South African and international standards for petrochemical and hazardous/explosive environments. The *Contractor* is required to coordinate with mechanical and civil works sub-contractors to ensure proper integration, safe installation and intended system function as per the design. A complete testing and commissioning plan must be developed and executed, including loop checks, functional testing, system integration testing, and formal handover documentation. All such activities must conform to the design basis and the performance and safety criteria established for the project.

Given the facility's designation under the National Key Points Act and the principles of Critical Infrastructure Protection, the following additional requirements apply to the upgraded SCADA and DCS systems:

- System Uptime: Digitalised SCADA, BPCS, and historian systems must demonstrate ≥99.95% uptime (less than 22 minutes of unplanned downtime per month), as verified during commissioning through simulated failover and system logs. This must comply with ISA-100, NIST ICS standards, and IEC 61511-2.
- Failover and Redundancy: Failover time must not exceed 2 seconds for SCADA/DCS, programmable logic controllers (PLCs), and critical network systems. No control or visibility loss should occur during these failovers, in line with IEC 61784-3 and ISA-TR84.00.07.
- Real-Time Diagnostics: Pumps and actuators must transmit condition monitoring data—including status, fault codes, torque, vibration, and cycle counts—at intervals no greater than 10 seconds. Historical data must be stored for a minimum of 12 months at 1-minute resolution, in accordance with ISO 13374.
- Cloud Connectivity and Integration: All cloud-connected systems must use encrypted protocols (Transport Layer Security [v1.2 or higher]) and maintain a data latency of ≤ 300 milliseconds. Edge computing devices must buffer data for at least 24 hours during loss of cloud connectivity. This shall comply with IEC 62541 (OPC UA), ISO/IEC 27001, and IEC 62443-4-2.
- Cybersecurity: Full IEC 62443 compliance is mandatory, including system hardening and secure architecture. Multi-factor authentication (MFA) is required for all remote access. Role-Based Access Control (RBAC) must be enforced on all SCADA, Historian, and Engineering Workstations. Intrusion Detection and Prevention Systems (IDPS) must be deployed on all critical OT networks. IT/OT

segregation must follow the Employer's internal cybersecurity policy and the South African National Cybersecurity Policy Framework (NCPF).
- Remote Access: All remote access must be via secure VPNs with MFA and/or IP whitelisting as appropriate. All access sessions must be logged and archived for 12 months. Default access shall be read-only unless otherwise authorised by the *Employer*.
- Scalability, Interfaces and Interoperability: The system must support a 150% increase in I/O (input/output) points without requiring hardware replacement. It must use vendor-neutral protocols (e.g., OPC UA, Modbus TCP/IP, MQTT) and be compatible with the existing fuel hydrant network ESDS (including both Siemens and HIMA HIQuad safety PLC's). This is such that the ESDS functionality of the fuel hydrant network is either maintained or improved. This shall be demonstrated through architecture documentation, FAT expansion simulations, and ESDS activation tests.
- Data Storage and Integrity: All critical data must be stored redundantly, backed up daily, and retained for a minimum of five years. Backup restore tests and checksum integrity checks will be required to verify compliance.

All outcomes of performance testing must be documented in performance validation reports and be submitted to the *Project Manager* and the *Employer* for review and approval.

3.2.4 Temporary Works

The *Contractor* shall design all temporary works necessary for safe and effective construction and commissioning, including but not limited to:
- Scaffolding, formwork, and falsework
- Temporary access roads, pedestrian walkways and/or working platforms
- Temporary pipe supports, power supplies, lighting, and welfare and hygiene facilities
- Construction-phase fire protection and fuel handling systems
- Temporary tank isolation or purging systems (when necessary)

3.2.5 Integration and Interfaces

The *Contractor* shall design all interfaces between:
- Existing infrastructure and new or refurbished systems
- Previously completed work packages and the *Contractor*'s new designs
- Procured long-lead items or spares and the final constructed works
- *Employer*'s operational systems, third-party utilities, and other contractors where necessary.

3.2.6 Statutory and Regulatory Compliance

The *Contractor* shall design all elements to ensure compliance with applicable laws, municipal by-laws, regulations, standards and industry-best practise:
- South African laws and regulations (e.g., OHSA, National Building Regulations, SANS codes)
- Aviation fuel handling standards and international codes of practice (e.g., JIG, API, NFPA)
- Environmental and hazardous substance management requirements
- Requirements of the local fire authority, Civil Aviation Authority, and other statutory bodies

3.2.7 Commissioning and Operational Readiness

The Contractor shall design systems and plans necessary to support:
- Pre-commissioning, testing, and start-up
- Safe and effective transition from construction to operations
- Initial operations and maintenance, including manuals and training materials
- Certification and handover to the *Employer*

3.2.8 Design Deliverables and Reviews

The *Contractor* shall provide design documentation at appropriate stages, including but not limited to:
- Design basis reports
- Preliminary and detailed design packages
- Interface control documents

- Hazard and Operability Study (HAZOP) outcomes
- Construction and “Approved for Construction” drawings
- Design compliance certificates (as required by statutory authorities)

All designs are subject to review by the *Project Manager* in accordance with this contract. The *Employer*’s or *Project Manager’s* review shall not relieve the *Contractor* of any responsibility for the accuracy, completeness, or compliance of the design with the Works Information and applicable legislation, laws and standards.

3.3 Procedure for submission and acceptance of *Contractor*’s design

In accordance with core clause 21.2 of the NEC3 ECC (April 2013), the *Contractor* shall submit to the *Project Manager*, for acceptance, particulars of all parts of the design to be carried out by the *Contractor*. These particulars shall include relevant design calculations, specifications, method statements, risk assessments, interface control documents (ICDs), and drawings necessary to describe the *Contractor*’s design and demonstrate its compliance with the Works Information and all applicable legal and regulatory requirements.

Design submissions shall be prepared in accordance with the *Employer*’s requirements for formatting, routing, and document control, as outlined in Sections 2.2.2 to 2.2.5 of the Works Information. All design submissions shall be:

- Issued in PDF format via email to the designated document control address, including the relevant document number in the subject line;
- Clearly marked as either “For Comment” or “For Acceptance”;
- Uploaded to the Employer’s Document Management System (DMS) within 24 hours of email transmission;
- Indexed and recorded in the Master Document Register (MDR).

Each submission shall include a transmittal identifying the applicable design stage (e.g. concept, preliminary, detailed, or issued for construction), and shall be aligned with the Design Stage Activity Matrix in Annexure F of the Works Information

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Designs not accepted shall be revised and resubmitted in accordance with the same procedure. The *Project Manager* shall respond to each submission within the period for reply stated in the Contract Data, or within a time period agreed to by the Contractor and Employer.

The *Contractor* shall prepare and submit all drawings necessary to describe and implement the Works, including general arrangements, detailed fabrication drawings, installation layouts, “Issued for Construction” (IFC) drawings, and “As-Built” drawings. All drawings shall comply with the *Employer*’s drawing standards and be coordinated with interfacing disciplines and stakeholders.

The *Contractor* shall ensure full cooperation with Others including regulatory bodies, utility providers, third-party contractors, airport operational teams, and others identified above, and shall participate in design coordination meetings as required to resolve interface issues prior to final design acceptance.

3.4 Other requirements of the *Contractor*’s design

The *Contractor* shall ensure that the design for the Works incorporates and maintains a configuration management system appropriate to the complexity and safety-critical nature of the facility. This system shall enable traceability and control of all design outputs, technical changes, and interfaces throughout the project lifecycle — from conceptual design to handover — and shall ensure alignment between the “as-designed”, “as-installed”, “as-commissioned”, and “as-built” states. All changes to the design baseline, including those originating from field conditions, value engineering, or third-party interface requirements, shall be formally recorded and subject to prior approval by the *Project Manager* and *Employer* in accordance with the change control procedures in the contract.

Codification of all Plant, Materials, systems, and major components shall be undertaken in accordance with the Employer’s asset hierarchy, tagging conventions, and fixed asset register. The Contractor shall assign unique, traceable identifiers to each system and component, consistent with applicable standards such as SANS 10286, ISO 14224 (where relevant for maintainability and reliability), and any *Employer*-provided specifications. This codification must be used consistently across all design documentation, drawings, schematics, cable schedules, instrumentation lists, and the asset register.

The *Contractor*'s design shall accommodate lifecycle asset management principles, including operability, maintainability, redundancy, and future inspection requirements. Due consideration shall be given to safe access, confined space entry, isolation and lock-out/tag-out procedures, and other operational safety constraints specific to aviation fuel storage and handling.

All design documentation shall reflect a single source of technical truth at each stage of design maturity. The *Contractor* shall maintain a Design Change Log, register of Interface Control Documents (ICDs), and traceability matrix linking each requirement in the Works Information to the relevant design deliverables. These records shall be made available to the *Project Manager* and *Employer* upon request and shall included in the final handover documentation package.

3.5 Use of *Contractor*'s design

The *Contractor* shall cooperate with Others, as defined in this Works Information, in accordance with core clause 22.1, by providing access to its design, drawings, specifications, models, and related documentation as necessary for coordination, construction, safety, operational readiness, maintenance, and regulatory compliance.

The facility operator (and its contractors, service providers, safety personnel, operational personnel, and maintenance staff) and the Employer's appointed maintenance contractor may use the Contractor's design solely for the purposes of:

- Construction, testing, and commissioning of the works,
- Safe operation of the facility,
- Regulatory review and approval, and
- Maintenance and repair of the completed works.

This permitted use does not transfer ownership of the design nor grant any license beyond the above-stated purposes. The *Contractor* retains all intellectual property rights in its design unless otherwise stated in the contract. Reproduction, modification, or further disclosure of the design beyond the permitted purposes requires the *Contractor*'s prior written consent.

The *Contractor* shall not unreasonably withhold or delay the provision of design documentation or clarification requested by Others in relation to these purposes.

The *Contractor* shall be responsible for the operation, maintenance, and safety of all works, whether permanent or temporary, which are installed but not yet taken over by the *Employer*. This includes any temporary enablement works and any elements designed by the Contractor. The *Contractor* shall bear all associated costs and risks until take over of the relevant part of the works in accordance with the contract. Nothing in this section limits the Contractor's obligations under other parts of this Works Information regarding temporary works or care of the works.

3.6 Design of Equipment

Where the *Contractor* proposes to use specialised or sophisticated plant, equipment, or systems—including temporary or off-the-shelf items—that are necessary to enable the Contractor to Provide the Works efficiently, safely, and without undue risk to the works, to Others, or to the ongoing facility operations, the *Contractor* shall ensure their safety, adequacy, and performance and, where necessary, their design.

Where the *Contractor* proposes to use specialised or sophisticated plant, equipment, or systems—including temporary or off-the-shelf items—that are necessary to enable the *Contractor* to Provide the Works efficiently, safely, and without undue risk, the *Contractor* shall ensure their safety, adequacy, and performance and, where necessary, their design.

If, in the opinion of the *Project Manager*, the nature or criticality of such equipment warrants, the *Contractor* shall submit relevant design information, performance characteristics, or safety documentation for the *Project Manager*'s information only. Such submissions are intended solely to provide assurance that the *Contractor*'s proposed equipment or systems will support the effective delivery of the works. The provision of this information does not constitute a formal submission for acceptance under core Clause 21, and the *Project Manager*'s review shall not relieve the *Contractor* of any responsibility or liability.

The *Contractor* retains full responsibility for the design, integrity, safe operation, and use of all such plant, equipment, or systems, including any consequences arising from their failure, inadequacy, or misuse. This section does not limit the *Project Manager*'s rights under Clause 23.1 to issue instructions or request further information as may be necessary in connection with the works.

For the avoidance of doubt, all permanent works designs requiring formal acceptance shall continue to be submitted in accordance with core Clause 21, including all design calculations, specifications, and drawings necessary to demonstrate compliance with the Works Information and applicable legal and regulatory requirements.

3.7 Equipment required to be included in the *works*

For the purposes of core clause 11.2(7), Equipment which the *Contractor* is required to include in the works comprises any plant, apparatus, systems, or ancillary items that are expressly or implicitly required to deliver the scope of work defined in this Works Information, including the work packages. This includes all permanent items which are to be installed, commissioned, and handed over to the *Employer* as part of the completed and operational works.

In addition, any specialised tools, test equipment, or system interfaces that are not standard *Contractor*-tools but are required for the safe, effective, and compliant operation, inspection, or maintenance of the installed plant and systems after take over shall be included in the works. These may include, but are not limited to, custom jigs, diagnostic devices, software interfaces, metering calibration tools, or other project-specific equipment where such items are essential to the long-term functionality and regulatory compliance of the facility.

No additional Equipment requirements are specified in this section beyond those arising from the scope of the works and work packages described elsewhere in this Works Information.

3.8 As-built drawings, operating manuals and maintenance schedules

The Contractor shall prepare and submit complete, accurate, and up-to-date as-built drawings, operating manuals, and maintenance schedules for all permanent works in strict accordance with the Employer's requirements and CAD Standards.

All as-built and CAD data must adhere to the following standards to ensure consistency and usability throughout the project lifecycle:

- The title block shall clearly specify the project name and number, project stage (e.g., Approval, Construction, as-built), and dates of any updates made to the drawings.
- The *Employer*-(ACSA) logo and title block will be provided to the *Contractor* upon request, along with the drawing register and project hand-over acceptance criteria.
- The title block must identify the consultants or contractors involved, including their contact details and physical address, to facilitate tracking and referencing of project data.
- Line scale, line types, and layer identities must be clearly defined.
- Components must be placed on individual layers with the ability to toggle them on or off and include attribute data for identification and ease of extraction.
- External references (XREFs), if used, must be properly attached or bound to the drawings.
- Text styles and dimensions must conform to ISO standards and be placed on dedicated layers.
- As-built drawings and asset data shall be submitted only in AutoCAD format via Microsoft Teams or SharePoint and must be accompanied by an up-to-date drawing register.
- Submission of data on CDs or other physical external devices is prohibited due to the *Employer*'s IT security policies.
- As-built documentation must include all relevant service drawings (water, sewer, electrical, electronics, HVAC, CCTV, fire detection), architectural drawings, close-out reports, certificates of compliance, asset maintenance manuals, and asset specifications.
- At project handover (or take over), all as-built materials shall be submitted to the *Project Manager*, who will facilitate their transfer to the *Employer*'s Asset Information Management Office (AIMO).
- The AIMO operates a Geographic Information System (GIS) as well as a Fixed Asset Register, both of which require accurate GPS coordinates, asset information including nameplate data, installation

date, asset classification, and the asset's/equipment's value at installation date. The *Contractor* shall ensure all submitted as-built data and asset information comply with these requirements to enable proper integration into the *Employer*'s asset management systems.
- All submissions must comply with IT security protocols, and the use of physical media for data submission will not be accepted.
- As-built drawings must be provided in both DWG and PDF formats.
- The *Contractor* shall submit all as-built documentation within 14 working days of project completion to the *Project Manager* and/or the CAD Office for onward transmission to the AIMO.

The *Employer*'s Document Management System (DMS), which shall be developed, configured, and maintained by the *Project Manager* on behalf of the *Employer*, will serve as the primary platform for the submission, review, acceptance, and secure storage of all as-built documentation, drawings, and asset data. The DMS shall ensure proper version control, traceability, access management, and compliance with the *Employer*'s information governance and IT security protocols.

All documentation shall be submitted through the DMS in accordance with the *Project Manager*'s document control procedures, including indexing, formatting, and timeliness.

3.9 Minimum Spares Holding, Lifecycle Costing, and Criticality Analysis

The *Contractor* shall, as part of its design finalisation and operational readiness obligations, perform a comprehensive spares analysis and lifecycle costing exercise for all permanent works, in alignment with the *Employer*'s asset management strategy and operational requirements.

This includes:
- Identification and classification of minimum spares holdings required to support safe, efficient, and reliable operation and maintenance of the completed facility;
- A spares criticality analysis to determine the operational risk and impact associated with failure or unavailability of specific parts or assemblies, taking into account lead times, safety implications, and redundancy strategies;
- Preparation and submission of a lifecycle cost assessment for key systems and equipment, covering acquisition, installation, commissioning, operation, maintenance, renewal, and decommissioning.

All asset-related information — including nameplate data, tag numbers, date of installation, cost at commissioning, expected lifespan, criticality ranking, and associated spare parts — shall be captured in accordance with the *Employer*'s codification standards and asset hierarchy, as referenced in Section 3.4. The *Contractor* shall assign unique, traceable identifiers to each asset, system, and component, consistent with SANS 10286, ISO 14224 (where applicable), and *Employer*-provided user asset requirements, specifications and/or performance targets. This codification shall be used consistently across all design and handover documentation, including drawings, schedules, registers, and digital submissions.

The *Contractor* shall ensure that all new and/or modified permanent assets introduced through the works are correctly registered and uploaded into the Employer's Computerised Maintenance Management System (CMMS) and Fixed Asset Register. This includes but is not limited to assets related to electrical distribution, control systems, fuel infrastructure, waterborne sanitation, stormwater management, lighting, security systems, and operational buildings, etc.

The *Contractor* shall coordinate closely with the *Project Manager*, the *Employer*'s Asset Information Management Office (AIMO), and designated CMMS representatives to ensure that:
- All asset master data and location information (including GPS coordinates where required) is submitted in the approved format;
- All spares and maintenance information is linked to corresponding CMMS entries;
- Data is transferred via the designated Document Management System (DMS) and/or SharePoint in line with *Employer* requirements — no external storage media may be used;
- Codified assets are aligned with the *Employer*'s GIS platform where geospatial data is relevant or required.

All submissions shall be completed and submitted to the Project Manager and AIMO within 14 working days of Practical Completion or as otherwise instructed in the Contract Data.

These obligations are intended to support the *Employer*'s configuration management and asset lifecycle planning processes, ensuring that the delivered works are fully operational, maintainable, and integrated into the long-term infrastructure management environment of the facility.

4 Procurement

4.1 People

4.1.1 Minimum requirements of people employed on the Site

The Contractor shall ensure that all personnel employed or engaged to Provide the Works on Site comply with the following minimum requirements:

Legal Right to Work: All personnel, including foreign nationals, must hold valid work permits, visas, and any other authorizations required by South African law to work on the Site. The Contractor shall maintain appropriate records and provide evidence of such permits upon request.

Training and Qualifications: Beyond mandatory health and safety training, personnel assigned to specialized tasks must possess appropriate qualifications, certifications, or licenses relevant to their roles (e.g., operation of lifting equipment, electrical works, confined space entry).

Local Labour and Employment Equity: The Contractor shall comply with all applicable South African labour laws, including the Employment Equity Act and the Broad-Based Black Economic Empowerment (B-BBEE) Codes of Good Practice. Wherever feasible, preference shall be given to labour sourced from designated areas, defined as geographic regions or communities prioritized by the Employer to support local economic development and social upliftment objectives. The Contractor shall implement affirmative action measures and employment equity targets consistent with these requirements.

Industrial Relations Compliance: The Contractor shall ensure all workers are employed under formal agreements compliant with the South African Labour Relations Act and relevant collective bargaining agreements. The Contractor must proactively engage with recognised trade unions and labour representatives where applicable and implement dispute resolution procedures to minimise risks of industrial action or work stoppages on Site.

Competency and Conduct: All personnel must demonstrate competence in their assigned roles and conduct themselves professionally, abiding by the Employer's Code of Conduct and Site rules.

Prior to mobilization, the Contractor shall submit a workforce plan demonstrating compliance with these minimum requirements. This plan shall include details of key personnel qualifications, planned labour sourcing strategies from designated areas, and industrial relations management approaches for review and approval by the *Project Manager*.

4.1.2 BBBEE and preferencing scheme

Specify constraints which *Contractor* must comply with after contract award in regard to any Broad Based Black Economic Empowerment (B-BBEE) or preferencing scheme measures.

The Contractor shall support the transformation objectives of the Employer and the broader national imperatives of Broad-Based Black Economic Empowerment (B-BBEE), in accordance with applicable legislation, government procurement policy, and the requirements of the Construction Industry Development Board (CIDB).

The following post-award obligations shall apply:

- B-BBEE Commitment:
  The Contractor shall maintain or improve its B-BBEE status level as declared at the time of tender throughout the duration of the contract. Any change in B-BBEE status must be declared to the Project Manager within 14 days, along with an impact statement and mitigation plan, if necessary.

- Transformation Implementation Plan:
  Within 30 days of the Contract Date, the Contractor shall submit a Transformation Implementation Plan to the Project Manager for review. This plan shall set out how the Contractor intends to contribute to transformation outcomes through meaningful participation of black-owned enterprises,

youth- or women-owned subcontractors, or targeted groups, in accordance with any obligations stated in the Employer's tender documents or the CIDB Framework.

- CIDB Socio-Economic Measures:
  In line with the CIDB's B.U.I.L.D Programme, the Contractor shall:
  - Allocate a minimum of 5% of the contract value toward enterprise development (e.g., capacity building, mentoring, or subcontracting with emerging CIDB-registered contractors); and
  - Invest a minimum of 0.25% of the contract value toward structured skills development, including accredited training, internships, and apprenticeships linked to the project.

- Monitoring and Reporting:
  The Contractor shall submit monthly reports via the Document Management System (DMS), demonstrating compliance with the approved Transformation Implementation Plan and CIDB socio-economic obligations. These reports shall include verifiable data and evidence (e.g., training registers, subcontractor payment records, proof of expenditure).

The Project Manager shall be responsible for evaluating compliance and enforcing these obligations throughout the project duration. Failure to comply with the above transformation measures, without prior approval or valid justification, shall constitute a substantial failure on the part of the Contractor to comply with his obligations under this contract.

4.2 Subcontracting

4.2.1 Preferred subcontractors

The *Employer* has not nominated or identified any specific subcontractors or suppliers that the *Contractor* is required to use in performing the works.

Where specialised Plant, Materials, or systems are required to meet applicable operational, safety, or regulatory standards, the *Contractor* remains responsible for identifying competent subcontractors and suppliers who can demonstrate compliance with the relevant requirements.

Should the *Employer*, at a later stage, recommend or request the use of a specific subcontractor or supplier for a defined portion of the works, such recommendation shall be provided in writing via the *Project Manager*. The *Contractor* shall give due consideration to the recommendation but shall remain fully responsible for the performance, coordination, and integration of all Subcontractors in accordance with the contract.

All subcontracts must comply with the relevant requirements of this Works Information, and the *Contractor* shall not subcontract any portion of the works without notifying the *Project Manager* and the *Employer* in accordance with the contract provisions.

4.2.2 Subcontract documentation, and assessment of subcontract tenders

The *Contractor* shall prepare all subcontract documentation in a manner consistent with the standards and procedures established for this project. While the use of the NEC subcontract system is recommended by the *Employer* to maintain alignment and consistency with the main contract, it is not compulsory. The *Contractor* may utilize alternative subcontract documentation, provided such documentation fully complies with the scope of work, the Works Information, and all applicable industry standards and best practices.

Subcontract tenders shall be issued in a transparent and competitive manner to ensure fair evaluation and selection. The *Contractor* shall manage the tender process to prioritize key criteria including:

- Quality: The quality of goods and services is paramount. Prospective subcontractors shall demonstrate capability to deliver world-class plant, materials, or services, supported by certifications, past project performance, and compliance with quality management systems beyond basic ISO certification.
- Compliance: Subcontractors must fully comply with the defined scope of work, Works Information, applicable standards, codes of practice, and industry best practices. The *Contractor* shall verify and document compliance through tender submissions.

- Price: Evaluation will balance price against value to ensure competitiveness without compromising quality and compliance. The most expensive tender shall not necessarily be preferred; instead, cost-effectiveness and lifecycle value shall be considered.
- After-Sales Technical and Spares Support: Prospective subcontractors, including OEMs, local agents, and installers, must provide written confirmation of their commitment to support the *Employer* throughout the operational phase of the installed permanent works. This commitment shall cover technical support, availability of spare parts, warranty obligations, and training for the *Employer*'s appointed maintenance contractors, replacement project contractors, and operational personnel of the facility (or of the facility operator). Demonstration of such commitment will be a mandatory part of the evaluation criteria.

Tender assessments shall be conducted jointly by the *Contractor*, *Project Manager* and the *Employer* to ensure impartiality and alignment with project objectives. A formal joint tender evaluation report shall be prepared, documenting the assessment process, scoring against the evaluation criteria, and justification for the recommended award.

The *Contractor* shall not award any subcontract without the prior review and written approval of the *Project Manager*. Subcontract awards must be based on compliance with the above criteria and the best interests of the *Employer*.

4.2.3 Limitations on subcontracting

The *Employer* does not impose any specific limitations on the *Contractor*'s use of subcontractors for the execution of the works. The *Contractor* is free to subcontract any portion of the contract as deemed necessary to fulfill the scope of work effectively and efficiently.

The *Contractor* shall remain fully responsible for the management, coordination, and performance of all subcontracted works and shall ensure that all subcontractors comply with the requirements of the Contract, Works Information, and all applicable standards.

All subcontracting proposals shall be submitted for review by the *Project Manager* and the *Employer* in accordance with the tendering and contract administration requirements. Final approval of any subcontractor engagement or appointment by the *Contractor* rests with the *Employer*.

4.2.4 Attendance on subcontractors

The *Contractor* shall provide all necessary attendance to enable subcontractors, sub-consultants and/or specialists to perform their work safely and efficiently on Site (the facility). This attendance shall include but is not limited to the provision of site access, temporary utilities (water, power), site facilities (welfare, storage), coordination, supervision, and assistance with compliance to the health, safety, and environmental (HSE) requirements of the facility operator.

Given the high-risk nature of the facility, and the zero-tolerance safety policy of the *Employer*, the *Contractor* and all subcontractors must submit detailed Risk Assessments and Method Statements (RAMS) for approval by the *Project Manager* and facility operator prior to accessing the Site. The *Contractor* shall be responsible for submitting, coordinating, and ensuring that all subcontractors comply with this requirement.

All attendance services and support shall be subject to the prior review and approval of the SHEQ (Safety, Health, Environment, and Quality) representative of the *Project Manager* and the facility operator, including plans, layouts, and any required services and/or utilities.

The *Contractor* shall ensure that all subcontractors comply strictly with the *Employer*'s HSE standards, including but not limited to Personal Protective Equipment (PPE), site induction, tooling, plant hire, and operational procedures as set out in the approved RAMS.

Failure to comply with these requirements may result in denial of Site access or suspension of works. Such denial or suspension shall not constitute a compensation event under the contract, and any costs incurred due to standing time or delays arising from denial of Site access or suspension of works shall be for the sole account of the *Contractor*.

4.3 Plant and Materials

4.3.1 Quality

Unless otherwise stated in the Works Information, all Plant and Materials used to Provide the Works shall be:

- free from defects in design, materials, and workmanship;
- of a quality fit for the operational, safety, and maintainability requirements of a high-risk aviation fuel storage and handling facility;
- compliant with the applicable standards and codes, including but not limited to SANS 1200, ISO, and other national or international standards referenced in the Works Information or otherwise applicable.

Where quality standards or product specifications are not expressly prescribed, the *Contractor* shall apply the higher of:

a) the generally accepted standards for comparable infrastructure of similar scale and criticality; or
b) the manufacturer's recommendations and published technical documentation.

All Plant and Materials proposed for use shall be subject to review and approval by the *Project Manager*. This review shall assess safety, quality, and compliance with regulatory and facility-specific standards. The *Project Manager*'s CHSO/CHSM shall carry out this role in coordination with the SHEQ representative of the facility operator to ensure alignment with site-specific controls, access protocols, and operational risk tolerances.

Where a Defect is notified, the *Contractor* shall not undertake any repair, modification, or substitution of defective Plant and Materials without the prior written instruction or agreement of the *Project Manager*. In principle, rectification of defective items shall be by replacement with new items of equivalent or superior specification unless:

- the *Project Manager* confirms that a repair will fully restore compliance, function, safety, and lifecycle performance;
- the *Project Manager*'s CHSO/CHSM and the facility's SHEQ representative jointly confirm that no residual risk or compromise will result from the repair; and
- such repair is adequately documented in the as-built records, with clear indication of warranty terms and any long-term performance implications.

Any Plant and Materials rejected by the *Project Manager*, the facility operator or the *Employer* shall be removed from the Site without delay and at the *Contractor*'s sole expense.

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

The Employer has previously procured and delivered to site a quantity of long-lead and project-specific spare parts and materials during an earlier project phase. These materials are currently stored in various locations, including:

- Shipping containers located in the SMD parking lot across the street from the facility;
- Shipping containers placed within the facility boundary, in designated grassed areas;
- Boxes and stock held in the facility's workshop spares room.

While these materials are not considered "free issue" in the contractual sense, the Employer prefers that the Contractor reuses these items where feasible, provided they are certified as technically sound, suitable, and aligned with the approved design and Employer's requirements.

To facilitate this shall conduct the following:

- Condition and Suitability Assessment:
  The Contractor shall undertake a comprehensive inspection, sampling, and technical evaluation of the stored materials, including destructive and non-destructive testing where necessary. The assessment must determine:
  - Compliance with the *Contractor*'s final design;
  - Conformity with statutory and technical standards;
  - Mechanical, metallurgical, and structural integrity;
  - Adequacy of remaining service life;
  - Whether OEM warranties can be reinstated, extended, or replaced;
  - Any safety or performance limitations affecting reuse.

- Spares Assessment Report and Documentation:
  The *Contractor* shall compile a detailed Spares Assessment Report identifying each item reviewed, test results, findings, and a recommendation for reuse, reconditioning, or disposal. This report and any supporting documentation shall be:
  - Uploaded to the Employer's Document Management System (DMS) in accordance with the document control protocols outlined in this Works Information;
  - Reviewed by the relevant discipline specialists appointed by the Project Manager (including engineering, SHEQ, and asset management specialists);
  - Submitted for formal acceptance by the Employer, following the required workflow.

- Design Integration and Accountability:
  The Contractor remains fully responsible for ensuring the safe, compliant, and functional integration of any reused materials into the final Works. Reuse shall not diminish the Contractor's obligations for fitness for purpose, warranties, or lifecycle performance.

- Custody and Handling Responsibilities:
  Upon withdrawal of any materials from storage, the Contractor shall assume full responsibility for:
  - Care, custody, and control;
  - Transport, offloading, temporary staging, and inventory management;
  - Any loss, damage, degradation, or substitution.

  Unused items shall be returned in acceptable condition or disposed of in accordance with Employer directions.

- Access and Security Arrangements:
  The Contractor shall coordinate access to storage areas with the Project Manager. Where required, access shall be supervised by the Facility Operator and/or SHEQ representative, especially when entering operational zones.

- Valuation and Risk Allocation:
  The financial treatment of any materials determined unsuitable for reuse — whether due to technical rejection, incompatibility with the approved design, or inability to restore warranties — shall be reflected in the Project Manager's assessments and may give rise to price adjustments, exclusions, or disallowed cost determinations in accordance with the contract. These outcomes shall also be recorded in the DMS and form part of the contract completion audit trail.

All other Plant and Materials required to Provide the Works — which are not drawn from the Employer's previously procured inventory — shall be sourced, delivered, and managed by the Contractor at its own cost and risk.

4.3.3 *Contractor*'s procurement of Plant and Materials

The *Contractor* shall be responsible for the timely procurement, codification, expediting, freight, importation, transport to Site, storage, and delivery of all Plant and Materials required to Provide the Works, except those materials previously procured and held by the Employer as described in Section 4.3.2.

Procurement activities must be conducted in strict compliance with the Works Information, the contract requirements, and applicable standards. All Plant and Materials procured must conform to the approved design, quality standards, and operational, safety, and maintainability requirements of this high-risk aviation fuel storage and handling facility.

To ensure consistent and transparent management of procurement, the *Contractor* shall prepare and maintain a Procurement Codification Register throughout the duration of the contract. This Register shall be the authoritative record of all procurement items and shall include, but not be limited to:

- Unique codification identifiers aligned with the *Employer*'s asset coding framework;
- Detailed descriptions of each item, including specifications and applicable standards;
- Supplier and manufacturer details, including contact information;
- Purchase order numbers and dates;
- Delivery schedules and logistics arrangements;
- Warranty terms, including any warranties required to be issued in favour of the *Employer* during the contract term;

- Inspection and acceptance status;
- Storage location and handling notes;
- Any other relevant data required to support integration into the *Employer*'s asset management systems.

The *Contractor* shall populate and update this Register as procurement progresses, ensuring accuracy and completeness. The Register shall be submitted for review and held by the *Project Manager*, who will maintain and periodically review the Register to ensure compliance with the Works Information and project intent. The *Project Manager* must approve all procurement decisions prior to the placement of orders. This approval process is critical to confirm that procured items align with the contract scope and quality requirements.

Should any of the materials previously procured and held by the *Employer*, as described in Section 4.3.2, be found fit-for-service and appropriate for use in the Contractor's design, these materials, once integrated into the Works, commissioned for operation, or designated as project spares, shall be codified in the Procurement Codification Register in the same manner as all other Plant and Materials. This ensures full traceability, management, and accountability throughout the asset lifecycle.

The *Contractor* shall provide all necessary vendor data, including but not limited to manufacturer's manuals, test certificates, performance data, and warranty documentation, for all procured Plant and Materials. This data shall be submitted through the Document Management System (DMS) and retained for use by the Employer after Completion for operation, maintenance, and asset management purposes.

All Plant and Materials delivered to Site must be appropriately identified, protected, and stored in accordance with manufacturer instructions and the Employer's requirements to prevent damage, deterioration, or loss prior to installation.

The *Contractor* shall be responsible for all costs, risks, and liabilities associated with procurement, including freight, customs clearance, import duties, transport, and storage. The Contractor must ensure that all deliveries comply with Site access protocols, security requirements, and health, safety, and environmental standards.

Any warranties provided by suppliers or manufacturers must be assignable or extended to the Employer to ensure continued protection beyond the contract duration. The Contractor shall liaise with suppliers to facilitate this requirement and include such conditions in procurement contracts.

The Procurement Codification Register shall be made available to the *Employer* upon request and will form a key element of the project handover documentation. It shall interface and align with other project documentation such as as-built records, asset registers, and maintenance manuals without duplication.

Failure to comply with these procurement requirements, including the management and submission of the Procurement Codification Register and vendor data, may result in delays, rejection of deliveries, or other remedial actions at the Contractor's cost and risk.

4.3.4 Spares and consumables

The *Contractor* shall be responsible for the provision, delivery, handling, testing, and temporary storage of all spares, consumables, and operational feedstocks necessary to complete, certify, and commission the Works in accordance with applicable standards, statutory requirements, and best industry practices. This includes all materials required for testing, cleaning, flushing, performance verification, and regulatory compliance during construction and pre-handover phases.

All such costs are deemed included in the *Contractor*'s scope of work and shall be priced accordingly. Without limitation, this includes:

- Jet A-1 aviation fuel, to be used as the soak testing medium for storage tanks, pipelines, filters, and associated fuel infrastructure. Use of Jet A-1 for soak testing is standard industry practice for aviation facilities and shall be the default method unless explicitly varied in writing by the *Project Manager*.
- Water or treated effluent, for hydrostatic leak testing and flushing of pipelines, containment bunds, firewater systems, and stormwater drainage.

- Specialised lubricants, oils, greases, and fluids, for pre-commissioning and functional operation of pumps, compressors, valves, and rotating equipment.
- Calibration gases, instrument test kits, and diagnostic tools, to verify instrumentation, alarms, fire detection systems, and environmental monitoring compliance.
- Cleaning agents, neutralising compounds, and flushing media, for preparation of pipework, tanks, and systems before commissioning and handover.

Where soak testing, cleaning, or certification processes require laboratory analysis, the *Contractor* shall include the cost of all related testing services, including sampling, transport, and third-party laboratory fees. In particular, full laboratory analysis of Jet A-1 fuel used during soak testing shall be conducted before, during, and after testing in accordance with EI 1530, EI/JIG 1535, and JIG Bulletin 110. The *Contractor* shall ensure that all sampling and testing procedures follow these recognised international best practices to verify compliance with fuel quality standards, confirm absence of contamination, and establish the system's fitness for service. Certificates of analysis, chain of custody documentation, and flushing logs shall be submitted to the *Project Manager* and included in the project's commissioning records. All certificates of analysis, sampling records, flushing logs, and related supporting data shall be submitted to the *Project Manager* for review and retained in the Document Management System (DMS) in accordance with the document control protocols defined in this Works Information.

The Contractor shall also identify and provide a minimum package of commissioning-related spares and consumables required to maintain the safe operation of the completed works immediately after Take Over. These shall include:

- Initial operational spares, as recommended by OEMs and equipment manufacturers, for at least the first 12 months of operation or until long-term maintenance agreements are in place;
- Special tools or system-specific diagnostic aids, necessary for calibration, fault isolation, or repair of project-specific equipment or infrastructure.

The *Contractor* shall prepare and submit a Commissioning Spares and Consumables Plan for the *Project Manager*'s and and SHEQ representative's review and approval not less than 90 days prior to the commencement of commissioning activities. This Plan shall identify item types, estimated quantities, proposed sources, associated data sheets (e.g. MSDS, safety handling requirements), and any interfaces with the facility operator's operations. The Plan shall be reviewed and approved by the *Project Manager* and SHEQ representative prior to procurement or mobilisation of these items to Site. This Plan shall identify all spares, temporary fuels (including Jet A-1 for soak testing), test media (including water or inert fluids), specialist lubricants, seals, gaskets, filters, cleaning agents, and other expendables required to safely and effectively perform commissioning, functional testing, regulatory certification, and system readiness demonstrations. The Plan shall clearly distinguish between items consumed during testing and those to be retained as post-handover operational spares, and shall include sourcing details, estimated quantities, storage requirements, and delivery schedules aligned with the commissioning programme.

Where initial fill and top-up volumes of fluids, oils, or other operating substances are required for continuous functionality of plant and systems, the *Contractor* shall identify these in its Commissioning Spares and Consumables Plan. However, subject to suitable coordination and advance notice, the facility operator may elect to provide such top-up volumes directly, particularly in the case of successive tank commissioning, to avoid duplication or unnecessary cost. In such cases, the *Contractor* shall liaise with the *Project Manager* and facility operator to confirm timing, volume, and delivery logistics.

The *Contractor* is not responsible for providing ongoing operational PPE or safety consumables required to support post-handover maintenance or day-to-day operation of the works. However, the *Contractor* shall provide, as part of its O&M deliverables, a clear and complete specification of all required PPE and safety consumables for operating and maintaining the completed systems. This information shall be included in the operating manuals and verified by the *Project Manager* at take over.

All spare parts, consumables, and commissioning items provided under this section shall be codified using the *Employer*'s asset classification standards (refer to Section 3.4) as appropriate, and recorded in the Procurement Codification Register. Serial numbers, delivery documentation, warranties (if applicable), and usage logs shall be submitted via the Document Management System (DMS) and made available to the AIMO and the facility operator.

No claims for delay, compensation, or variation shall be entertained due to the *Contractor*'s failure to plan for or provide required consumables and spares. These are considered integral to the Contractor's obligations in Providing the Works.

4.4 Tests and inspections before delivery

In accordance with Core Clauses 40 and 41 of the NEC3 ECC (April 2013), the following requirements apply to tests and inspections that must be undertaken before delivery of Equipment, Plant, and Materials to the Working Areas:

4.4.1 General Requirements

The *Contractor* shall ensure that all Plant, Materials, systems, and equipment to be incorporated into the Works are subject to appropriate factory acceptance tests (FATs), pre-delivery inspections, and/or third-party certification, as specified in this Works Information or as reasonably required by the Supervisor or Project Manager to demonstrate fitness for purpose, compliance with applicable standards, and readiness for installation.

Where components are manufactured, assembled, or procured overseas, the *Employer* reserves the right to appoint or nominate agents (including but not limited to the facility operator and the *Project Manager*), consultants, or inspectors to carry out such tests and inspections at the manufacturer's or supplier's premises, prior to shipment. These inspections may include, but are not limited to:

- Verification of conformity with technical specifications, performance data, and contractual requirements;
- Review of quality assurance records and factory test certificates;
- Functional testing, calibration, pressure testing, electrical safety testing, or software validation;
- Verification of packing, tagging, and shipping documentation;
- Witnessing of Factory Acceptance Tests (FATs) where critical systems are involved.

The *Contractor* shall give the *Project Manager*, *Supervisor* and the *Employer*'s nominated representative not less than 14 calendar days' written notice of any such tests or inspections to allow sufficient time for travel and coordination. The *Contractor* shall provide full access to premises, personnel, documentation, and facilities required for such inspections.

4.4.2 Inspection by Others

Where the *Employer*, *Project Manager* or *Supervisor* requires inspection by third-party entities—including:

- Regulatory bodies, such as the Civil Aviation Authority, fire safety inspectors, or environmental authorities;
- Classification societies, specialist consultants, or statutory certifying bodies;
- Employer-appointed overseas agents for imported equipment.

The *Contractor* shall cooperate fully and make available all test results, certifications, technical documentation, and inspection access required. The Contractor shall bear all reasonable costs associated with these inspections except where expressly stated otherwise in the Contract Data.

4.4.3 Pre-Delivery Test Records and Acceptance

The *Contractor* shall compile and submit, for each major equipment package or system, a pre-delivery Inspection and test pack to the *Project Manager* and *Employer*, containing:

- FAT reports and test certificates (mechanical, electrical, controls)
- Certificates of conformity or compliance
- Third-party inspection reports, where applicable
- Packing lists and shipping declarations
- Installation, commissioning, and operating instructions (if not previously submitted)

These records shall be submitted to the *Project Manager* via the Document Management System (DMS) and must be reviewed and accepted prior to shipment to site, unless otherwise agreed in writing.

4.4.4 Equipment Marking and Traceability

All equipment and components shall be:

- Clearly tagged with unique identifiers in accordance with the *Employer*'s codification system (refer to Section 3.4)
- Accompanied by documentation referencing the specific item's serial number or batch number
- Traceable through the design and procurement process back to the originating manufacturer or supplier

The Project Manager may reject delivery of any item that does not comply with the required inspection and documentation procedures.

4.5 Marking Plant and Materials outside the Working Areas

Where the *Contractor* seeks payment for Plant and Materials that are not yet delivered to the Working Areas, but which the *Project Manager* and *Employer* agrees may be paid for under the provisions of core clause 70.1, such Plant and Materials must be clearly and permanently marked in accordance with this Works Information to identify them as being the property of the *Employer*.

The Contractor shall ensure that such Plant and Materials:

- Are physically and visibly marked with the following minimum information:
    - Project Name and Number,
    - Contract Number,
    - "Property of Airports Company South Africa SOC Ltd. – Not to be Moved Without Written Permission", and
    - Unique Identifier or Tag Number, cross-referenced to the applicable schedule of values or payment claim.
- Are segregated from other *Contractor*- or supplier- or subcontractor-owned items at the storage or fabrication location by physical means (e.g. fencing, barriers, or designated bays) to prevent confusion or commingling.
- Have markings that are durable, tamper-resistant, weather-resistant, and legible for the full anticipated period of storage before delivery and/or installation. This includes weatherproof labels, painted stencils, or engraved tags as appropriate to the material type and environment.
- Are listed in a register maintained by the *Contractor*, which includes photographs, GPS location (if applicable), manufacturer or supplier details, serial numbers, delivery status, and reference to the relevant payment certificate. This register shall be submitted to the *Project Manager* for verification.

Where such Plant and Materials are stored at locations overseas or within third-party premises, the *Contractor* shall, upon request by the *Project Manager*, facilitate inspection by the *Supervisor* or the *Employer*'s appointed representative. The *Contractor* shall provide reasonable access, supporting documentation, and any required coordination with the storage or fabrication facility.

The *Contractor* remains responsible for risk, insurance, and proper care of all such marked Plant and Materials until such time as they are delivered to the Working Areas and incorporated into the Works, in accordance with core clause 71.1.

No payment will be certified for Plant and Materials outside the Working Areas unless the *Project Manager* is satisfied that the marking and related conditions stated in this section have been fully complied with.

4.6 *Contractor*'s Equipment (including temporary works).

The *Contractor* shall provide all Equipment, including temporary works and temporary installations, necessary to safely, efficiently, and effectively carry out the Works. This includes construction machinery, scaffolding, lifting equipment, specialised tools, temporary fuel systems, and any other *Contractor*'s Equipment, whether permanent, temporary, or mobile, as required to fulfil its obligations under the contract.

- All *Contractor*'s Equipment shall be:
- Safe, properly maintained, and fit for purpose,
- Compliant with applicable legal, statutory, and regulatory requirements, including OHSA, SANS codes, and relevant aviation fuel safety standards,

- Operated and maintained by suitably qualified and competent personnel,
- Designed (where applicable) in accordance with the requirements set out in Section 3.6 of this Works Information.

4.6.1 Specialised and Sophisticated Equipment

Where the *Contractor* proposes to use highly specialised, sophisticated, or custom-built *Contractor*'s Equipment that is essential to progress or completion of the Works — such as fuel handling rigs, automated control systems, pre-fabricated tank isolation kits, or critical lifting systems — the following additional requirements shall apply:

- Design Information and Assurance: The Contractor shall submit for the *Project Manager*'s information the design specifications, safety documentation, and performance characteristics of such Equipment, as outlined in Section 3.6. Submission is for information only and does not constitute acceptance or approval. The *Contractor* remains fully responsible for the design, integrity, safe operation, and fitness for purpose of all *Contractor*'s Equipment.
- Manufacturing and Delivery Constraints: The *Project Manager* may identify witness points or hold points during the manufacture, assembly, factory testing, or delivery of such Equipment, where oversight is necessary to confirm readiness or quality assurance. These points shall be notified to the *Contractor* in writing and scheduled in a mutually agreed inspection plan.
- Witness and Hold Points: Where witness or hold points are specified:
    - The *Contractor* shall give the *Project Manager* and the *Supervisor* reasonable notice of the relevant activity;
    - No activity subject to a hold point shall proceed without written confirmation from the *Project Manager* that the hold point has been released;
    - Witness or hold points are for oversight and assurance purposes only and do not relieve the *Contractor* of any of its obligations or liabilities under this contract.
- Access to Off-Site Locations: The *Contractor* shall grant the *Project Manager* or *Supervisor* reasonable access to any off-site fabrication yards, suppliers, or facilities involved in the preparation, assembly, or testing of such *Contractor*'s Equipment for the purpose of witnessing activities related to identified hold or witness points.

4.6.2 Temporary Works

The *Contractor* is solely responsible for the design, installation, maintenance, and eventual removal of all temporary works, including but not limited to the following:

- Formwork, scaffolding, falsework, or temporary structures,
- Access roads, fencing, site offices, welfare facilities, and safety systems,
- Temporary utilities (power, lighting, water), and fire protection systems,
- Temporary support systems for pipework, tanks, or equipment.

All temporary works shall be designed and implemented in accordance with Section 3.2.4 of this Works Information and shall comply with relevant codes, standards, and safety legislation. Where the failure of temporary works could pose a safety or operational risk, the *Contractor* shall submit relevant design and method statements for information to the *Project Manager* prior to installation.

The *Contractor* shall remove all *Contractor*'s Equipment, including temporary works, from the Working Areas upon completion unless otherwise instructed by the *Project Manager*. No additional payment shall be made for such removal, which shall be deemed included in the Prices.

5 Construction

This section sets out the constraints, facilities, procedures, and *Employer*'s requirements applicable to the *Contractor*'s execution of the Works on Site during the construction, commissioning, and maintenance phases. These requirements apply to all activities undertaken within the Working Areas and the broader Site and are intended to ensure that construction works proceed safely, efficiently, and in accordance with applicable legal, environmental, and operational regulations.

The *Contractor* shall comply with all Site-specific protocols, access control systems, safety and security rules, interface management obligations, and operational constraints imposed by the *Employer*, relevant authorities, or other third parties, including the facility operator. The *Contractor* shall ensure that all subcontractors and personnel under its control always understand and comply fully with these requirements.

5.1 Temporary works, Site services & construction constraints

The Contractor shall design, procure, install, maintain, and remove all temporary works and construction-phase facilities necessary to support the execution of the Works. These include, but are not limited to:

- Temporary welfare and ablution facilities;
- Construction access routes, laydown areas, and parking zones;
- Scaffolding, formwork, support structures, fencing, and signage;
- Temporary utility connections (power, lighting, water, telecoms);
- Fuel handling, fire protection, and hazardous material management systems (where temporary provision is required).

The *Contractor* shall plan and carry out all temporary works in compliance with applicable legislation, SANS standards, environmental approvals, and any additional constraints imposed by the *Employer*, the facility operator, or statutory authorities.

All construction activities shall be coordinated to minimise disruption to ongoing operations and other stakeholders on Site, including airport operations, aviation fuel handling activities, and third-party contractors. The *Contractor* shall maintain clear communication with the *Project Manager*, facility operator, and Others to manage work permits, temporary enablements, and access restrictions effectively.

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

The Site is located within a secure operational aviation fuel depot designated as a National Key Point (NKP) in terms of the National Key Points Act (Act 102 of 1980). The facility is owned by Airports Company South Africa (ACSA) and operated by the facility operator, and is subject to strict access control, security screening, and permit-to-work protocols. The Contractor shall strictly adhere to all access requirements, induction processes, and Site-specific regulations throughout the Contract Period.

5.1.1.1 Access Control and Permitting

All personnel, vehicles, tools, equipment, and materials entering the Site must be pre-approved and registered with the Employer and the Operator. Each individual entering the Site must:

- Hold a valid South African identity document or passport and work permit (if applicable);
- Undergo full security vetting and obtain an ACSA-issued access permit or visitor pass;
- Complete mandatory Site-specific safety and security inductions before entry;
- Comply with biometric or electronic access control systems where implemented.

Access requests must be submitted no less than ten (10) working days in advance of the intended mobilisation date, unless otherwise agreed to by the *Project Manager* and facility operator. The *Employer* and facility operator reserve the right to deny entry or remove from Site any person who fails to meet access or conduct requirements.

5.1.1.2 Site Security and Conduct

The *Contractor* shall ensure that all personnel adhere to the National Key Point security protocols, including restrictions on photography, unauthorised data transmission, and disclosure of sensitive information. Site boundaries are clearly demarcated and patrolled. The *Contractor* shall not enter restricted or operational areas outside the designated Working Areas without prior written approval. Identification badges shall be worn at all times. Access cards and permits remain the property of the *Employer* and must be returned on completion or termination of access rights.

5.1.1.3 Permit-to-Work System

A comprehensive permit-to-work system is in operation on Site. The *Contractor* shall obtain all necessary permits for activities involving:

- Hot work (cutting, welding, grinding, etc.);
- Confined space entry;
- Excavation or trenching;
- Electrical isolation and energisation;
- Work at height;
- Hazardous substances handling or any fuel system modifications.

Permits shall be coordinated with the Operator's control room and safety officers, and no activity may commence without an authorised permit.

5.1.1.4 Orientation and Compliance

All workers must attend a mandatory Site induction covering emergency procedures, fire prevention, first aid, Site rules, evacuation plans and routes, and operational constraints specific to the aviation fuel environment. Refresher inductions may be required for long-term projects or after any serious incident. The *Contractor* is responsible for managing and documenting compliance with Site regulations for its own staff, subcontractors, and visitors.

5.1.1.5 Consequences of Non-Compliance

Failure to comply with Site access, safety, or security requirements by any party may result in immediate removal from Site. Repeated non-compliance may constitute a breach of contract, subject to remedies under the Conditions of Contract.

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

The *Contractor* and all personnel, subcontractors, suppliers, and visitors under its control shall strictly comply with all access restrictions, operational protocols, and safety measures in place on the Site. These restrictions are critical due to the hazardous nature of the facility and its designation as a National Key Point.

Access within the Site shall be limited to designated routes and working zones, as identified in the approved construction traffic management plans, risk assessments, and Hazard and Operability Studies (HAZOPs). No deviation from these routes shall be permitted without the prior written approval of the *Project Manager* and the facility operator. The *Contractor* shall:

- Adhere to all operational rules governing movement on Site, including speed limits, access times, and directional flow on internal roads;
- Clearly demarcate and maintain safe pedestrian walkways, work zones, and restricted areas using appropriate signage, barriers, and barricades in accordance with applicable legislation and the approved construction safety plan;
- Ensure all routes used for the delivery and movement of materials, personnel, or equipment have been HAZOP-reviewed and accepted by the Employer and facility operator;
- Not obstruct, damage, or interfere with existing operational infrastructure, emergency access routes, hydrants, or escape paths at any time.

In addition, the *Contractor* shall ensure that all construction works and temporary enablements are aligned with the facility's Emergency Response Plan, and that clear access is maintained at all times for emergency services and operational personnel.

Failure to comply with these access and barricading requirements may result in suspension of works, removal from Site, or other remedies available under the contract.

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

The *Contractor* shall ensure that all persons under its control, including employees, subcontractors, consultants, and visitors, strictly adhere to the Site's access rules, working hours, behavioural requirements, and security protocols, as prescribed by the *Employer* and the facility operator.

5.1.3.1 Hours of Work

Standard working hours on Site shall be in accordance with the facility's operational guidelines, typically limited to daytime shifts unless otherwise approved by the facility operator and the *Employer*. However, subject to prior agreement with the *Employer* and the facility operator, the *Contractor* may request to perform work during extended or overnight periods where:

- Such work is necessary to avoid disruption to critical operational activities;
- Temporary shutdowns or time-sensitive operations require continuous or uninterrupted construction effort;
- Situational constraints (e.g., safety concerns, environmental conditions, material curing windows, or confined space access limitations, etc.) would otherwise unduly delay completion or compromise safety or quality.

All such requests must be made in writing and must be supported by a detailed RAMS, and tooling and resource plans for review and approval by the *Project Manager* and the facility operator.

5.1.3.2 Conduct on Site

All personnel must maintain professional conduct, adhere to prescribed PPE requirements, and comply fully with Site safety, health, and environmental regulations at all times. Misconduct, unsafe behaviour/actions, or non-compliance with Site rules may result in removal from Site and/or disciplinary action as appropriate. The Contractor shall:

- Ensure all personnel have received Site-specific induction and safety briefings prior to mobilising on Site;
- Maintain discipline among its workforce and subcontractors and enforce compliance with the rules of the site and all applicable regulations;
- Ensure that any unauthorised persons are not allowed access to any part of the Site.

5.1.3.3 People Tracking and Record Keeping

The *Contractor* shall maintain an accurate and up-to-date register of all personnel on Site, including:

- Full names, ID/passport numbers, and contact details;
- Dates and times of entry and exit;
- Affiliated subcontractor or organisation;
- Permit-to-work or induction certificate status;
- Any incidents or disciplinary actions reported.

These records shall be made available to the *Project Manager*, *Supervisor*, and any authorised representative of the *Employer* or facility operator upon request and shall be submitted periodically in the format required by the Document Management System (DMS).

Accurate and complete people records are essential for assessing compensation events, enforcing access control, and verifying compliance with occupational health and safety regulations.

5.1.4 Health and safety facilities on Site

In addition to the *Contractor*'s obligations under Section 2.3 of the Works Information and the Occupational Health and Safety Act (OHSA), the following health and safety facilities and arrangements shall apply throughout the construction period:

5.1.4.1 *Employer*-Provided Emergency Facilities

The facility includes existing *Employer*-provided health and safety installations, including but not limited to:

- Emergency showers and eye-wash stations located at designated high-risk operational zones;
- First-aid kits positioned at various operational locations and accessible to all site personnel;
- Firefighting equipment such as fire extinguishers and hose reels placed throughout the facility;
- Demarcated emergency assembly points;
- Clearly marked escape routes, aligned with the Site Emergency Response Plan.

These facilities and their locations shall be shown to the *Contractor* and all relevant personnel during the mandatory site orientation conducted by the facility operator prior to commencement of work. The *Contractor* shall ensure that its personnel understand the purpose and proper use of these facilities, and that this is included in all induction, training, and toolbox sessions.

5.1.4.2 Contractor Responsibilities for Temporary and Modified Areas

Where temporary works or permanent modifications to the Site layout are introduced by the *Contractor* (e.g., adjustments for traffic flow, working zones, laydown areas, or confined spaces), the *Contractor* shall be responsible for ensuring that equivalent emergency health and safety facilities are provided and maintained, including:

- Emergency showers and eye-wash stations in locations where hazardous materials are used or stored;
- Appropriate fire-fighting equipment within temporary works areas;
- First-aid kits in mobile work units, satellite areas, and field offices;
- Clearly identified temporary emergency assembly points and escape routes that are accessible, visible, and communicated to all working personnel.

All such provisions shall be reviewed and approved by the Project Manager in coordination with the facility operator to ensure consistency with the Site Emergency Response Plan. The Contractor shall remove all temporary facilities and restore affected areas upon completion of the relevant work, unless otherwise directed by the Project Manager.

The Contractor is fully responsible for the adequacy, availability, and upkeep of all health and safety facilities required for its scope of work and must ensure their readiness prior to commencement in any designated work area.

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

The *Contractor* shall comply with all environmental obligations outlined in Section 2.4 of the Works Information, including adherence to applicable environmental laws, local by-laws, environmental management plans (EMP), and any relevant environmental authorisations or permits.

5.1.5.1 Environmental Controls on Site

The *Contractor* shall take all necessary steps to avoid, mitigate, or remedy adverse environmental impacts during construction and temporary works. This includes implementing appropriate environmental controls aligned with the risks identified in the approved Environmental Management Plan (EMP), such as:

- Dust suppression,
- Waste and water management,
- Spill prevention and response,
- Emission control, and
- Noise management.

The *Contractor* is fully responsible for the provision, suitability, maintenance, and cost of all temporary environmental protection measures and equipment required for the Works, including but not limited to:

- Spill kits (hydrocarbon and chemical specific),
- Temporary bunding and containment barriers,
- Drip trays, silt fences, and vapour recovery systems where applicable,
- Temporary waste storage and segregation facilities, and
- Emergency environmental response equipment.

These controls shall be in place prior to the commencement of any work in sensitive or high-risk areas, and shall be maintained in effective condition for the duration of the Works.

5.1.5.2 Fauna and Flora

While the Site is highly industrialised and operates as a Major Hazard Installation (MHI), the *Contractor* shall remain alert to the potential presence of protected or indigenous species. Should any protected flora or fauna be encountered during the execution of the Works, the *Contractor* shall:

- Cease work in the immediate vicinity,
- Notify the *Project Manager* and *Employer*'s Environmental Officer without delay,
- Await further instruction prior to resuming work in the affected area.

Under no circumstances shall fauna be harmed or flora be removed or damaged without the explicit written approval of the relevant environmental authority and the *Employer*.

5.1.5.3 Objects of Historical or Cultural Interest

Should the *Contractor* or any of its personnel discover any object of archaeological, palaeontological, or historical significance, including artefacts, fossils, bones, or structures, work shall be immediately halted in the affected area. The *Contractor* shall:

- Secure the area to prevent disturbance,
- Inform the *Project Manager* and *Employer*'s Environmental Officer,
- Comply with all directions issued by the South African Heritage Resources Agency (SAHRA), the *Employer*, or any relevant heritage authority.

No object of potential historical interest may be removed, disturbed, or handled without prior authorisation. The *Contractor* shall cooperate fully with any investigation or study arising from such discoveries.

5.1.6 Title to materials from demolition and excavation

In accordance with Clause 73.2 of the NEC3 ECC, and unless expressly stated otherwise in writing by the Employer, title to all materials, components, spares, and equipment recovered from any demolition, excavation, or previously delivered stock located on the Site shall remain with the Employer. This includes, but is not limited to:

- Scrap or decommissioned items from removed infrastructure (e.g. tanks, piping, instrumentation, electrical distribution, and control panels),
- Discarded or redundant equipment and materials extracted during excavation or demolition,
- Spares and materials previously delivered to Site for earlier works or cancelled phases of the project (as referenced in Section 3.1.3 and elsewhere in this Works Information),
- Surplus Plant and Materials not ultimately incorporated into the permanent works.

5.1.6.1 Assessment of Recovered or Previously Delivered Spares and Materials

The Contractor shall undertake a formal assessment of the fitness-for-service and suitability of all spares and materials previously delivered to Site or recovered during demolition and excavation. This assessment may include:

- Visual inspection,
- Non-Destructive Testing (NDT),
- Destructive sample testing (where required), and
- Comparison against technical specifications for compatibility with the permanent works design.

The cost of this assessment shall be included in the Prices as per the Pricing Data and will not be deducted from any subsequent valuation of materials.

The findings shall be documented and submitted to the Project Manager for review and concurrence.

5.1.6.2 Disposition and Valuation of Recovered Materials

Where the materials or spares are:

- Unfit for service, or
- Fit for service but not suitable for the design of the permanent works,

the *Employer* may elect to dispose of or to transfer title to the *Contractor*, subject to the following process:

i. The *Contractor* shall propose a fair market residual value in ZAR per item or unit weight;
ii. From this value, the costs of disposal and transport incurred by the *Contractor* shall be deducted;
iii. The resulting net residual value shall be submitted to the Project Manager, together with supporting documents including:
   - Test reports,
   - Disposal certificates (where applicable),
   - Valuation basis, and
   - Transport cost breakdown.

5.1.6.3 Mechanisms for Transfer of Title

Upon agreement with the *Employer* and validation by the *Project Manager*, the transfer of title to the *Contractor* for such materials may proceed by either:

- The *Contractor* reimbursing the *Employer* the net residual value; or
- The *Employer* accepting a reduction in the Prices proposed by the *Contractor* that is equal to the net residual value, which will be formally documented and processed through the *Project Manager*.

This process shall ensure clarity of asset disposition and uphold value-for-money principles.

5.1.6.4 Recovered Materials Suitable for Reuse as Spares

Where recovered materials or spares are found to:

- Have sufficient remaining useful life, and
- Be suitable for reuse as maintenance or operational spares once the works are completed,

the *Contractor* shall:

- Categorise, label, and count such items,
- Store them safely and securely in accordance with the *Employer*'s inventory and asset management procedures,
- Provide accompanying technical documentation, Material Safety Data Sheets (MSDS), and certificates of conformance or serviceability (where applicable),
- Submit a complete inventory list to the *Project Manager* and the *Employer*'s Asset Information Management Office (AIMO) for incorporation into the *Employer*'s Computerised Maintenance Management System (CMMS) and Fixed Asset Register.

5.1.6.5 Documentation and Record-Keeping

For all materials, whether reused, disposed of, or transferred:

- Full documentation shall be submitted to the *Project Manager*,
- This includes all assessment reports, test results, inventory lists, disposal manifests, and valuation records,
- All documentation shall be uploaded to the Document Management System (DMS) or other *Employer*-specified platforms in compliance with Section 3 of this Works Information,
- The process shall follow all protocols for record traceability, security, and audit readiness as stipulated elsewhere in the Contract.

No recovered material may be removed from Site or otherwise disposed of without the written approval of the *Project Manager*, and all activities must comply with the *Employer*'s environmental, asset management, and information governance policies.

5.1.7 Cooperating with and obtaining acceptance of Others

In accordance with core clause 25.1, the *Contractor* shall co-operate with Others as defined in clause 11.2(10) and take all reasonable steps to ensure that its work does not interfere unnecessarily or improperly with the activities of Others on or adjacent to the Site or the Working Areas. For the purposes of this contract, "Others" shall include, but are not limited to:

- The facility operator, including its operational staff, control room personnel, maintenance teams, and security staff,
- The *Employer*'s appointed maintenance contractors,
- The *Employer*'s appointed *Project Manager*, *Supervisor*, and *Employer*'s representatives,
- Any specialist contractors, professional service providers or consultants appointed by the *Employer*,
- Statutory authorities, inspectors, regulators, or auditing personnel acting within their mandate.

The *Contractor* shall:

- Coordinate its activities with those of Others to avoid disruption, duplication, or conflict in the execution of the works,
- Comply with all reasonable instructions and protocols issued by the facility operator or the *Project Manager* to maintain the safe, continuous, and efficient operation of the facility,
- Take into account working hour restrictions, physical access constraints, safety zones, and existing operational protocols of the facility as may be issued or updated from time to time,
- Ensure that its subcontractors and personnel respect the operational, security, and safety requirements applicable to the site and to Others.

5.1.7.1 Liaison with Statutory Authorities and Regulatory Bodies

The *Contractor* is responsible for:

- Liaising with all applicable statutory authorities, utility providers, and regulatory bodies as necessary to carry out the works,
- Obtaining any permissions, approvals, licences, or permits required by law in relation to its scope of work unless otherwise stated in the Contract Data.

This includes, but is not limited to:

- NERSA (National Energy Regulator of South Africa), where the works may impact energy supply systems or require confirmation of continued compliance with the *Employer*'s operating license,
- Ekurhuleni Metropolitan Municipality, in matters related to:
    - Water use licensing and water discharge,
    - Stormwater management,
    - Noise control,
    - Air quality, dust, and VOC emissions (as referenced in Section 2.4),
    - Waste management and environmental reporting requirements,
- The Department of Employment and Labour, including compliance with:
    - Construction Work Permit and/or Notification of Construction Work in accordance with the Construction Regulations issued under the Occupational Health and Safety Act,
    - Statutory health and safety file inspections, and
    - Any other legislative compliance inspections applicable to the works.

The *Contractor* shall provide all required documentation, test results, method statements, or safety submissions required for approval by these bodies and submit copies to the Project Manager upon request or prior to any related hold or witness point.

5.1.7.2 Access and Coordination Protocols

Where necessary, the *Project Manager* shall:

- Facilitate introductions between the *Contractor* and identified Others,
- Establish protocols for coordinating meetings, safety inductions, inspections, and access to shared areas.

Any disputes or access limitations arising from conflicts between the activities of the *Contractor* and Others shall be referred to the *Project Manager* for resolution.

The *Contractor* shall maintain a proactive and cooperative relationship with Others throughout the execution of the works and ensure that all relevant documentation and communications with regulatory bodies or Others are recorded and uploaded via the Document Management System (DMS) or submitted in accordance with the procedures set out in this Works Information.

5.1.8 *Contractor*'s Equipment

The *Contractor* shall maintain an up-to-date and accurate register of all *Contractor*'s Equipment brought onto the Site or used within the Working Areas, regardless of whether such equipment is owned, leased, or hired. This register shall be made available to the *Project Manager* and *Supervisor* upon request at any time and shall indicate, at a minimum:

- Description and identification number of each item of equipment,
- Ownership status (owned, leased, hired, subcontracted),
- Dates of arrival on and removal from Site,
- Daily or weekly inspection status,
- Status of operator training and competency certification (where applicable).

All *Contractor*'s Equipment shall:

- Be maintained in a safe, fully operational, and legally compliant condition,
- Be operated only by trained, certified, and authorised personnel,
- Be used only in accordance with the approved Risk Assessment and Method Statement (RAMS),
- Comply with all applicable OEM recommendations, national safety regulations, and site-specific health, safety, environmental and quality (SHEQ) protocols.

All RAMS shall be submitted to the *Project Manager* and reviewed by the SHEQ representatives of both the facility operator and the *Project Manager* prior to mobilisation of equipment or commencement of the related work activity.

5.1.8.1 Heavy Lifts, Cranes, Rigs, and Scaffolding

The *Employer* places no specific restrictions on the use of cranes, heavy lifting equipment, rigs, or scaffolding beyond the following general requirements. These items must be:

- Fit-for-purpose and certified in accordance with applicable South African legislation (including DMR 18 and DMR 19, where applicable),
- Inspected and signed off by a Competent Person prior to each use or re-erection,
- Used in accordance with a task-specific RAMS that has been accepted by the SHEQ representatives of both the *Project Manager* and the facility operator.

Rigging studies, crane lift plans, and scaffold designs must be submitted to the *Project Manager* and made available on request.

Noise suppression measures shall be employed where the operation of the equipment could interfere with sensitive facility operations or personnel safety, in accordance with the principles of SANS 1200A Clause 4.1 and the facility's operational procedures.

Where any lifting, erection, or dismantling activity requires temporary exclusion zones, route closures, or disruption of operational areas, this must be coordinated in advance with the *Project Manager* and facility operator.

5.1.8.2 Removal and Demobilisation of Equipment

The *Contractor* shall ensure that all equipment is:

- Removed from the Site promptly once it is no longer required,
- Decontaminated, cleaned, and certified as safe for off-site transport where necessary,
- Removed in a manner that causes minimal disruption to facility operations, roadways, and walkways.

No *Contractor*'s Equipment may be left unattended, abandoned, or stored long-term on Site without the written agreement of the *Project Manager* and the facility operator.

5.1.9 Equipment provided by the *Employer*

The *Employer* provides no equipment in addition to those equipment, plant, materials, and utilities similarly referred to in previous sections of this Works Information.

5.1.10 Site services and facilities

In accordance with Core Clause 25.2 of the ECC3 Contract, the following outlines the services and facilities that may be made available to the *Contractor* on Site, including the associated constraints and responsibilities. These provisions are subject to availability and approval by the relevant departments of the *Employer* or the facility operator and shall not be construed as an obligation on the part of the *Employer* to provide such services in full.

5.1.10.1 Electrical Power Supply

Electrical power may be made available for temporary construction use through coordination with the ACSA Electrical Maintenance Department or the facility operator. The *Contractor* shall liaise with these parties during site establishment to confirm the availability, loading limits, and specific hook-up locations.

All infrastructure beyond the agreed point of connection—including cabling, protection, metering, and temporary distribution boards—shall be provided, installed, and maintained by the *Contractor* at the *Contractor*'s cost. The *Contractor* remains responsible for all safety and compliance obligations in this regard.

5.1.10.2 Potable Water and Construction Water

Potable and non-potable water for use during construction may be sourced via the ACSA Civil Maintenance Department or the facility operator. Hook-up points and flow limitations will be confirmed through formal coordination during mobilisation.

All piping, hoses, backflow prevention devices, and related distribution infrastructure shall be provided and maintained by the *Contractor*. The *Contractor* bears full responsibility for ensuring hygienic, safe, and compliant use of the water supply.

5.1.10.3 Waste Disposal

The *Contractor* shall liaise with the facility operator's waste management representative to understand site-specific requirements for waste handling, segregation, storage, and removal. Waste streams—including general, hazardous, and hydrocarbon-contaminated waste—shall be managed as described in the *Contractor*'s Waste Management Plan and in accordance with Section 2.4 of this Works Information.

The *Contractor* shall provide all bins, skips, containment measures, and removal services at its own cost unless otherwise agreed in writing. Disposal shall be via licensed waste handlers and accompanied by the necessary documentation (e.g. safe disposal certificates, weighbridge slips, and manifest logs).

5.1.10.4 Telecommunication Services

Neither the *Employer* nor the facility operator will provide any form of telecommunications infrastructure, including internet, fibre, or telephony, to the *Contractor*.

Should the *Contractor* or any of its subcontractors, specialists, or sub-consultants require telecommunications access, they may approach the *Employer*'s IT Department and/or the facility operator to ascertain possible points of connection or available infrastructure to which service providers may be connected. However:

- All service provider arrangements,
- All connection works and internal infrastructure,
- And all associated costs (including service subscriptions, hardware, and data plans),

shall be the sole responsibility of the *Contractor*.

5.1.10.5 Ablution Facilities

The *Contractor* shall provide temporary ablution facilities for its personnel and those of its subcontractors for the duration of the Contract. These facilities shall be:

- Sited in locations agreed with the *Project Manager* and the facility operator,
- Maintained in accordance with site hygiene, health, and environmental requirements,
- Routinely serviced and cleaned,
- Provided in sufficient quantity to meet legislative and site SHEQ requirements.

Use of any existing on-site ablutions is not guaranteed and shall not be relied upon unless expressly authorised in writing by the facility operator and *Employer*.

5.1.10.6 Fire Protection Systems

The Site is equipped with a network of fire protection systems, including fire extinguishers, hose reels, and hydrants. Their locations and operational use will be made known to the *Contractor* during the site induction provided by the facility operator.

The *Contractor* shall supplement these existing systems as needed with task-specific fire suppression equipment (e.g., mobile extinguishers at hot work zones) as dictated by the approved RAMS for the works being performed.

5.1.10.7 Temporary Lighting

General area lighting exists in some parts of the facility; however, the Contractor is responsible for:

- Providing all additional temporary lighting required to ensure safe working conditions in all areas under its control,
- Ensuring proper installation, support, protection, and energisation of temporary lighting systems,
- Complying with all relevant electrical standards and safety requirements.

5.1.10.8 Hook-Up Coordination and Contractor Responsibility

The *Contractor* shall coordinate with the relevant ACSA maintenance departments and/or the facility operator to identify and confirm available hook-up points for any of the above services during the mobilisation phase.

While these departments may assist in identifying access points or infrastructure, all work, connections, usage, and associated costs (including materials, installation, and ongoing service fees) remain entirely the *Contractor*'s responsibility.

5.1.11 Facilities provided by the *Contractor*

The *Employer* does not prescribe the exact nature, layout, or scope of site facilities to be established by the *Contractor*. However, the *Contractor* is required to ensure that all facilities it elects to establish or operate during the execution of the contract are adequate, lawful, and sufficient to enable the *Contractor* to Provide the Works efficiently, safely, and in accordance with the Contract.

The following provisions shall apply to all *Contractor*-provided facilities:

5.1.11.1 Scope of Facilities

Where deemed necessary for the efficient execution of the works, the *Contractor* may provide (at its own cost and for its own use) any of the following facilities:

- Site offices, accommodation, and meeting rooms;
- Laboratories for testing and quality control;
- Workshops, laydown areas, and secure stores for tools, materials, and equipment;
- Parking areas, mess areas, ablution units, or staff rest areas;
- Temporary bulk storage for construction fuel, chemicals, or hazardous materials, subject to applicable approvals;
- Office equipment, communications, and printing facilities.

Any such facilities shall be suitably sized, constructed, and equipped for their intended purpose and maintained in a clean, safe, and professional condition throughout the duration of the works.

5.1.11.2 Use of Existing Facilities and Non-Operational Areas

Given the constrained nature and operational sensitivity of the Site—which functions as a national key point and an active bulk Jet-A1 fuel tank storage facility—the *Contractor* shall minimise interference with ongoing operations and refrain from establishing facilities in any live operational zones unless expressly approved in writing.

The *Contractor* is encouraged to make use of the existing parking lot situated across the street from and to the East of the facility or another non-operational space to be identified and agreed upon during the mobilisation phase. The suitability of such space shall be confirmed with the facility operator and the *Supervisor*.

5.1.11.3 Drawings and Site Layout Plan

The *Contractor* shall submit to the *Project Manager* a site establishment layout drawing showing the proposed location of all temporary facilities, access routes, laydown areas, and storage zones for review and coordination with operational stakeholders. No establishment of any facility may commence without the written acceptance of this plan.

5.1.11.4 Safety, Environmental and Operational Constraints

All temporary facilities must comply with the applicable requirements of:

- The site-specific Environmental Management Plan (EMP),
- The *Contractor*'s approved RAMS,
- The OHS Act and relevant regulations,
- Local municipal by-laws and fire safety regulations,
- Site security and access control protocols.

The *Contractor* remains responsible for securing its own temporary facilities and shall ensure that no flammable, hazardous, or otherwise sensitive materials are stored in unauthorised areas or in conflict with site operational constraints.

5.1.11.5 End-of-Contract Removal and Reinstatement

Upon completion of the works, all temporary facilities shall be dismantled and removed by the *Contractor* at its own cost. The affected areas shall be cleared, cleaned, and reinstated to the satisfaction of the *Project Manager* and in compliance with environmental and operational requirements.

No disposal of rubble, demolition debris, or unwanted materials from site establishment shall be permitted on Site or in any stormwater or fuel containment infrastructure.

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

Prior to commencing any works that could potentially impact existing assets or surrounding areas, the *Contractor* shall carry out precautionary inspections of any buildings, infrastructure, or equipment not included in the scope of work or forming part of ongoing facility operations. These inspections shall be conducted in coordination with the *Project Manager*, the *Supervisor*, and the facility operator (where necessary) and recorded in a format suitable for inclusion in the Document Management System (DMS). The *Contractor* shall submit inspection records to the *Project Manager* for verification and record-keeping. Where there is potential for the *Contractor*'s work, equipment, plant, or materials to:

- encroach beyond designated Working Areas or established facilities,
- or otherwise cause damage, nuisance, or safety risks to existing structures, ongoing operations, or adjoining properties,
- the *Contractor* shall:
    - Identify and assess such risks as part of its RAMS and construction planning processes;
    - Propose and obtain acceptance for suitable elimination or mitigation measures;

- Implement these measures under the supervision of the *Project Manager* and in accordance with the agreed method statements, statutory obligations, and facility operating procedures.

The *Contractor* shall also ensure that any works in proximity to retained structures or infrastructure—whether active or redundant—are undertaken with appropriate care and protection measures in place, including but not limited to the use of physical barriers, signage, ground protection, or structural monitoring, as may be required.

5.1.12.1 Checking Work of Others

Where the *Contractor* is required to interface with or connect to any systems, services, or structures provided or retained by Others (as defined in core clause 11.2(10)), the *Contractor* shall:

- Carry out timely inspections of such work or infrastructure to verify its condition, accuracy, compliance, and suitability for the intended integration;
- Promptly notify the *Project Manager* of any non-conformances, damage, or design mismatches that may impact the *Contractor*'s ability to complete the works;
- Ensure that such inspections and assessments are performed early enough so as not to delay its own programme.

This includes but is not limited to interfaces with electrical distribution systems, instrumentation, process piping, foundations, containment systems, and any retained civil structures or operational equipment.

The provisions of Section 5.1.7 (Cooperating with and obtaining acceptance of Others) shall apply in full, and the *Contractor* shall maintain close coordination with all relevant parties—including the facility operator, *Employer*'s maintenance contractors, and statutory authorities—wherever shared access, operational continuity, or overlapping scopes exist.

5.1.13 Survey control and setting out of the *works*

The *Contractor* shall be responsible for the accurate setting out of the works in accordance with the Works Information, construction drawings, and specifications. This includes all alignments, levels, coordinates, dimensions, and spatial layouts necessary to complete the works in compliance with the design intent and all applicable statutory and regulatory requirements.

Where applicable, the *Contractor* shall make use of any existing survey control points, benchmarks, and geodetic references identified or confirmed during the mobilisation and start-up phase of the project. The Project Manager, in coordination with the Employer's Asset Information Management Office (AIMO), relevant *Employer* departments, and/or the facility operator, will assist in facilitating access to such information. Any such survey control references shall be aligned, to the extent practicable, with the *Employer*'s spatial data and graphical information systems (GIS).

The *Employer* does not warrant the accuracy, completeness, currency or suitability for construction purposes of any graphical information, drawings, legacy survey data, GIS records, or other spatial documentation made available to the *Contractor*. This includes but is not limited to information obtained from AIMO, the facility operator, the *Project Manager*, or any other representative of the *Employer*. Accordingly, the *Contractor* shall not rely on any such information without independent verification, and the *Employer* shall bear no liability for errors, delays, rework, or additional costs arising from inaccuracies in such data.

In line with this responsibility, the *Contractor* shall:

- Conduct all necessary topographical surveys, laser measurements, digital scans, condition assessments and on-site investigations to verify spatial and dimensional information required for the works;
- Use survey techniques and equipment appropriate to the level of accuracy required by the nature and complexity of the works;
- Establish and maintain appropriate temporary or permanent survey control benchmarks as needed to execute and complete the works;
- Maintain a secure record of all survey control points and their coordinates and provide this to the *Project Manager* for reference;
- Ensure that all setting out is conducted by suitably qualified and competent personnel;

- Ensure that all as-built drawings and documentation are based on field-verified measurements and not solely on legacy records or *Employer*-provided graphical information;
- Format and structure final survey deliverables, as-built data, and geospatial documentation in a manner compatible with the *Employer*'s GIS and asset management systems, as agreed with the *Project Manager* and AIMO.

The scope and format of survey records and final deliverables, including electronic data formats, shall be finalised and agreed with the *Project Manager* at the start-up phase of the contract.

5.1.14 Excavations and associated water control

The *Contractor* shall plan, execute, and manage all excavation works in accordance with relevant legislation, approved method statements, and best industry practice. Particular care shall be taken in managing risks associated with soil stability, groundwater ingress, buried services, confined spaces, and nearby operational infrastructure.

It is acknowledged that the project site, located at or adjacent to O.R. Tambo International Airport (ORTIA), is known to have a relatively high water table. Therefore, the *Contractor* shall make appropriate provision for excavation in saturated or unstable ground conditions, including implementing suitable water control and dewatering systems.

The following requirements shall apply:

- Geotechnical Surveys and Validation: Any geotechnical surveys or soil reports provided by the *Employer* during the tender or mobilisation phase are made available for general guidance only. The *Contractor* shall not rely on the accuracy or completeness of such information and shall undertake their own detailed geotechnical surveys and related investigations to validate site conditions. These investigations shall include, but are not limited to, assessments of groundwater levels, soil stratigraphy, bearing capacity, compaction properties, and any condition that may affect excavation safety and structural stability.
- Water Control and Dewatering: Where excavations intersect the water table or where water ingress is otherwise likely, the *Contractor* shall implement appropriate dewatering methods—such as well-points, sumps, submersible pumps, or perimeter drainage systems—to ensure that excavations remain stable, safe, and dry. All collected water shall be handled and disposed of in compliance with the environmental management requirements in Section 2.4 and with applicable legal and permitting obligations.
- Excavation Support and Shoring: Where required due to soil conditions, depth, proximity to structures, or duration of open excavation, the *Contractor* shall provide temporary works such as trench boxes, shoring, sheet piling, or sloped/benched walls in accordance with legal and engineering standards. Excavation methods shall be designed and executed to avoid collapse and protect both workers and adjacent infrastructure.
- Inspection and Monitoring: All excavations shall be inspected and monitored regularly. Signs of instability, water build-up, settlement, or unexpected ground conditions shall be promptly reported to the *Project Manager* and the *Supervisor* and mitigated immediately. Any excavation adjacent to operational infrastructure shall be subject to heightened monitoring and review.
- Backfilling and Reinstatement: Excavations shall be backfilled using suitable materials, compacted in layers to engineering specifications. Where structural backfill is required, materials and compaction methods shall be in accordance with the design and subject to testing and verification.
- Permit and Regulatory Coordination: Where applicable, the *Contractor* shall obtain required permits and consents from statutory authorities for excavation or dewatering works, including water use authorisations from the Department of Water and Sanitation. The *Project Manager* and *Employer*'s Environmental Officer shall be informed in advance of such activities.
- Buried Services and Coordination: The *Contractor* shall identify and protect all known or suspected underground services within the area of excavation. The *Contractor* shall consult service drawings, liaise with the facility operator and relevant ACSA departments, and undertake physical verification before commencing any excavation.

The *Contractor* shall prepare and submit for acceptance detailed method statements covering all aspects of excavation and associated water control, including the proposed excavation approach, temporary works, safety precautions, groundwater management, sequencing, and environmental protection measures. These shall be submitted in good time for review by the *Project Manager* prior to commencement of works.

5.1.15 Underground services, other existing services, cable and pipe trenches and covers

The site contains a range of known underground and existing services, including but not limited to electrical cables, water pipes, drainage systems, fuel and process pipelines, telecommunications ducting, and other utility infrastructure. The Employer will provide drawings and information on known services as part of the tender documentation and, where applicable, during the mobilisation phase.

5.1.15.1 Verification and Confirmation of Existing Services

The accuracy and completeness of service drawings and records provided by the Employer or other sources shall not be relied upon exclusively by the Contractor. The Contractor shall undertake all necessary investigations, including trial excavations, use of detection equipment such as cable locators, ground penetrating radar (GPR), and other appropriate methods, to positively locate and verify the position, depth, and condition of underground and other existing services where such knowledge is critical to the execution of the Works.

5.1.15.2 Marking and Recording of Services

Upon verification, the Contractor shall clearly mark all underground and existing services on site using approved methods and maintain accurate records of their location. These markings shall be kept intact and refreshed as necessary throughout the contract duration. All marked services shall be incorporated into the Contractor's site plans and submitted periodically to the Project Manager.

5.1.15.3 Treatment of Existing Services

The Contractor shall manage existing services in accordance with the Works Information and instructions from the Project Manager. This includes, but is not limited to:

- Termination of services permanently removed from use.
- Diversion or rerouting of services where required to accommodate the Works.
- Installation of redundancies or alternative arrangements where interruption to services would impact the safe and effective operation of the facility.
- Temporary disconnection or protection of services that will remain in use or require reinstatement.

Any such work shall be coordinated with the Project Manager, facility operators, and relevant authorities to ensure continuity of service where necessary, and compliance with statutory requirements.

5.1.15.4 Working in Proximity to Services

The Contractor shall exercise extreme care when working adjacent to or above underground or existing services. Appropriate protective measures, excavation methods, and temporary supports shall be implemented to prevent damage or disruption.

5.1.15.5 Responsibility for Damage to Services

The Contractor shall be responsible for any damage to known or unknown services caused by their operations. The Contractor shall immediately report any damage or disruption to services to the Project Manager and the relevant authority or facility operator. Repair works shall be carried out at the Contractor's cost, to the satisfaction of the Project Manager and the relevant service owner.

5.1.15.6 Notification and Reinstatement Procedures

All damage to services shall be documented, and repairs shall be effected promptly to minimise disruption. The Contractor shall submit detailed reports of the incident, remedial works undertaken, and preventive measures to avoid recurrence. Failure to properly notify and promptly repair damage may result in penalties or deductions as determined by the Project Manager in accordance with the contract conditions.

5.1.15.7 Use of Detection Equipment

The Contractor shall provide and use suitable detection equipment and techniques to locate underground services prior to any intrusive works. Training and competency requirements for personnel performing these tasks shall comply with applicable legislation and best practice standards.

5.1.16 Control of noise, dust, water and waste

The *Contractor* shall implement and maintain all necessary controls to minimise the generation and spread of dust, noise, uncontrolled water, and waste during construction, in accordance with the highest standards of industrial housekeeping and operational safety. All such controls shall:

- Align with applicable statutory regulations, including but not limited to the National Environmental Management Acts, municipal by-laws, and SANS codes;
- Be compatible with the operational protocols, risk profile, and safety standards applicable to a National Key Point and Major Hazard Installation regulations;
- Not interfere with, degrade, impair, or risk the integrity of ongoing site operations, safety systems, or personnel wellbeing.

Specific attention shall be paid to:

- The prevention of airborne particulate dispersion near sensitive equipment or operational zones;
- Noise suppression to limit disruption to operational communication and monitoring systems;
- The management of slurry, contaminated runoff, or construction effluent to prevent ingress into stormwater or operational drainage systems;
- The regular collection, containment and removal of general, construction, and hazardous waste from the Working Areas.

The *Project Manager* and the facility operator reserve the right to halt any activity, or demand immediate corrective action, should the *Contractor*'s controls be deemed inadequate or pose a risk to ongoing operations.

5.1.17 Sequences of construction or installation

The Contractor shall plan, manage, and sequence all construction and installation activities to maintain the safe, secure, and continuous operation of the fuel storage and distribution facility. Construction sequencing shall be subject to review and acceptance by the Project Manager and shall be coordinated with the facility operator and relevant departments of the Employer.

The following operational and safety constraints shall be observed in sequencing the Works:

5.1.17.1 Limited Availability of Critical Assets for Construction Works

Only a limited number of Jet-A1 storage tanks and hydrant supply pumps may be taken out of service at any one time. The sequencing of decommissioning and recommissioning these systems shall be developed in consultation with the facility operator and the Project Manager, and shall be clearly reflected in the accepted programme.

5.1.17.2 Bund Capacity and Integrity During Construction

At all times, bunds associated with operational storage tanks must retain sufficient capacity to contain 110% of the volume of the largest tank still in operation within that bund, as per applicable national standards and international best practice (e.g., API 2610).

- No bund construction, modification, or removal may proceed unless an acceptable temporary containment solution is in place.
- The sequencing of bund-related works shall ensure that this requirement is met continuously throughout the execution of the Works.

5.1.17.3 Uninterrupted Operational Access

The Contractor shall ensure continuous and safe access for:

- Aircraft refuelling bowsers and hydrant dispensers,

- Operational and maintenance vehicles,
- Facility personnel, emergency responders, and security teams.
- Construction activities (e.g., trenching, equipment staging, scaffolding) must be phased or rerouted to prevent obstruction or operational risk. Proposed access management strategies must be coordinated with the facility operator for acceptance.

5.1.17.4 Continuity of Critical Facility Systems

The Contractor shall ensure that works do not compromise the continuous and safe operation of essential facility systems, including but not limited to:

- Electrical power supply and distribution systems,
- SCADA and control systems,
- Safety and alarm systems,
- Firefighting and fire detection systems.
- Any interruption, modification, or interfacing with these systems shall be subject to strict controls, with approved RAMS, method statements, and necessary permits from the facility operator and Project Manager.

5.1.17.5 Facility Security

The Contractor shall ensure that the security of the facility is maintained at all times throughout the execution of the Works. This includes, but is not limited to, control of site access points, protection of assets and materials, and cooperation with the facility's security personnel to adhere to all security protocols and requirements.

5.1.17.6 Access by Others Without Take-over

The Contractor shall permit access to Others, including:

- Facility operator personnel,
- The Employer's appointed maintenance contractors,
- Project stakeholders, regulators, and SHEQ representatives.
- This access shall be coordinated through the Project Manager and the facility operator and shall not constitute Take-over under Clause 35.2.

5.1.17.7 Interface with Live Systems

Works affecting live systems (e.g., fuel lines, firewater mains, electrical networks, instrumentation) shall be sequenced with extreme caution.

- No tie-ins, isolations, or shutdowns shall occur without approved RAMS, method statements, and permits from the facility operator.
- Temporary or bypass arrangements must be clearly indicated and validated before any interruption is made.

5.1.17.8 Mitigation of Impacts on Facility Operations

Where work cannot be limited and will impact the safety and/or effectiveness of the facility operations, suitable enablement works, redundancies, and/or mitigations must be implemented to ensure ongoing, safe, and effective operation.

5.1.17.9 Other Operational Constraints

The foregoing list is not exhaustive. Other operational constraints may exist depending on specific equipment, processes, and site conditions. The Contractor shall, throughout the Works, limit and sequence any activities that may impact facility operations to the minimum extent necessary to ensure safe, secure, and effective operation.

5.1.17.10 Programme Integration and Revisions

All sequencing constraints shall be incorporated into the detailed programme submitted for acceptance in accordance with Clause 31.2.

- The Contractor shall maintain the programme to reflect actual progress and operational coordination.
- Proposed changes to sequencing that may affect safety, security, or operations must be submitted for review and may not be implemented without acceptance by the Project Manager and agreement from the facility operator.

The Employer reserves the right to require adjustments to sequencing to ensure safe operations, maintain security, or to respond to emergent risks. No compensation events shall arise due to such adjustments where they result from insufficient coordination or foresight by the Contractor.

5.1.18 Giving notice of work to be covered up

The Contractor shall give the Supervisor not less than 48 hours' written notice before covering up or concealing any part of the works which the Supervisor is entitled to inspect or test under the Contract. This requirement applies, but is not limited to:

- Underground services and pipework installations,
- Structural concrete works including rebar placement and formwork,
- Cable trenches and ducts,
- Backfilling over buried infrastructure,
- Works embedded in concrete or other permanent construction,
- Any item requiring witness or hold points as per the approved Inspection and Test Plans (ITPs), Method Statements, or Quality Control Plans.

The notice must be submitted using the agreed site communication procedure or digital platform, and shall clearly specify:

- The exact nature and location of the work to be covered,
- The date and time by which the Supervisor may inspect it,
- The applicable quality documentation (e.g., ITP, drawings, test results, photos).

No work shall be covered without the Supervisor's acceptance or a written waiver confirming that inspection is not required. Any work covered without such acceptance may be required to be uncovered at the Contractor's cost.

In cases where follow-on activities are dependent on timely inspection, the Contractor is advised to plan notices proactively, coordinating with the Supervisor to avoid delay.

5.2 Completion, testing, commissioning and correction of Defects

5.2.1 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 except for the work listed below which may be done after the Completion Date but in any case before the dates stated. The *Project Manager* cannot certify Completion until all the work except that listed below has been done and is also free of Defects which would have, in his opinion, prevented the *Employer* from using the *works* and Others from doing their work.

	Item of work	**To be completed by**
	As-built drawings of the permanent works (including marked-up design drawings, layout modifications, and routing changes for all mechanical, electrical, civil and control systems)	Within 14 days after Completion
	Updated operation and maintenance manuals, including training records and test certificates	Within 14 days after Completion
	Performance testing of the works in use as specified in paragraph 5.2.3 of this Works Information	See performance testing requirements
	Provision of asset tagging data and inventory updates for new or modified plant and equipment	Within 21 days after Completion
	Submission of final safety file and H&S documentation required	Within 14 days after Completion

	under Construction Regulations	
	Reconciliation and handover of recovered or unused Employer-owned materials and spares	Within 10 days after Completion
	Demobilisation and removal of all temporary works, plant, equipment, and site establishment items (except as otherwise agreed in writing)	Within 7 days after Completion
	Final environmental compliance close-out reporting and waste disposal certificates	Within 14 days after Completion

5.2.2 Use of the *works* before Completion has been certified

Until Completion has been certified and the *Employer* has formally taken over the works in accordance with Clause 35.2 of the Contract, the *Contractor* remains fully responsible for the operation, maintenance, supervision, and management of all or any part of the works, including any systems, facilities, or components brought into operation.

Where, prior to Completion, it becomes necessary for the works (or any part thereof) to become operational in support of the *Employer*'s or *Contractor*'s ongoing facility activities, such operation shall be:

- Undertaken and managed entirely by the *Contractor*, at the *Contractor*'s risk and cost;
- Subject to the *Project Manager*'s approval, with appropriate risk assessments, operational plans, and maintenance procedures in place;
- Conducted without constituting Take Over, unless explicitly agreed in writing.

This arrangement does not relieve the *Contractor* of any of his obligations under the Contract, including the correction of Defects, performance testing, or commissioning. Nor does it transfer any responsibility or liability for the works to the *Employer* prior to Completion.

For clarity, where the works (or parts thereof) are placed into use or operation to support ongoing facility functions — such as temporary fuel supply enablement, partial energisation of systems, or interim operation of pumps or controls — such use shall be for the benefit of the *Employer* but shall not be construed as the *Employer* having accepted the works, assumed operational responsibility, or taken over any part of the works.

5.2.3 Materials facilities and samples for tests and inspections

The Contractor shall provide all materials, facilities, samples, equipment, labour, and access necessary for the performance of all tests and inspections required under this Contract, including those expressly specified in the Works Information or the Contract. Such provisions shall be in accordance with the applicable laws, regulations, standards, and good industry practice relevant to petrochemical infrastructure and commissioning works.

The Employer shall provide, as reasonably necessary, practicable and requested, access to designated site areas, relevant documentation, and support for testing and inspection activities, but shall not be responsible for providing materials, samples, or specialised facilities.

The Contractor shall arrange, at its own cost, for all third-party inspection agencies, Approved Inspection Authorities (AIAs), API inspectors, statutory authorities, or other competent bodies required for the conduct of tests and inspections. This includes all fees, scheduling, and coordination to ensure timely inspections and approvals.

The Contractor acknowledges that the Employer is not an expert in petrochemical projects and relies on the Contractor's expertise, including that of its appointed subcontractors, specialists, and suppliers, to identify and carry out all necessary tests and inspections to ensure compliance with all applicable laws, standards, regulations, and contractual requirements. Accordingly, while the Works Information and Contract specify certain tests and inspections, the Contractor remains fully responsible for undertaking any additional tests or inspections reasonably required to demonstrate compliance, even if not explicitly referenced or documented.

The Contractor shall ensure that all test results, inspection reports, certificates, and related documentation are submitted to the Project Manager in a timely manner and in the required format for review, acceptance, and record-keeping.

No obligation shall arise for tests or inspections that are not specified or reasonably required under the Contract unless agreed otherwise in writing by the Employer.

5.2.4 Commissioning

The *Contractor* is fully responsible for the planning, execution, and documentation of commissioning activities across all relevant disciplines. This includes but is not limited to mechanical, electrical, instrumentation, control, and communication systems integral to the works. The *Contractor*, or its appointed subcontractors, suppliers, and specialists, is expected to have proven expertise in the commissioning of petrochemical infrastructure and shall perform all commissioning activities in accordance with applicable legislation, standards, codes of practice, and recognised industry norms.

All mechanical, electrical, instrumentation, control, and communication systems — including but not limited to those associated with jet fuel storage and distribution, safety, firefighting, power supply, SCADA, and interlocks — shall be commissioned in accordance with recognised international best practice, original equipment manufacturer (OEM) specifications, and applicable standards and legislation, including (but not limited to):

- The Occupational Health and Safety Act (Act 85 of 1993), including its relevant regulations;
- The Pressure Equipment Regulations (PER), including engagement with and approval by an Approved Inspection Authority (AIA), where required;
- API, ASME, SANS, IEC, ISO and related engineering standards;
- Energy Institute (EI) and JIG standards for aviation fuel infrastructure;
- Fire protection regulations and standards applicable to hazardous and flammable installations.

Commissioning shall be completed prior to Completion to the extent required for safe, effective, and uninterrupted operation of the facility and to enable execution of the remaining works. The *Project Manager* shall review and approve the *Contractor*'s proposed commissioning methodologies, drawing upon the *Project Manager*'s own experience in the multi-disciplinary delivery of petrochemical infrastructure projects.

It is acknowledged that, as set out in section 5.1.17 – Sequences of construction or installation, certain mechanical, electrical, instrumentation, and control works will be completed in a phased or staggered manner due to operational constraints, including but not limited to:

- Limitations on the number of storage tanks and hydrant supply pumps that may be taken out of service concurrently;
- Requirements to maintain continuous operation of critical systems such as electrical supply, SCADA, interlocks, firefighting systems, and safety circuits;
- The need to preserve secure and unobstructed access for aircraft refuelling operations, vehicular and pedestrian movement, and emergency services.

Commissioning plans shall therefore be structured to reflect these constraints, with each system or component commissioned in its respective stage prior to handover for use by the *Employer*. Where interim enablement or temporary solutions are required to allow commissioning without disruption to facility operations, the *Contractor* shall implement such measures at its own cost and as part of its duty to Provide the Works.

A performance test matrix is provided in Annexure E of the Works Information as a baseline although it is the responsibility of the Contractor to ensure that all installed equipment is appropriately performance tested as part of commissioning to ensure that all relevant performance targets have been met as per the design intent.

All records, test results, certifications, and OEM sign-offs associated with commissioning shall be submitted to the *Project Manager* via the Document Management System (DMS), and form part of the Completion documentation.

5.2.5 Start-up procedures required to put the *works* into operation

Following the successful completion of commissioning activities in accordance with Section 5.2.4, the *Contractor* shall be responsible for all start-up procedures necessary to bring the completed Works into full and safe operation. The *Contractor* shall perform all actions required to ensure that the works are functional, stable, and reliable for operational use in accordance with:

- The original equipment manufacturer's (OEM) guidelines;
- Applicable South African legislation and regulations (e.g., the Occupational Health and Safety Act and the Pressure Equipment Regulations);
- Applicable international best practice (e.g., API, ASME, JIG, EI standards);
- The performance and functionality requirements specified in the Works Information;
- All relevant safety, environmental, and quality management obligations.

Start-up activities shall include, but are not limited to:

- Completion and verification of all pre-start-up safety checks and interlock verifications;
- Energisation, flow verification, and live testing under controlled conditions;
- Supervised introduction of product (e.g., Jet A-1 fuel) into operational systems;
- Monitoring and fine-tuning of control systems;
- Recording of baseline operational parameters;
- Handover of operational logs and documentation related to start-up;
- Functional demonstrations for the Employer's operations and maintenance teams, including provision of training if specified.

Start-up shall be considered an extension of the commissioning phase and must be performed by the *Contractor* (or their qualified subcontractors, specialists, or OEM representatives). The *Employer* shall not be expected to undertake any part of the start-up.

The *Project Manager* may, in agreement with the *Employer*, attend start-up activities for purposes of verification and oversight but this shall not relieve the *Contractor* of responsibility or liability for the readiness and performance of the Works. Wherever the operational sequencing or phased delivery of the Works (refer to section 5.1.17) results in partial or staged start-up activities, each stage shall be independently verified and documented prior to proceeding with subsequent phases. No area may be declared completed or ready for handover unless it has successfully passed start-up and functional performance criteria as agreed with the *Project Manager*.

5.2.6 Take over procedures

5.2.6.1 Take Over Only Upon Completion

The Employer shall only take over the Works upon the Project Manager's certification of Completion, in accordance with core clause 30.2 of the Contract. Completion shall be as defined in clause 11.2(2), meaning that all work required to be done by the Completion Date has been completed and is free of Defects that, in the opinion of the Project Manager, would prevent the Employer from using the Works and Others from doing their work.

Until such certification is issued, the Contractor retains full responsibility for the care, custody, operation, and maintenance of the Works, including the continuation of any facility operations which depend on the functionality of the Works. This shall include all relevant safety, control, electrical, mechanical, and fuel-handling systems, as applicable.

5.2.6.2 Post-Take Over Defects Responsibility

Take Over by the Employer shall not constitute a waiver or discharge of the Contractor's obligations with respect to the correction of Defects. The Defects Correction Period shall be a minimum of twelve (12) months from the certified date of Completion, unless otherwise stated in the Contract Data.

During this period, the Contractor shall:

- Attend to all identified Defects at no additional cost to the Employer;
- Respond promptly to defect notifications issued by the Project Manager, the Employer, or the facility operator;

- Cooperate fully with the facility operator, who will have ongoing custodianship of the facility, and shall be considered a beneficiary of the Defects Correction Period.

5.2.6.3 Assistance Post Take Over

For the duration of the Defects Correction Period, the Contractor shall provide assistance to both the Employer and the facility operator, including but not limited to:

- On-site and remote technical support for the operation of systems handed over;
- Deployment of knowledgeable personnel for troubleshooting and optimisation;
- Assistance in resolving operational issues arising during early-stage operation of the Works;
- Continued support with completing and refining as-built documentation;
- Coordinating and managing any claims related to product, workmanship, or system warranties.

5.2.6.4 Partial or Phased Take Over (if applicable)

Where the Works are delivered in phases due to operational constraints (refer to Section 5.1.17 – Sequences of construction or installation), partial Take Over of individual sections may be considered under the following conditions:

- The relevant section of the Works has been fully commissioned and safely started up;
- The section is required for the continued operation of the facility and its availability does not compromise the Contractor's ability to complete the remaining Works;
- The Project Manager, in consultation with the Employer and the facility operator, certifies that the section meets the Completion criteria for partial Take Over;
- The Contractor continues to support, operate, and protect the partially taken-over Works as required, and interfaces properly with remaining construction activities.

In such cases, the Defects Correction Period for each partially taken-over section shall commence from the date of its partial Take Over.

5.2.6.5 Security, Operations, and Safety Posture

Take Over shall not diminish the Employer's expectations for continuity in operational safety, environmental protection, fire integrity, or fuel quality standards. The Contractor shall ensure that the transition of responsibilities to the Employer and facility operator does not result in lapses in compliance with any applicable legal, regulatory, or technical requirements.

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

In accordance with clause 43.4 of the Contract, the Project Manager shall arrange for the Employer to grant the Contractor reasonable access to and use of any part of the Works that has been taken over, to enable the Contractor to execute necessary corrective actions during the Defects Correction Period.

5.2.7.1 Access Requirements and Procedures:

The Contractor shall provide no less than 2 working days' advance notice to the Project Manager of any intended access for defect correction activities to allow adequate coordination with ongoing facility operations and third parties, including the facility operator. Access shall be granted on the condition that the Contractor complies fully with all applicable health, safety, security, and environmental procedures and requirements in force at the facility.

Where the correction of Defects requires specific operational procedures, such as temporary shutdowns, isolation of systems, or restricted working hours, these shall be coordinated with the Employer and facility operator to minimize disruption to facility operations.

In certain circumstances where access involves safety-critical or high-security areas (e.g., fuel storage zones, firefighting systems, control rooms, or other sensitive infrastructure), the Employer may require the Contractor to undertake additional procedures before access is granted. Such procedures may include but are not limited to:

- Barricading or isolating affected areas;
- Implementation of specific safety management plans;

- Escorting by Employer or facility security personnel;
- Compliance with site-specific operational protocols;
- Obtaining permits or clearances required for work in restricted zones.

The Contractor shall bear the cost and responsibility for implementing any such special procedures and shall ensure that all personnel involved are appropriately trained and authorised.

The Employer and Project Manager shall not unreasonably withhold or delay access required for the timely correction of Defects but must ensure that all safety and operational constraints are respected.

5.2.8 Performance tests after Completion

The Contractor shall carry out performance and proving tests to demonstrate that the Works meet the performance targets and criteria specified in the Contract, in accordance with the requirements of Secondary Option X17 (Performance Tests) of the ECC3 contract.

A baseline Performance Test Matrix is included as an appendix to this Works Information for reference purposes only. The Employer does not warrant or guarantee the completeness or suitability of this baseline matrix. The Contractor's approved matrix shall take precedence and must cover all necessary tests to meet the Contract requirements and applicable standards. The Contractor is responsible for developing a comprehensive Performance Test Matrix based on all applicable work packages of the project. This matrix shall detail the scope, methodologies, acceptance criteria, and schedule for all required performance tests. The Contractor shall submit the Performance Test Matrix for review and approval by the Project Manager and the Employer prior to commencing any performance testing activities.

Performance tests shall be conducted following Completion and prior to Take Over, or as otherwise agreed and specified in the approved test procedures. These tests shall verify the functional and operational performance of all relevant systems, equipment, and components, including but not limited to mechanical, electrical, instrumentation, control systems, safety, firefighting, power supply, and SCADA systems.

Should any part of the Works fail to meet the specified performance criteria during testing, the Contractor shall promptly undertake corrective actions and retesting as required until satisfactory performance is demonstrated.

5.2.9 Training and technology transfer

The Contractor shall, as an integral part of Providing the Works, develop and implement a comprehensive training and technology transfer programme. This programme shall ensure that the Employer, the facility operator, and any other relevant stakeholders are fully capable of operating, adjusting, monitoring, maintaining, and managing the installed systems, equipment, and infrastructure safely and effectively upon Take Over.

5.2.9.1 Training Requirements

The Contractor shall prepare a Training Plan, which shall be submitted to the Project Manager and the Employer for review and approval not less than 60 days before Completion. Training shall be discipline-specific and equipment-specific, and shall cover, where applicable:

- Operational procedures and sequences,
- Safety systems and emergency protocols,
- Preventive and corrective maintenance,
- Use of manuals, drawings, datasheets, and OEM documentation,
- Adjustments, calibrations, and troubleshooting,
- SCADA, control systems, and instrumentation interfaces,
- Interfaces with legacy systems or existing infrastructure,
- Energy efficiency, environmental compliance, and sustainability measures.

Training shall be delivered by qualified personnel with appropriate subject matter knowledge and shall include both classroom-based and hands-on, on-site instruction, where appropriate.

5.2.9.2 Training Materials

The Contractor shall provide all necessary training materials including (but not limited to):

- User manuals and OEM documentation,
- Illustrated procedures and system schematics,
- Maintenance schedules and checklists,
- Multimedia content (e.g., videos, presentations),
- Assessment or certification tools where applicable.

All training materials must be provided in English, clearly structured, and sufficiently detailed to support future refresher training by the Employer or facility operator.

5.2.9.3 Technology Transfer

As part of the training and handover process, the Contractor shall ensure the full and practical transfer of knowledge, operational understanding, and control of the systems and infrastructure to the Employer and/or facility operator.

The technology transfer shall include:

- Functional understanding of all installed systems and equipment,
- Software and hardware interface training,
- Documentation of any custom programming or integration,
- Source codes, passwords, configuration files, and administrative access credentials where applicable,
- Licensing, warranties, and version control details for software and firmware.

5.2.9.4 Involvement of OEMs and Subcontractors

Where necessary, the Contractor shall ensure that original equipment manufacturers (OEMs), subcontractors, specialists, or suppliers directly involved in the design, manufacture, installation, or commissioning of systems or equipment:

- Participate actively in the training programme,
- Provide technical support and expertise during training sessions,
- Attend and support the technology transfer process,
- Make available any proprietary documentation, software, licences, and know-how required for effective training and long-term use of the systems.

5.2.9.5 Attendance and Records

Training shall be provided to all relevant personnel nominated by the Employer and/or the facility operator. A register of attendance shall be maintained, and training completion shall be recorded with signed acknowledgements by participants and verified by the Project Manager.

No training programme shall be deemed complete without the Project Manager’s written acceptance of satisfactory delivery and documentation.

5.2.9.6 Timing and Dependencies

All training and technology transfer activities shall be conducted prior to or in parallel with Take Over, unless otherwise agreed by the Project Manager.

In cases where corrective actions, modifications, or late-stage installations affect previously delivered training, the Contractor shall provide additional or repeat training at no additional cost.

Training shall be scheduled in coordination with commissioning and start-up timelines to ensure relevance and applicability.

5.2.10 Operational maintenance after Completion

The *Employer* may require the *Contractor* before the *defects date* to perform certain duties after Completion and take over which relate to maintenance of the *works*. (Not to be confused with Defect correction) For example oil and filter changes

Following Completion and until Take Over, the Contractor shall continue to be responsible for the operation and maintenance of the Works, systems, and equipment delivered under this Contract, as necessary to ensure their safe, reliable, and continuous performance in support of the facility's ongoing operations.

This operational maintenance period shall:

- Begin at Completion, and
- End at Take Over, when responsibility for ongoing operations and maintenance is formally handed over to the Employer and/or facility operator.

5.2.10.1 Scope of Operational Maintenance

The Contractor's responsibilities during this period shall include, but are not limited to:

- Routine inspections, adjustments, and functional checks;
- Preventive maintenance activities as recommended by OEMs, including (but not limited to):
    - Lubrication,
    - Filter and oil changes,
    - Calibration of instruments and safety systems,
    - Tightening of mechanical and electrical connections,
- Execution of any necessary short-interval maintenance cycles or consumable replacements,
- System monitoring, diagnostics, and performance optimisation,
- Reporting of faults, anomalies, or abnormal performance to the Project Manager.

These activities shall be undertaken in accordance with:

- OEM instructions,
- Industry best practice,
- Relevant safety and environmental regulations, and
- Any additional maintenance procedures reviewed and approved by the Project Manager and/or facility operator.

5.2.10.2 Records and Reporting

The Contractor shall:

- Maintain detailed logs and maintenance records,
- Provide regular operational and maintenance reports (format and frequency to be agreed with the Project Manager),
- Immediately notify the Project Manager of any issues that may affect performance, reliability, or safety.

5.2.10.3 Coordination and Oversight

All operational maintenance activities shall be coordinated with:

- The Employer,
- The facility operator,
- The Project Manager,

to ensure that no disruption occurs to ongoing facility operations.

Where necessary, the Contractor shall:

- Provide trained personnel to execute or oversee maintenance tasks,
- Make available any required special tools or diagnostic equipment.

5.2.10.4 Handover Readiness

In preparation for Take Over, the Contractor shall:

- Submit a complete record of maintenance activities performed during the post-Completion period,
- Demonstrate that all systems are in good working condition and that OEM-recommended commissioning and early-life maintenance tasks have been completed,
- Handover updated maintenance logs, consumable records, and any observed performance trends or recommendations for future maintenance.

5.2.10.5 Exclusions

This section is distinct from Defect correction obligations under Clause 43. It applies only to routine and planned operational maintenance required for safe and effective functioning of the Works during the interim period between Completion and Take Over.

Any reactive maintenance or repair of defects discovered during this period shall be handled under the provisions of Defect correction and shall not relieve the Contractor of their separate obligations under that clause.

6 Plant and Materials standards and workmanship

6.1 Investigation, survey and Site clearance

6.1.1 General Scope

This section defines the Contractor's responsibilities for all investigation, survey, and site clearance activities essential to support the execution of the permanent Works. As this project is being delivered under a design and construct (EPCM) arrangement, the Contractor shall be solely responsible for validating and supplementing all technical inputs required to inform the final designs and ensure safe, compliant, and fit-for-purpose implementation.

The Contractor is required to:

- Review all existing data and studies supplied by the Employer,
- Determine their relevance and sufficiency,
- Update or re-perform these where necessary, and
- Identify and execute any additional studies or assessments required to ensure project success.

Designs may only be submitted for approval after undergoing formal risk assessment procedures, including HAZOP workshops and approval by Approved Inspection Authorities (AIAs) or other legally or technically competent authorities, as may be required under applicable legislation, regulation, or good engineering practice.

6.1.2 Review of Existing Studies and Data

At contract commencement, the Employer will provide the Contractor with access to all documentation from previous design efforts, including:

- Technical studies and assessments,
- Design reports and drawings,
- Process flow diagrams and P&IDs,
- Survey and inspection data, and
- Other relevant engineering or operational information.

It is important to note that the Employer provides all previously generated documentation without any warranty as to accuracy, completeness, or applicability. The Contractor must make an independent assessment of the usefulness of such information and shall remain fully responsible for any reliance placed thereon. The Contractor shall:

- Assess each item for accuracy and current applicability,
- Justify where previous work is to be relied upon without update,
- Re-perform outdated or inadequate studies, and
- Propose any new required investigations.

6.1.3 Specialist Technical Studies and Engineering Risk Reviews

The table below outlines key studies to be reviewed or considered by the Contractor. The Contractor must propose and finalise a comprehensive list of necessary studies to meet legal, regulatory, licensing, and performance obligations. The following requirements apply:

- Any study legally required or necessary for safety, compliance, or to meet performance targets must be performed.
- The final list of studies is subject to Project Manager and Employer review and approval.
- The Contractor shall ensure each final design package is supported by a HAZOP, and where applicable, approved by AIAs and other competent persons.

Study Area	Description
Geotechnical and Subsurface Investigations	Assess bearing capacity, contamination, and groundwater conditions.
Topographical Survey and Site Conditions	Survey roads, tanks, drainage, utilities, and bunds.

Study Area	Description
Structural Integrity Assessments	API 653 inspections; NDT; verify wind loading resilience.
Environmental and Regulatory Compliance	Revalidate EIAs, emissions handling, and ICAO/local compliance.
Safety and Risk Assessments	Conduct updated QRA, fire modelling, and operational hazard identification.
Fuel and Process Flow Analysis	Optimise system from receipt through storage to dispatch.
Tank Terminal Traffic and Logistics	Evaluate flow of vehicles, tankers, and depot access points.
Utility and Services Assessment	Confirm water, electrical, backup systems and capacity.
Regulatory and Legal Review	Verify licensing, EI/JIG, SACAA, and local laws compliance.
Economic and Lifecycle Cost Analysis	Compare new build vs refurbishment of tanks and assets.
Minimum Spares Holding Analysis	Define operational spares strategy for mission-critical systems.
FMECA	Conduct Failure Modes, Effects, and Criticality Analysis for both existing site conditions and final design to ensure that maintenance and operational risks are eliminated or mitigated.
HAZOP and AIA Review	Every design must undergo formal HAZOP analysis and, where required, approval by AIAs and legally competent professionals.
SIL Assessment	Assign SIL ratings to safety systems, fire suppression, and ESD.
Cybersecurity of SCADA/DCS	Evaluate network segmentation, access control, and resilience.
IT/OT Architecture Review	Assess integration with enterprise networks and control systems.
Access Control and Surveillance Studies	Design and evaluate CCTV and restricted access control.
Security Systems Integration	Review integration of all safety, access, alarm, and fire systems.
4IR/Digital Transformation Strategy	Review and propose IoT, AI, and automated controls implementation.
Smart Sensors and IoT	Evaluate ATG, pressure/temperature/flow sensors, smart alerts.
Predictive Analytics and Big Data Feasibility	Assess maintenance optimisation using data-driven tools.
Digital Twin Feasibility	Simulate tank operations, alarms, and fail scenarios.
Automation Systems Strategy	Define automated valve, pump, and SCADA control upgrades.
Cloud-Based and Edge SCADA	Propose cloud-ready and local control architectures.
AI-Driven Decision Support	Evaluate predictive diagnostics, intelligent alarms, and condition monitoring.
Digital Skills Gap Assessment	Identify training and digital skill requirements for new systems.
Equipment Condition & Service Life (Tanks, Pumps, Valves, etc.)	Validate or update design life and serviceability of key assets.

Study Area	Description
Safety Systems Condition Assessment	Assess ESDs, foam systems, alarms, and fire detection reliability.
Foam Concentrate and Suppression Review	Confirm system adequacy, compliance, and replenishment needs.
Firefighting Infrastructure Assessment	Hydrants, hoses, foam, and mobile firefighting asset compliance.
P&ID and As-Built Validation	Ensure accuracy of P&IDs and drawings versus field installations.
Best Practice Benchmarking	Review latest global benchmarks for safety, automation, and efficiency.
Weather Data and Environmental Trends	Validate past 10-year data to confirm design assumptions.

6.1.4 Site Clearance and Access Planning

The Contractor shall:

- Confirm and obtain all clearances required for safe and legal execution of the Works,
- Identify and validate servitudes, right-of-way, and shared access routes,
- Ensure no interference to current operations, airport regulations, or third-party obligations,
- Design and implement temporary works or enablement measures as needed to facilitate site access, plant, and material delivery or construction activity.

All site access, clearance, and temporary works shall be:

- Fully documented,
- Submitted for Project Manager and Employer review, and
- Coordinated with all on-site stakeholders.

6.2 Building works

6.2.1 Scope and general requirements

The Contractor is required to carry out all building refurbishment, minor new construction, and reactivation works necessary to restore, improve, or optimise the Employer's operational and occupied building infrastructure within the Site. This includes, but is not limited to, the administration building, security guard house, medical bay, MCC building, and any other occupied or previously used structures intended for reinstatement. These buildings are primarily of masonry construction, typically featuring tiled roofs, internal partitions, and serving various administrative, operational, or control functions. The scope includes:

- Roofing repairs or replacement, particularly where sagging, leaks or structural degradation has occurred;
- Reconfiguration of internal layouts, especially within the administrative building, to suit updated operational requirements;
- Flooring renewal or replacement, where degradation affects safety, hygiene, or performance;
- Refurbishment and reactivation of disused buildings, including the full reinstatement of functionality, finishes, utilities, and compliance where such facilities are required for operational needs;
- Surface repairs, painting, and general modernisation of finishes and fixtures;
- Joinery, fenestration, ceilings, partitions, and plumbing fixtures as required to restore or modernise facilities;
- Feasibility assessment, design, and construction of a permanent permit office, replacing the current containerised structure, subject to review and approval of siting and operational need by the Employer.

The Contractor shall assess the existing conditions, identify refurbishment and reinstatement strategies, and execute the works to meet or exceed functional, regulatory, aesthetic, and safety performance targets. All work shall be properly coordinated with concurrent or adjacent engineering and infrastructure works (e.g. mechanical, civil, EC&I).

6.2.2 Applicable standards and specifications

All building works shall comply with applicable South African and local standards, including but not limited to:

Standard / Regulation	Description
SANS 10400 (Parts A, B, C, D, O, T, XA)	National Building Regulations for buildings, including structure, fire safety, occupancy, energy efficiency, etc.
SANS 10114-1 & 10114-2	Interior lighting and emergency lighting of occupied spaces
SANS 10252	Water supply and drainage installations for buildings
SANS 322	Safety signage and evacuation systems
SANS 10254	Installation and maintenance of fixed electric storage water heating systems
SANS 10400 Part P	Drainage installations (for wet rooms or ablutions)
ASHRAE 55 & 62.1	Thermal comfort and indoor air quality (where HVAC is required)
Municipal Building By-laws	Local requirements including setbacks, occupancy approvals, fire clearances, etc.
OHS Act and General Safety Regulations	Ensuring safe working environments during construction and post-occupancy

6.2.3 Contractor's responsibilities

The Contractor shall:

- Perform surveys and condition assessments of all buildings prior to finalising designs;
- Develop refurbishment and construction proposals to meet the performance, functional, and compliance needs of each space;
- Coordinate design intent with the Employer's operational and maintenance personnel;
- Ensure all building design submissions are reviewed by the Employer, and, where required, modified per feedback prior to construction;
- Integrate building works with other disciplines including mechanical, electrical, civil, and SCADA/control packages;
- Where new permanent structures are proposed (e.g., the permit office), develop multiple layout/siting options for review by the Employer and Project Manager;
- Obtain any necessary approvals (municipal or other) where legally required and not already obtained by the Employer;
- Provide records of all building work, including as-built drawings, specifications, finishes schedules, and warranties.

6.2.4 Standard Specifications and Reference Preambles

The standards of workmanship and materials applicable to general building trades—such as masonry, roofing, ceilings, finishes, painting, and joinery—shall conform to the requirements of all applicable standards and regulations, and any supplementary specifications/performance targets issued or approved by the Employer.

Where required to specify workmanship or materials for minor building refurbishments or reinstatement works, the Contractor may refer to the Model Preambles for Trades published by the Association of South African Quantity Surveyors (ASAQS) as a recognised industry benchmark for sub-contracted building works. The Contractor shall ensure that any such references are:

- consistent with the terminology and requirements of this Contract,
- appropriate to the form and scope of the work, and
- subject to review and approval by the Employer prior to use in subcontract procurement or construction implementation.

The ASAQS model preambles are not binding under this Contract unless specifically referenced in the Employer's specifications or agreed during the design development process.

6.2.5 Variations and change instructions

Should additional building works be instructed, including enhancements or scope modifications, the Contractor shall assess the impact on time, cost, and quality. Change proposals must include updated drawings, cost estimates, construction methodology, and revised project implications in accordance with Clause 60 of the Contract.

6.3 Mechanical Works

6.3.1 General

Mechanical works shall be executed in accordance with the Employer's performance targets (provided in annexures) as well as applicable South African and international standards governing mechanical equipment, installation, and maintenance. The Contractor shall ensure that all materials, equipment, and workmanship meet or exceed these requirements. Should there be any conflict between OEM manuals, applicable laws, or technical best practice, the more stringent requirements will take precedence.

All mechanical materials and equipment shall be new, compliant with the listed standards, and free from defects. Installation, testing, and commissioning shall follow best industry practices and comply with all relevant statutory and contractual requirements. The Contractor shall coordinate as necessary with OEMs and subcontractors to ensure proper workmanship and compliance. The Contractor remains responsible for ensuring compliance with all performance and legal requirements, applying the more stringent standard when conflicts arise between OEM documentation and contractual or statutory requirements.

6.3.2 Mechanical Design Review and Approval

The Contractor shall secure all necessary approvals from the Employer for mechanical materials, equipment, and workmanship. Such approvals will be subject to the review of the Project Manager to ensure compliance with the contract requirements. No critical mechanical equipment or components shall be installed or commissioned without prior written approval by the Employer.

6.3.3 List of Applicable Standards – Mechanical Works

The following standards, specifications, and regulations apply to the mechanical works where relevant. This list is provided as a guideline and baseline reference; the Contractor remains responsible for identifying and complying with all applicable standards necessary to meet contractual and legal requirements:

Standard / Regulation	Title / Scope
API 2000	Venting Atmospheric and Low-Pressure Storage Tanks
API 2610	Design, Construction, Operation, and Maintenance of Terminal and Tank Facilities
API 520 Parts 1 & 2	Pressure-Relieving Devices – Sizing, Selection, and Installation
API 521	Guide for Pressure-Relieving and Depressurising Systems
API 610	Centrifugal Pumps for Petroleum, Petrochemical and Natural Gas Industries
API 650	Welded Steel Tanks for Oil Storage
API 677	Gear Units for Petroleum, Chemical, and Gas Industry Services
API 421	Design and Operation of Oil-Water Separators
API RP 2003	Protection Against Static, Lightning, and Stray Currents
API RP 500	Classification of Locations for Electrical Installations in Petroleum Facilities
ASME B31.3	Process Piping
ASME B31.4	Pipeline Transportation of Liquid Hydrocarbons
ASME VIII Div 1	Rules for Construction of Pressure Vessels
EI 1540	Design, Construction and Operation of Aviation Fuel Depots
EI 1541	Protective Coatings for Aviation Fuel Systems
EI 1542	Identification Systems for Aviation Fuel Infrastructure

Standard / Regulation	Title / Scope
NFPA 70B	Recommended Practice for Electrical Equipment Maintenance
NFPA 75	Fire Protection for Information Technology Equipment
NFPA 30	Flammable and Combustible Liquids Code
JIG 2 Standard	Quality Control and Operating Procedures for Airport Fuel Depots
PER (OHS Act)	Pressure Equipment Regulations
MHI Regulations	Major Hazard Installation Regulations
SANS 310	Design and Construction of Welded Steel Tanks for Petroleum Products
SANS 10089-1	Petroleum Industry – Storage and Distribution Facilities
SANS 10089-2	Petroleum Industry – Electrical and Mechanical Installations
SANS 10108	Classification of Hazardous Locations
SANS 10142-1	Wiring of Premises – Covers interfaces with mechanical equipment
SANS 10160 Series	Structural Design Actions – Relevant where supporting mechanical equipment
SANS 1475	Fire Extinguishing Equipment – Covers portable/mechanical systems
SANS 10313	Protection Against Lightning – Where mechanical systems interface with earthing and bonding
SANS 10252	Water Supply and Drainage for Buildings – For mechanical utility services
SANS 241	Potable Water Quality – For washdown, foam systems, or utility usage
SACAA	South African Civil Aviation Authority – Safety and airside compliance for mechanical systems
ICAO Annex 14	Aerodrome Design and Operations – Fuel system layout, tank and pump clearance zones
ACSA Requirements	Operational and technical standards, including mechanical safety and maintenance access provisions

The Contractor must ensure full and ongoing compliance with all applicable standards, specifications, regulations, and statutory requirements relevant to the mechanical works. The Employer reserves the right to require additional standards or modifications as necessary to meet performance, safety, or legal requirements.

Where conflicts arise between original equipment manufacturer (OEM) standards or manuals and the standards listed above, applicable laws, or accepted technical and operational best practices, the more stringent requirement or set of conditions shall govern and apply.

6.4 Civil engineering and structural works

6.4.1 General

Civil engineering and structural works shall comply with the applicable parts of the SANS 1200 series, specifically those related to earthworks, concrete works, and structural steel, as well as relevant South African National Standards and statutory requirements. The Contractor shall ensure all materials, workmanship, and construction methods conform to these standards and the Employer's specifications. It is noted that some portions of SANS 1200 have been updated or superseded, and the Contractor must verify the latest applicable versions. Where conflicts arise between standards or contractual requirements, the more stringent shall apply.

All materials and workmanship shall be new, compliant with the specified standards, free from defects, and suitable for the intended purpose. Installation and construction methods shall adhere to good industry practice and statutory requirements. The Contractor remains liable for ensuring that all works meet the performance, design intent, and compliance targets stipulated in this contract and relevant law. In any case where conflicts arise between standards or Employer specifications, the most stringent requirement shall prevail.

6.4.2 Civil and Structural Design Review and Approval

The Contractor shall obtain all necessary approvals from the Employer for civil and structural works, including materials, workmanship, and construction methods. Such approvals are subject to the review and recommendations of the Project Manager's technical team to ensure compliance with contractual and statutory requirements. No critical civil or structural work shall proceed without prior written Employer approval.

6.4.3 List of Applicable Standards

The following technical standards and regulations apply to the civil and structural works as relevant. This list is non-exhaustive, and the Contractor must identify and comply with all additional standards that may be necessary to complete the works safely, legally, and in accordance with best engineering practice.

Standard / Regulation	Description
SANS 10100-1	Structural Use of Concrete – Design
SANS 10100-2	Structural Use of Concrete – Materials
SANS 10160-5	Structural Design and Actions – Soil and hydrostatic pressures
SANS 1200 MJ	Asphalt Paving
SANS 2001-CC1	Structural Concrete
SANS 2001-CE1	Earthworks
SANS 241	Potable Water
SANS 310	Welded Steel Tanks for Petroleum Products
SANS 10131	Above-Ground Storage Tanks
SANS 10400 Parts A, B, C, D, T, O, XA	Application of National Building Regulations
SANS 10114-1 & -2	Interior and Emergency Lighting
SANS 10142-1	Wiring of Premises
SANS 10252 & 10254	Water and Hot Water Installations
SANS 10292	Earthing of Low-Voltage Installations
SANS 10313 & 10108	Lightning Protection and Hazardous Area Classification
SANS 10389-1	Exterior Lighting
SANS 322	Safety Signage and Evacuation Plans
SANS 1475	Fire Extinguishing Equipment
API 650	Welded Tanks for Oil Storage
API 2610	Terminal and Tank Facilities
Petroleum Products Act Regulations	Storage and Distribution Requirements
OHS Act (85 of 1993)	Occupational Health and Safety Act
NEMA	National Environmental Management Act
MHI Regulations	Major Hazard Installation Regulations

It is important to note that for enclosed or occupied structures (e.g. control buildings, workshops, and operator spaces), compliance is also required with the relevant parts of SANS 10400 and other applicable building and fire safety standards.

6.4.4 Variations to Standardised Specifications

The Contractor may propose alternative standards or variations to listed references, where justified by technical superiority, better alignment with the project scope, or updated regulatory requirements.

Any proposed variation must be submitted to the Project Manager for review and, where applicable, to the Employer for approval prior to implementation. Proposals must be supported by:

- A technical justification for the variation;
- A comparison with the referenced standard;
- Confirmation that all statutory and performance obligations will still be met.

6.4.5 Contractor's Responsibility for Scope and Compliance

In accordance with Section 6.1, the list of applicable standards, and technical detail provided in this section are not exhaustive. The Contractor is responsible for:

- Identifying all additional design, investigation, and execution requirements;
- Meeting all statutory, regulatory, and performance target obligations;
- Ensuring that the final works fully satisfy the performance targets, functional intent, and operational requirements defined elsewhere in this Works Information and the Contract.

No omission or ambiguity in this section shall relieve the Contractor of its obligations to Provide the Works in full compliance with the Contract and applicable law.

6.5 Electrical, Controls and Instrumentation works

6.5.1 General

The appendix contains the performance targets applicable to all Electrical, Controls and Instrumentation (EC&I) works required for the successful execution and long-term operation of the facility. These specifications are developed by the Employer and are to be read in conjunction with the Contract Data, the Contractor's Works Information, and other Annexures. Where additional detail is required to suit operational requirements or site-specific conditions, these shall be referenced or appended to the Works Information as annexures.

The Contractor shall ensure that all EC&I works meet the functional, safety, and regulatory needs of a fuel handling, storage, and dispatch facility operating in a hazardous environment, and shall do so using plant, equipment, materials, and workmanship that are fit for purpose and compliant with all applicable standards. The Contractor remains responsible for ensuring that all installations meet the Employer's performance targets and legal obligations, as further detailed in Section 6.1.

The Contractor must ensure that no contradiction arises between the EC&I specifications and any provisions of the NEC3 ECC (April 2013). In the event of conflict between OEM recommendations, standards, laws, or project-specific requirements, the most stringent requirement shall apply.

All EC&I components must be new, traceable, and fit for purpose within hazardous fuel depot zones. Materials and workmanship must be durable in the given environmental conditions, include adequate corrosion protection, and ensure reliable performance and maintainability. Compliance with applicable long-term performance and inspection standards is mandatory.

6.5.2 EC&I Design Approvals

All electrical, control, and instrumentation system designs, including schematics, specifications, layouts, and integration plans, are subject to approval by the Employer, following review by the Project Manager. The Contractor shall ensure that approval is obtained prior to procurement, installation, energisation, or commissioning of any EC&I systems. This includes all power supply and distribution systems, instrumentation and telemetry, control panels, SCADA and automation systems, and associated hardware and software.

Approval shall not absolve the Contractor of its responsibility for ensuring full compliance with contractual, legal, and technical obligations. No component of the EC&I systems shall be commissioned or placed into operational service without the Employer's formal written approval.

6.5.3 Applicable Standards and Regulations

The following table lists the key applicable standards for EC&I works on this project. It is not exhaustive, and the Contractor remains responsible for identifying and complying with all standards relevant to this scope. The Contractor must confirm applicability during detailed design and propose any additions or deviations for the Project Manager's review and for the Employer's consideration and approval:

Standard / Regulation	Description
ATEX 95 Dir. – 94/9/EC	Equipment for Explosive Atmospheres

Standard / Regulation	Description
API RP 2003	Protection Against Static, Lightning, and Stray Currents
API RP 500	Classification of Locations for Electrical Installations in Petroleum Facilities
EI 1540	Aviation Fuel Facility Design and Operation
OHS Act (85 of 1993)	Occupational Health and Safety Act — general workplace safety and electrical safety requirements.
Electrical Installation Regulations (OHS Act)	Regulations specifically governing electrical installations and work.
SANS 10313	Protection Against Lightning
SANS 10389-1	Exterior Lighting – Work and Safety
SANS 10142-1	Wiring of Premises — installation standards for electrical wiring and systems.
SANS 10114-1	Interior Lighting — general lighting standards including safety and efficiency in occupied spaces.
SANS 10114-2	Emergency Lighting — standards for emergency lighting systems and safety.
SANS 10089-2	Petroleum Industry — Electrical and Mechanical Installations — specific to petroleum facilities.
SANS 10313	Protection Against Lightning — lightning protection for structures and equipment.
SANS 60079	Explosive Atmospheres — requirements for electrical equipment in hazardous zones.
NFPA 70B	Electrical Equipment Maintenance — standards for maintenance of electrical equipment and rooms.
NFPA 75	Fire Protection for Information Technology Equipment — includes cooling and protection of electrical rooms.
IEC 60364-7-714	Low-Voltage Electrical Installations — Transformer Room Requirements (cooling, ventilation).
IEC 62443	Industrial Automation and Control Systems Security
ISO 14644 (Parts 1–3)	Cleanroom Standards — where applicable to instrumentation and control environments.
JIG 2 Standard	Aviation Fuel Quality and Operating Standards — includes instrumentation related to fuel handling.
SACAA	South African Civil Aviation Authority — national oversight impacting electrical installations at airports.
SANS 322	Safety Signage and Evacuation Plans — includes electrical safety signage requirements.
Security Systems Standards (e.g., SANS 1779)	Standards related to security alarm systems, CCTV, and access control relevant to the facility.
IT and Network Standards (ISO/IEC 27001, IEEE 802)	Standards related to secure network, communications, and IT infrastructure at the facility.

7 List of drawings

7.1 Drawings issued by the *Employer*

This is the list of drawings issued by the *Employer* at or before the Contract Date and which apply to this contract.

Note: Some drawings may contain both Works Information and Site Information.

Drawing number	Revision	Title

8 Annexures to the Works Information

8.1 ANNEXURE A – OCCUPATIONAL HEALTH AND SAFETY AGREEMENT

AGREEMENT IN TERMS OF SECTION 37(2) OF THE OCCUPATIONAL HEALTH & SAFETY ACT (ACT 85 Of 1993) & CONSTRUCTION REGULATION 5.1(k)

OBJECTIVES

To assist Airport Company South Africa (the Employer) in order to comply with the requirements of:

1. The Occupational Health & Safety (Act 85 of 1993) and its regulations and
2. The Compensation for Occupational Injuries & Diseases Act (Act 130 of 1993) also known as the (COID Act).

To this end an Agreement must be concluded before any contractor/ subcontracted work may commence

The parties to this Agreement are:

Name of Organization: **AIRPORTS COMPANY SOUTH AFRICA** **O R Tambo INTERNATIONAL AIRPORT**
Physical Address: **Airport Company South Africa** **OR Tambo International Airport** **ACSA Building, 4th Floor**

Hereinafter referred to as "Client"

Name of organisation:
Physical Address:

Hereinafter referred to as "the Mandatary/ Principal Contractor"

MANDATORY'S MAIN SCOPE OF WORK

Multi-Disciplinary Engineering Design and Construction of Refurbishment Works to Bulk Jet-A1 Fuel Storage Tank Depot Infrastructure at O. R. Tambo International Airport

GENERAL INFORMATION FORMING PART OF THIS AGREEMENT

1. The Occupational Health & Safety Act comprises of SECTION 1-50 and all unrepealed REGULATIONS promulgated in terms of the former Machinery and Occupational Safety Act No.6 of 1983 as amended as well as other REGULATIONS which may be promulgated in terms of the Act and other relevant Acts pertaining to the job in hand.
2. "Mandatary" is defined as including as agent, a principal contractor or a contractor for work, but WITHOUT DEROGATING FROM HIS/HER STATUS IN HIS/HER RIGHT AS AN EMPLOYER or user of the plant
3. Section 37 of the Occupational Health & Safety Act potentially punishes Employers (PRINCIPAL CONTRACTOR) for unlawful acts or omissions of Mandataries (CONTRACTORS) save where a Written Agreement between the parties has been concluded containing arrangements and procedures to ensure compliance with the said Act BY THE MANDATARY.
4. All documents attached or refer to in the above Agreement form an integral part of the Agreement.
5. To perform in terms of this agreement Mandataries must be familiar and conversant with the relevant provisions of the Occupational Health & Safety Act 85 of 1993 (Occupational Health and Safety Act) and applicable Regulations.
6. Mandatories who utilise the services of their own Mandatories (contractors) must conclude a similar Written Agreement with them.
7. Be advised that this Agreement places the onus on the Mandatary to contact the CLIENT in the event of inability to perform as per this Agreement.
8. This Agreement shall be binding for all work the Mandatary undertakes for the client.
9. All documentation according to the Safety checklist including a copy of the written Construction Manager appointment in terms of construction regulation 8, must be submitted 7 days before work commences.

THE UNDERTAKING

The Mandatary undertakes to comply with:

INSURANCE

1. The Mandatary warrants that all their employees and/or their contractor's employees if any are covered in terms of the COID Act, which shall remain in force whilst any such employees are present on the Client's premises. A letter is required prior commencing any work on site confirming that the Principal contractor or contractor is in good standing with the Compensation Fund or Licensed Insurer.
2. The Mandatary warrants that they are in possession of the following insurance cover, which cover shall remain in force whilst they and /or their employees are present on the Client's premises, or which shall remain in force for that duration of their contractual relationship with the Client, whichever period is the longest.
    a. Public Liability Insurance Cover as required by the Subcontract Agreement.
    b. Any other Insurance cover that will adequately makes provision for any possible losses and/or claims arising from their and /or their Subcontractors and/or their respective employee's acts and/or omissions on the Client's premises.

COMPLIANCE WITH THE OCCUPATIONAL HEALTH & SAFETY ACT 85 OF 1993

The Mandatary undertakes to ensure that they and/or their subcontractors if any and/or their respective employees will at all times comply with the following conditions:

1. All work performed by the Mandatary on the Client's premises must be performed under the close supervision of the Mandatary's employees who are to be trained to understand the hazards associated with any work that the Mandatary performs on the Client's premises.
2. The Mandatary shall be assigned the responsibility in terms of Section 16(1) of the Occupational Health and Safety Act 85 of 1993, if the Mandatary assigns any duty in terms of Section 16(2), a copy of such written assignment shall immediately be forwarded to the Client.
3. The Mandatary shall ensure that he/she familiarise himself/herself with the requirements of the Occupational Health and Safety Act 85 of 1993 and that s/he and his/her employees and any of his subcontractors comply with the requirements.
4. The Mandatary shall ensure that a baseline risk assessment is performed by a competent person before commencement of any work in the Client's premises. A baseline risk assessment document will include identification of hazards and risk, analysis and evaluation of the risks and hazards identified, a documented plan and safe work procedures to mitigate, reduce or control the risks identified, and a monitoring and review plan of the risks and hazards.
5. The Mandatary shall appoint competent persons who shall be trained on any Occupational Health & Safety aspect pertaining to them or to the work that is to be performed.
6. The Mandatary shall ensure that discipline regarding Occupational Health & Safety shall be strictly enforced.
7. Any personal protective equipment required shall be issued by the Mandatary to his/her employees and shall be worn at all times.
8. Written safe working practices/procedures and precautionary measures shall be made available and enforced and all employees shall be made conversant with the contents of these practises.
9. No unsafe equipment/machinery and/or articles shall be used by the Mandatary or contractor on the Client's premises.
10. All incidents/accidents referred to in Occupational Health and Safety Act shall be reported by the Mandatary to the Provincial Director: Department of Labour as well as to the Client.
11. No use shall be made by the Mandatary and/or their employees and or their subcontractors of any of the Client's machinery/article/substance/plant/personal protective equipment without prior written approval.
12. The Mandatary shall ensure that work for which the issuing of permit is required shall not be performed prior to the obtaining of a duly completed approved permit.
13. The Mandatary shall ensure that no alcohol or any other intoxicating substance shall be allowed on the Client's premises. Anyone suspected to be under the influence of alcohol or any other intoxicating substance shall not be allowed on the premises. Anyone found on the premises suspected to be under the influence of alcohol or any other intoxicating substance shall be escorted off the said premises immediately.
14. Full participation by the Mandatary shall be given to the employees of the Client if and when they inquire into Occupational Health & Safety.

FURTHER UNDERTAKING

1. Only a duly authorised representative appointed in terms of Section 16.2 of the Occupational Health and Safety Act is eligible to sign this agreement on behalf of the Mandatary. The signing power of this representative must be designated in writing by the Chief Executive Officer of the Mandatary. A copy of this letter must be made available to the Client.
2. The Mandatary confirms that he has been informed that he must report to the Client's management, in writing anything he/she deems to be unhealthy and /or unsafe. He has versed his employees in this regard.
3. The Mandatary warrants that he/she shall not endanger the health & safety of the Client's employees and other persons in any way whilst performing work on the Client's premises.
4. The Mandatary understands that no work may commence on the Client's premises until this procedure is duly completed, signed and received by the Client.
5. Non-compliance with any of the above clauses may lead to an immediate cancellation of the contract.

ACCEPTANCE BY MANDATARY

In terms of section 37(2) of the Occupational Health & Safety Act 85 of 1993 and section 5.1(k) of the Construction Regulations 2014,

I, _____, a duly authorised 16.2 Appointee acting for and on behalf of

_____ (company name) undertake to ensure that the requirements and the provision of the Occupational Health and Safety Act 85 of 1993 and its regulations are complied with.

Mandatary – WCA/ Federated Employers Mutual No: _____

Expiry date: _____

_____ _____
SIGNATURE ON BEHALF OF MANDATARY **DATE**
(Warrant his authority to sign)

_____ _____
SIGNATURE ON BEHALF OF THE CLIENT **DATE**
AIRPORT COMPANY SOUTH AFRICA

8.2 ANNEXURE B – ENVIRONMENTAL TERMS AND CONDITIONS

ACSA SERVICE & MAINTENANCE CONTRACTORS
ENVIRONMENTAL TERMS AND CONDITIONS TO COMMENCE WORK - EMS 048

The following Environmental Terms and Conditions shall be strictly adhered to by all contractors when conducting works for the Employer. The Employer shall audit Contractor activities, products and services on an ad hoc basis to ensure compliance to these environmental conditions. Any pollution clean-up costs shall be borne by the Contractor.

ISSUE	REQUIREMENT
Environmental Policy	ACSA's (the Employer's) Environmental Policy shall be communicated, comprehended and implemented by all appointed Contractor staff.
Storm water, Soil and Groundwater Pollution	• No solid or liquid material may be permitted to contaminate or potentially contaminate storm water, soil or groundwater resources. • Any pollution that risks contamination of these resources must be cleaned-up immediately. Spills must be reported to the Employer immediately. Contractors shall supply their own suitable clean-up materials where required. • Washing, maintenance and refuelling of equipment shall only be allowed in designated service areas on the Employer property. It is the Contractor's responsibility to determine the location of these areas. • No leaking equipment or vehicles shall be permitted on the airport.
Air Pollution	• Dust: Dust resulting from work activities that could cause a nuisance to employees or the public shall be kept to a minimum. • Odours and emissions: All practical measures shall be taken to reduce unpleasant odours and emissions generated from work related activities. • Fires: No open fires shall be permitted on site.
Noise Pollution	• All reasonable measures shall be taken to minimize noise generated on site due to work operations. • The Contractor shall comply with the applicable regulations regarding noise.
Waste Management	• Waste shall be separated as general or hazardous waste. • General and hazardous waste shall be disposed of appropriately at a permitted landfill site should recycling or re-use of waste not be feasible. • Under no circumstances shall solid or liquid waste be dumped, buried or burnt. • Contractors shall maintain a tidy, litter free environment always in their work area. • Contractors must keep on file: 1. The name of the contracting waste company 2. Waste disposal site used 3. Monthly reports on quantities – separated into general, hazardous and recycled 4. Maintained file of all Waste Manifest Documents and Certificates of Safe Disposal 5. Copy of waste permit for disposal site

	This information must be available during audits and inspections.
Handling & Storage of Hazardous Chemical Substances (HCS)	• All HCS shall be clearly labelled, stored and handled in accordance to Materials Safety Data Sheets. • Materials Safety Data Sheets shall be stored with all HCS. • All spillages of HCS must be cleaned-up immediately and disposed of as hazardous waste. (HCS spillages must be reported to the Employer immediately). • All contractors shall be adequately informed with regards to the handling and storage of hazardous substances. • Contractors shall comply with all relevant national, regional and local legislation regarding the transport, storage, use and disposal of hazardous substances.
Water and Energy Consumption	the Employer promotes the conservation of water and energy resources. The Contractor shall identify and manage those work activities that may result in water and energy wastage.
Training & Awareness	The conditions outlined in this permit shall be communicated to all contractors and their employees prior to commencing works at the airport.

Low Performance Damages

Low performance damages shall be imposed by the Employer on Contractors who are found to be infringing these requirements and/or legislation. The Contractor shall be advised in writing of the nature of the infringement and the amount of the low performance damages to be imposed. The Contractor shall take the necessary steps (e.g. training/remediation) to prevent a recurrence of the infringement and shall advise the Employer accordingly. The Contractor is also advised that the imposition of low performance damages does not replace any legal proceedings the Council, authorities, landowners and/or members of the public may institute against the Contractor.
Low service damages shall be evaluated by the Employer and the Project Manager, depending upon the severity of the infringement. The decision on how much low performance damages to impose will be made by ACSA's (the Employer) Airport Environmental Management Representative in consultation with the Airport Manager or his/her designate and will be final. In addition to the low performance damages, the Contractor shall be required to make good any damage caused due to the infringement at his/her own expense.

I, _____ (name & surname) of _____

_____ (company) agree to the above conditions and acknowledge the Employer's right to impose low performance damages should I or any of my employees or sub-contractors fail to comply with these conditions.

Signed: _____ on this date: _____ (dd/mm/yyyy)

at: **O. R. Tambo International Airport** (airport name).

8.3 ANNEXURE C – PROJECT MANAGEMENT PERFORMANCE TARGETS

Category	Aspect	Description	Contractual Implication
1. Schedule Performance	**Milestone Achievement**	Define key milestones (design, procurement, mechanical completion).	Link milestones to payments or bonuses.
	Liquidated Damages (LDs)	Penalties for failure to complete milestones on time.	Set penalty rates for delayed milestones.
	Bonus for Early Completion	Incentives for early project delivery or commissioning.	Establish bonus structure for early completion.
2. Safety Performance	**Safety KPIs (e.g., LTIFR, TRIR)**	Targets for safety performance and injury rates.	Ensure safety performance is tracked and reported monthly.
	Safety Audit Compliance	Compliance with ISO 45001 or local safety standards.	Periodic safety audits by third-party assessors.
	Stop-Work Authority	Empowerment for stopping work due to safety risks.	Clear authority for halting unsafe operations without penalty.
3. Environmental Performance	**Compliance with EIAs**	Adherence to Environmental Impact Assessment conditions.	Require proof of compliance with all EIA regulations.
	Spill Prevention	Zero tolerance for spills; bunded areas, leak detection.	Specify spill control mechanisms and penalties for non-compliance.
	Waste Management Targets	Waste recycling targets and disposal requirements.	Require detailed waste management plans with specific targets.
4. Operational Readiness	**O&M Documentation**	Delivery of operation and maintenance manuals, as-builts, etc.	Link final acceptance to the submission of full O&M documentation.
	Training Requirements	Minimum training hours for operations staff.	Specify operator training and certification requirements.
	Spares & Tools Delivery	Timely delivery of critical spares, tools, and consumables for startup.	Ensure essential spares and tools are available at handover.
5. Warranty and Defect Liability	**Defect Liability Period (DLP)**	Minimum defect liability period after project completion.	Set DLP for major systems (typically 12-24 months).

Category	Aspect	Description	Contractual Implication
	Response Time SLA	Time-bound response for defect rectification (e.g., 24 hrs for urgent faults).	Set clear timelines for addressing defects or failures.
	Extended Equipment Warranty	Extended warranties for critical equipment.	Require extended OEM warranties for key systems (e.g., PLCs, pumps).
6. Commissioning & Acceptance Criteria	**Performance Testing Period**	Define a period to test system performance (e.g., 30–60 days).	Set testing period and criteria for acceptance of systems.
	Final Acceptance Test (FAT)	Procedure and criteria for final acceptance.	Define testing protocols and parties responsible for FAT.
	Punch List Management	Process for identifying and rectifying outstanding items post-handover.	Set timelines for resolving punch list items and penalties for delays.
7. Quality Management	**QA/QC Plan Requirements**	Contractor to follow an approved QA/QC plan with inspections.	Require submission of a detailed QA/QC plan before work begins.
	Third-Party Inspections	Independent inspections of critical work (e.g., welds, coatings).	Specify third-party inspector roles and frequency of inspections.
	Material Traceability	Full traceability of materials, particularly for critical items.	Include material certification and traceability requirements.
8. Financial Performance	**Cost Control / Reporting**	Detailed cost reporting with variance analysis.	Require monthly financial reports that track costs vs. budget.
	Contingency Management	Clear process for accessing and reallocating contingency funds.	Define procedures for managing contingency use and approval.
	Change Order Protocols	Formal process for managing change orders (time & cost impact).	Specify timelines and approval mechanisms for change orders.

8.4 ANNEXURE D – TECHNICAL PERFORMANCE TARGETS

Discipline / System	Parameter	Unit / Requirement	Target Performance Guarantee	Test / Validation Method
Civil & Structural	Foundation settlement	mm/year	≤ 5 mm/year differential	Geotechnical monitoring
	Bund wall containment capacity	% of largest tank volume	≥ 110%	Hydrostatic test / visual inspection
	Concrete durability	Years (certified mix design)	≥ 25 years	Lab testing and QA documentation
	Surface drainage functionality	Flow / ponding	No flooding or ponding at any location	Rain simulation or visual inspection
Mechanical (Process)	Airport hydrant fuel supply	m^3/hour	≥ 2,160 m^3/hr	System test during commissioning
	Weld quality (tank shell & floor)	% defect-free welds	≥ 98%	100% NDT (floor/shell/roof welds)
	Tank hydrostatic integrity	Leak-tightness	No leakage for 24 hrs under full head	Hydrostatic test (API 650)
	Tank cooling system performance	°C/hour	Max fuel temp rise ≤ 1°C/hr	Thermal monitoring/simulation
	Venting system flow capacity	Nm^3/hr	Meets API 2000 flow for in/out	Flow simulation / pressure test
	Floating suction functionality	Suction level	≤ 150 mm from surface	Filling/emptying test
	Pipe coating durability	Years (minimum)	≥ 20 years (with certified coating)	Coating adhesion and wear test
	Piping supports and brackets	Load-bearing capacity	≥ 1.5x operational load	Load test (deflection under operational load)
Pumping Systems	Pump vibration level	mm/s RMS	≤ 2.8 mm/s (ISO 10816-3 Zone B)	Vibration analysis during FAT/SAT
	Cavitation margin	m	NPSHA ≥ NPSHR + 1.0 m	Hydraulic calc + operational test

Discipline / System	Parameter	Unit / Requirement	Target Performance Guarantee	Test / Validation Method
	Pump casing temperature rise	°C	≤ 40°C rise over ambient	Thermal testing / thermography
	Pump efficiency at BEP	%	≥ 75% at Best Efficiency Point	Test curve validation
	Seal and bearing leakage	Visual / volumetric	No visible leakage over 72 hrs	Observation / pressure test
	Pump duty compliance	Flow/head	±5% of design point	Flow/head test
Instrumentation	Flowmeter accuracy	%	± 0.5% or better	Calibration & comparison test
	Level sensor accuracy	mm	± 5 mm	Manual dip test comparison
	Temperature sensor drift	°C/year	≤ 1°C/year	Calibration log analysis
	Density measurement accuracy	kg/m³	± 0.5% of actual density	Calibration and comparison testing
	Pressure sensor accuracy	%	± 0.5% or better	Calibration & comparison test
Overfill Protection Systems	Pressure surge detectors/ arrestors	% flow protection	≥ 99.9% effective	System test / operational simulation
	Overfill protection system	%	100% functionality	Functional test / flow simulation
Redundancy / Resilience	UPS system backup	N+1 config, ≥ 30 min	Supports critical loads for 30+ min	Load test
	Redundant pump systems	N+1 configuration	Maintain full flow with 1 offline	Pump isolation / failover test
	Dual suction/discharge apron pump headers	Flow retention	≥ 80% flow during failure	Valve/pipeline simulation
	Redundant power feeds	Power continuity	No outage >10 seconds	Simulated outage
	Redundant SCADA / PLCs	Failover performance	No visibility/control loss >2 sec	FAT/SAT failover test

Discipline / System	Parameter	Unit / Requirement	Target Performance Guarantee	Test / Validation Method
	Redundant network paths	Data continuity	No data loss >2 sec; ≥ 99.9% uptime	Link switchover test
Fire Protection	Foam concentrate capacity	Liters	As per design	System test
	Foam type	Compliance standard	AFFF / FFFP	Manufacturer certification
	Foam application rate	L/min	As per design	Operational test
	Foam concentrate shelf-life	Years	≤ 5 years	Visual check/expiry date verification

8.5 ANNEXURE E – PERFORMANCE TEST MATRIX

Discipline	Equipment / System	Performance Parameter(s)	Test Type	Reference Standard / Spec
Mechanical	Storage Tanks (Jet-A1)	Leak test, hydrostatic test, coating integrity, volumetric capacity	Hydrostatic & Visual Inspection	API 650, API 653, SANS 10240
	Fuel Piping Systems	Pressure test, leak test, flow rate	Pneumatic/Hydrostatic	ASME B31.3, API 570
	Valves	Functional test, pressure tightness	Functional & Pressure Testing	API 598, ASME
	Pumps (Hydrant Supply, Booster, etc.)	Flow, pressure, vibration, noise levels	Operational & Vibration Testing	API 610, ISO 9906
	Compressors	Pressure, flow, vibration, temperature	Operational Testing	API 617
	Heat Exchangers	Thermal performance, leak test	Thermal & Pressure Testing	TEMA, API
	Bund Walls / Containment	Structural load capacity, impermeability	Load & Leak Test	NFPA 30, SANS
Electrical	Power Distribution Panels	Voltage, insulation resistance	Electrical Testing	IEC 61439, IEEE Std
	Transformers	Load test, temperature rise	Electrical & Thermal Testing	IEC 60076
	Emergency Generators	Automatic start, load transfer, runtime	Functional Testing	ISO 8528
	Motor Control centre	Functional test	Functional Testing	IEC 60947
	Lighting Systems	Illumination levels	Photometric Testing	EN 12464-1
	UPS and Battery Backup Systems	Runtime, load test	Load Testing	IEC 62040
Instrumentation & Control	SCADA and DCS	Data acquisition accuracy, alarm functionality	Functional & Calibration Testing	IEC 61131, ISA-95
	Field Instruments (Pressure, Flow, Temp sensors)	Calibration, accuracy	Calibration	IEC 60584, API 670
	Safety Instrumented Systems (SIS) and Interlocks	Trip set points, fail-safe testing	Functional & Fail-Safe Testing	IEC 61508, IEC 61511
	Communication Networks	Signal integrity, latency, redundancy	Network Testing	IEEE 802, ISA 100
Fire Protection	Fire Suppression Systems	Flow rate, pressure, activation time	Functional Testing	NFPA 15, NFPA 25
	Fire Detection and Alarm Systems	Sensor sensitivity, response time	Functional Testing	NFPA 72
	Emergency Shutdown Systems	Functional testing	Functional Testing	API 521, IEC 61508
Civil / Structural	Foundations and Earthworks	Settlement tests, compaction	Geotechnical Testing	ASTM D422, SANS
	Drainage and Water Management	Flow capacity, water tightness	Hydraulic Testing	SANS 10400, Local

Discipline	**Equipment / System**	**Performance Parameter(s)**	**Test Type**	**Reference Standard / Spec**
				Standards
	Access Roads and Pavements	Load bearing capacity	Load Testing	SANS 10160
Environmental & Operational	Noise Emissions	Decibel levels during operation	Noise Monitoring	SANS 10103
	Dust and Air Quality Control Systems	Particulate matter measurement	Air Quality Monitoring	SANS 1929
	Wastewater Treatment / Runoff Management	Quality testing	Water Sampling & Analysis	SANS 241

8.6 ANNEXURE F – DESIGN ACTIVITY MATRIX

Discipline	Design Package	Design Activity/Deliverable	Design Stage	Submission Type	Responsible Party	Requires PM Acceptance? (Y/N)	Required Coordination with Others
Mechanical	New Jet-A1 Bulk Storage Tanks	Construction drawings, design calculations, API 650 compliance	Detailed Design	For Acceptance	Contractor	Y	Independent Tank Specialist, Employer
	Jet Fuel Pipelines (headers, suctions, reticulation)	P&IDs, stress analysis, isometrics	Detailed Design	For Acceptance	Contractor	Y	Existing Ops Team, Fuel OEM
	Apron Pump Bay Upgrade	Equipment layout, pump curves, control philosophy	Detailed Design	For Acceptance	Contractor	Y	Apron Ops Authority
	Truck Loading & Meter Proving	Layout, safety interlocks, instrumentation	Detailed Design	For Acceptance	Contractor	Y	Fuel Logistics Interface Team
	Sampling & Flushing Systems	Schematics and operating procedures	Preliminary & Detailed Design	For Comment & Acceptance	Contractor	Y	Quality Assurance Rep
	Firewater/Foam Fire Systems	Hydraulic design, suppression zones, compliance review	Detailed Design	For Acceptance	Contractor	Y	Airport Fire Safety Officer
	Diesel Tank & Pump Relocation	GA drawings, tie-in procedures, safety plan	Detailed Design	For Acceptance	Contractor	Y	Civil & Electrical Interfaces
	Contaminated Water Truck Bay	P&IDs, drainage interface, control system	Detailed Design	For Acceptance	Contractor	Y	Environmental Regulator
	Boundary Pipeline Valves	Valve specs, automation logic, interface drawing	Detailed Design	For Acceptance	Contractor	Y	Airport ATC, Control Systems Engineer
	Site Compressed Air	Distribution layout, compressor specs	Detailed Design	For Acceptance	Contractor	N	Mechanical & Instrumentation Teams
	Potable Water Distribution	Routing, tie-ins, schematic	Detailed Design	For Comment	Contractor	N	Civil Engineer, Utility Authority
	Rail Decanting Facility Upgrade	Layouts, loading arms, automation	Concept & Detailed Design	For Acceptance	Contractor	Y	Rail Operator, HAZOP Team
Civil	Tank Bunds, Foundations, Sheath	Geotech report, bund wall drawings, foundation detailing	Detailed Design	For Acceptance	Contractor	Y	Structural Reviewer, Geotechnical Consultant
	Concrete Surfacing & Roads	Pavement design, road marking plan	Detailed Design	For Acceptance	Contractor	N	Airport Infrastructure Ops
	Stormwater Infrastructure	Hydraulic design, catchment analysis	Detailed Design	For Acceptance	Contractor	Y	Environmental Engineer

Discipline	Design Package	Design Activity/Deliverable	Design Stage	Submission Type	Responsible Party	Requires PM Acceptance? (Y/N)	Required Coordination with Others
	Segregated Drainage & API Systems	Drainage zoning drawings, separator specs	Detailed Design	For Acceptance	Contractor	Y	Pollution Control Authority
	Water-borne Sanitation	Sewer layout and tie-in drawings	Detailed Design	For Comment	Contractor	N	Local Municipality
	Structural Works (Refurbs, Painting, etc.)	Structural assessment reports, material specs, corrosion control plan	Concept & Detailed Design	For Acceptance	Contractor	Y	Employer Facilities Management
Electrical, Controls & Instrumentation	Site Equipment Relocation	Electrical design updates, cable routing	Preliminary & Detailed Design	For Acceptance	Contractor	Y	Mechanical and Civil Leads
	Power System Review (inc. Backup)	Fault level analysis, load assessment, substation layout	Preliminary & Detailed Design	For Acceptance	Contractor	Y	Independent Electrical Engineer
	Site Lighting	Lighting design, lux level mapping, energy efficiency plan	Detailed Design	For Acceptance	Contractor	N	Airport Compliance Office
	Controls & Instrumentation	Automation strategy, logic diagrams, HMI architecture	Detailed Design	For Acceptance	Contractor	Y	SCADA Integrator, Operations Team

C3.2 *CONTRACTOR*'S WORKS INFORMATION

This section of the Works Information will always be contract specific depending on the nature of the *works*. It is most likely to be required for design and construct contracts where the tendering contractor will have proposed specifications and schedules for items of Plant and Materials and workmanship, which once accepted by the *Employer* prior to award of contract now become obligations of the *Contractor* per core clause 20.1.

Typical sub headings could be

a) *Contractor*'s design
b) Plant and Materials specifications and schedules
c) Other

This section could also be compiled as a separate file.