

Notsi PV Project

Engineering, Procurement and Construction Contract

Employer's Requirements

1. Introduction

1.1. General

This Employer's Requirements describes and makes reference to the minimum technical requirements for the Facility, including compliance, scope, design and execution requirements. The Contractor shall comply with all applicable legislation and requirements of the Contract, including the ERs.

Any approval, document, response or comment given by the Employer under or in connection with this Contract shall not relieve the Contractor of any responsibility under the Contract, except to the extent expressly provided.

1.2. Definitions and Abbreviations

In this ERs, the words and expressions established as definitions in the Contract and in other Schedules shall have the same meaning as assigned to them in such Contract and Schedules. The same shall apply for abbreviations.

1.2.1. Definitions

Access Road means any new or existing road between the S322 secondary road and the site entrances.

Contract means the Engineering Procurement, and Construction contract to which this Schedule 2 – Employer's Requirements applies

Contracted Capacity is defined in the Contract.

Contractor's Permits means all permits, which are necessary for the design, execution and completion of the Work and the remedying of any defects, but excluding the Employer Permits.

Contract Price is defined in the Contract.

Design Life means a period of 30 years commencing on the date of Taking Over.

Distribution Self-Build Agreement means the agreement governing the Eskom connection works to be built by the Contractor, on behalf of Eskom, as provided in Schedule 23 [*Related Document Obligations*].

Employer's Permits means the permits listed in Schedule 4 - Authorisations.

Energy Meter means any and all import or export meters applicable to the Facility, including any backup or check meters, as defined in the CUOSA.

Environmental Plan means a comprehensive document outlining how the Contractor will ensure it will comply with all environmental requirements of the Contract.

Facility means the PV system, which comprises PV modules, trackers, inverters, transformers, subsystems, cabling, associated metering and other civil and electrical works, constructed and installed as part of the Work.

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Factory Acceptance Tests means tests to be completed by the original equipment manufacturer at the production facility for the relevant piece of equipment. Grid Network Service Provider means the counterparty to the CUOSA contained within Schedule 23 – Related Documents.

Health and Safety Plan means a comprehensive document outlining how the Contractor will ensure it will comply with all health and safety requirements of the ERs. The Health and Safety Plan will document, among other things, the Contractor's health and safety policy, and how it will ensure health and safety risks to its staff, and staff of the Employer, will be managed.

Independent Engineer means the independent consulting engineer or engineering company of international repute with relevant experience in photovoltaic electric power generation.

Initial Performance Test means the testing set out in Schedule 8 [Tests] which shall be performed prior to Taking Over.

Inspection and Test Plan means a document detailing all inspections and tests to be performed by the Contractor, Third Party auditors and the Employer, in order to ensure that the applicable equipment are produced in compliance with requirements of the Contract. The Inspection and Test Plan will include an overview of all tests to be performed throughout execution of the Works, along with detailed test sheets which will be completed during each test or inspection. All test sheets will be provided to the Employer once relevant tests are completed.

Interim Performance Test means the testing set out in Schedule 8 [Tests] which shall be performed 12 months after the Initial Performance Test.

Irradiance means the incident flux of radiant power per unit area, expressed in units of W/m².

Levelised Cost of Electricity means the cost of generating a fixed unit of electricity, as defined in Section 1.4.

Milestone Schedule means a milestone payment schedule included in Schedule 3 [Contract Price and Payment Schedule] of the Contract.

Notice to Proceed is defined in the Contract.

O&M Agreement is defined in the Contract.

Operator is defined in the Contract.

Performance Guarantees means a Performance Ratio in accordance with the provisions of Schedule 7 – Performance Guarantees of the Contract.

Performance Test is defined in Schedule 8.

Point of Connection means the point of PV plant connection to the grid network, as defined in the CUOSA.

Programme means a comprehensive document describing all Works to be performed by the Contractor and the timeframes in which these works will be completed. The Programme is included in Schedule 6 [Programme and Milestone Schedule].

Project Execution Plan means a comprehensive plan provided by the Contractor that documents how it will deliver its scope of work under the Contract.

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PV Monitoring System Availability means the availability of the measured parameters required for the calculation of each Performance Tests. It shall be calculated computing the availability of each measured parameter during all 10- or 15-min Test Intervals of the Test Period as further defined in Schedule 8 [Tests].

Quality Plan means a comprehensive document outlining how the Contractor will ensure it will comply with all quality control and assurance requirements of the Contract. The Quality Plan will document, among other things, the Contractor's quality policy, its plans for audits, contents and timings of submission for the Inspection and Test Plan, how the Contractor will manage records and documentation, including demonstrating traceability of all materials, and how the Contractor will track and address non-conformances.

Recording Interval means time between records.

Sampling Interval means time between samples.

Site Conditions means prevailing meteorological, ground and other conditions experienced at the Site.

Spare Parts means a collection of materials and equipment stored at Site and supplied by the Contractor in order for the Operator to be able to perform timely scheduled and unscheduled maintenance on the Facility.

Standard Test Conditions is defined in the Contract.

Standards means an established norm or requirement in regard to technical systems specified at the international, national and local level.

Test Data means data collected during a Test specified in Schedule 8 [Tests]. The raw data is the data collected prior to applying any quality filter or data treatment to missing or invalid Test Intervals.

Test means all required technical activities to be performed to demonstrate the Facility and Work has been completed in accordance with the Contract. Tests include those specified in Schedule 8 [Tests], the Inspection and Test Plan, Quality Plan, the Contract and any other documentation.

Test Period means the time between commencement and finalisation of a Performance Test.

Test Results means the document provided by the Contractor to the Employer for review and acceptance or rejection including, but not limited, the raw data that were collected during the test, data quality check and data filtering and treatment, PR and availability calculations results.

Testing Schedules means Schedule 8 [Tests].

Transmission Self-Build Agreement means the agreement governing the Eskom connection works to be built by the Contractor, on behalf of Eskom, as provided in Schedule 23 [Related Document Obligations].

1.2.2. Abbreviations

Table 1: List of Abbreviations

Abbreviation	Abbreviated Expression
A	Ampere
AC	Alternating Current
AMR	Automatic Meter Reading
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
BoM	Bill of Materials
CCTV	Closed Circuit Television
CdTe	Cadmium Telluride
CIGS	Copper Indium Galium Selenide
CT	Current Transformer
DC	Direct Current
DIN	Deutsches Institut fuer Normung (German Institute for Standards)
EL	Electroluminescence
EN	European Standards
EPC	Engineering, Procurement, and Construction
ERs	Employer's Requirements
ESG	Environmental, Social and Governance
GHI	Global Horizontal Irradiance
GII	Global Inclined Irradiance
GNSP	Grid Network Service Provider
GPS	Global Positioning System

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HV	High Voltage, which for the purposes of this Contract shall be 44 kV and above, unless defined otherwise in specific standards.
HVAC	Heating, Ventilation, and Air-Conditioning
IBC	International Building Code
IEC	International Electrotechnical Commission
IED	Intelligent Electronic Devices such as MV or HV protection relays
IEEE	Institute of Electrical and Electronic Engineers
ISO	International Standards Organisation
ITP	Inspection and Test Plan
LCOE	Levelised Cost of Electricity
LeTID	Light and Elevated Temperature Induced Degradation
LPS	Lightning Protection System
LPL	Lightning Protection Level
LRA	Lightning Risk Assessment
LV	Low voltage, which for the purposes of this Contract shall be 1,000V _{AC} or below and 1,500V _{DC} or below
MC	Multi-Contact
MV	Medium Voltage, which for the purposes of this contract shall be those voltage levels between LV and HV
NERSA	National Energy Regulator of South Africa
NTCSA	National Transmission Company South Africa
NTP	Notice to Proceed
O&M	Operations and Maintenance
PCB	Power Conversion Block
PEP	Project Execution Plan

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PID	Potential Induced Degradation
PLC	Programmable Logic Controller
POA	Plane of Array
POC	Point of Connection
PPAs	Power Purchase Agreements
PR	Performance Ratio
PV	Photovoltaic
QA/QC	Quality Assurance / Quality Control
QHSE	Quality, Health, Safety, and Environment
RTU	Remote Terminal Unit
SANS	South African National Standards
SCADA	Supervisory Control and Data Acquisition
SLD	Single Line Diagram
STC	Standard Test Conditions
UPS	Uninterruptable Power Supply
UTC	Coordinated Universal Time
V	Volt
VA	Volt Ampere
VT	Voltage Transformer
W	Watt

1.3. Law, Permits, and Standards

The Contractor's obligation to comply with all relevant Authorisations and Standards shall include (but shall not be limited to) an obligation to comply with the following:

- The requirements of the Buyer;
- The requirements of Eskom;

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- The requirements of the NTCSA
- The Requirements of the NERSA;
- The requirements of the Related Documents;
- Relevant requirements of the Employer's Authorisations, which have been included in Schedule 4 [*Authorisations*];
- All Contractor's Authorisations;
- Any directive, requirement, instruction, order, or guideline issued by a manufacturer of goods, materials, and/or plant to be used by or installed into the Facility; and,
- Any industry norm or best practice.

Within 4 weeks of NTP of the Contract, the Contractor shall produce an exhaustive list of codes and Standards to apply to the design of the Facility for Employer comment.

The applicable regulations, standards and laws which are mentioned within this document, are to be regarded as non-exhaustive and do not relieve the Contractor from its obligation to provide complete and fully functional systems and facilities. The Contractor shall observe all the applicable laws, national and international standards which are relevant for completion of its Work under the Contract.

When a specific topic is not regulated by a national law or standard, the Work shall comply with the standards issued by the following organisations, in order of precedence:

- SANS;
- IEC;
- ISO; and,
- IEEE.

In the absence of any relevant SANS or international standards, EN Standards shall be used.

1.4. General Requirements

The Contractor shall provide a “turn-key” solar photovoltaic PV power plant, including related infrastructure, to export the generated power to the local electricity network up to the nominated Point of Connection. The Facility shall be constructed in compliance with the terms and obligations of the Contract and this ERs.

The Contractor shall be required to design, procure, construct and test all equipment and perform all services necessary for complete, safe and prudent operation and maintenance of the Facility by others, including information and training, even if not expressly stated in this ERs.

For the avoidance of doubt, it is the Contractor's responsibility to ensure that the Facility is designed to the latest applicable local and international design criteria and industry best practice.

Documentation provided by the Contractor shall be provided in English. Where indicated in Section 11, documents shall additionally be provided in English.

The Facility shall be located at the Site and shall have a Design Life of 30 years.

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2. Site Details

2.1. The Site

The Site is specified in tables and maps in this Section.

Table 2: Site description

Item	Description
Name of place	Near Dealesville
Region	Free State Province, South Africa
Location Description	Farms Welgeluk No. 1622 and Ebenhaezer No. 1623
Latitude	28°45'35.59"S
Longitude	25°38'10.45"E
Altitude (a.s.l)	1240 m
Development Area	~1000 ha
Access	Off the S322 secondary road which branches off the R64 regional road at Dealesville

Table 3: Site boundary co-ordinates

Point	Latitude	Longitude
A	28°44'21.73"S	25°35'35.73"E
B	28°44'42.68"S	25°38'22.50"E
C	28°44'12.09"S	25°38'33.94"E
D	28°44'19.86"S	25°39'32.19"E
E	28°46'03.01"S	25°39'58.88"E
F	28°46'34.41"S	25°39'24.12"E
G	28°45'51.03"S	25°37'11.16"E
H	28°44'31.42"S	25°35'39.68"E

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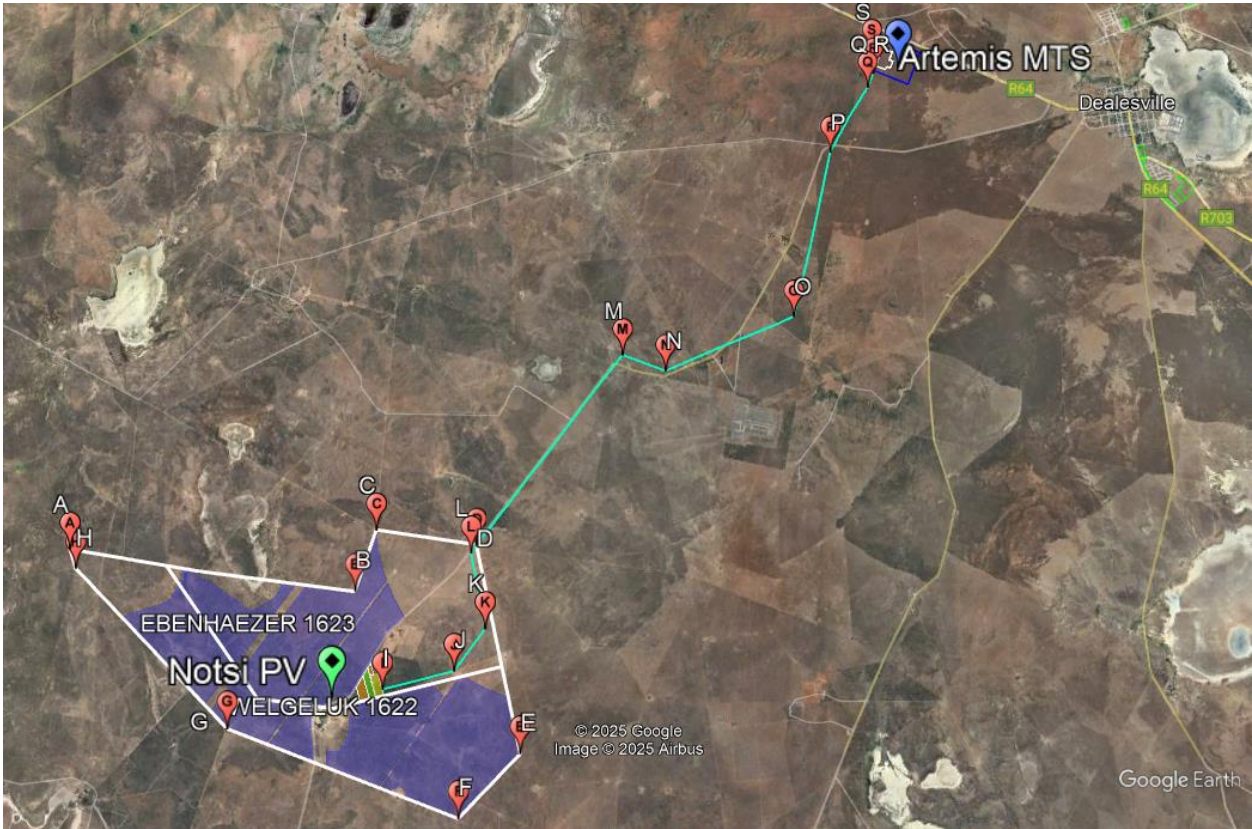
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The site shall also include the areas and routes detailed below. Note, these are approximate co-ordinates, as currently permitted, and are subject to minor changes.

Table 4: Approximate overhead lines co-ordinates

Point	Latitude	Longitude
I	28°45'31.63"S	25°38'39.58"E
J	28°45'22.51"S	25°39'20.48"E
K	28°45'01.64"S	25°39'37.97"E
L	28°44'23.67"S	25°39'29.21"E
M	28°42'41.87"S	25°40'56.92"E
N	28°42'50.22"S	25°41'22.25"E
O	28°42'21.73"S	25°42'38.28"E
P	28°40'53.95"S	25°43'01.50"E
Q	28°40'18.59"S	25°43'24.84"E
R	28°40'10.98"S	25°43'28.46"E
S	28°40'00.65"S	25°43'27.85"E

Figure 1: Map of site boundary and overhead line



Access to the Site shall be from the S322 secondary public road. The Site entrances and access roads shall be identified and assessed by the Contractor who will determine the necessary upgrades required to ensure that the S322 and access roads are adequate for the heavy and oversized vehicles which will deliver all goods and materials, including transformers, to the Site. The S322 and all access roads must be maintained for the duration of the construction phase and any required reinstatement works required must be concluded prior to Taking-Over.

The site entrance positions must be identified, designed, and submitted for approval to the relevant authority and constructed in accordance with the designs (once approved).

2.2. Site Conditions

The Contractor shall be responsible for identifying and fully detailing all relevant Site and climatic conditions applicable to the Facility, and documenting these conditions in a Site Conditions report to be submitted within four weeks of Notice to Proceed. The Contractor's assessment shall be based on its own assessment and investigation as to the most severe climatic conditions or local regulations which should be used as a basis for the final design of the Facility.

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3. Project Management

Until Taking Over the Facility shall be managed solely by the Contractor.

The Contractor shall utilise its extensive project management skill, experience and resources to appoint a competent team for the successful execution of the Facility. Key project management activities of the Contractor shall include:

- Responsibility for all engineering, procurement and construction aspects of the Facility ensuring that the Contractor's individual activities are compatible with each other and with the overall Schedule and Milestone Schedule.
- Ensuring that the Facility is technically integrated and cohesive.
- Ensuring that all documentation is to a common format and style of presentation and is competently rendered in the English language.
- Applying technical control to ensure that a consistent approach is adopted by all of the Contractor's engineering teams (including Subcontractors).
- Ensuring the cohesive, accurate and timeous provision of documentation in support of review processes, construction activities, commissioning processes, testing processes - all within the timescales agreed as per the Schedule and Milestone Schedule.

3.1. Planning and coordination

The Contractor shall prepare a Project Execution Plan ('**PEP**') outlining how it intends to execute the Facility, and shall provide the PEP to the Employer within 30 Days of the Notice to Proceed date.

The PEP shall include all major elements of the Facility including project management and control, engineering design and technical coordination, procurement, point-of-manufacture inspection and testing, construction including pre-commissioning, commissioning and training required for the Facility. The PEP shall include an interface management plan, with detail of authority management, outlining how the Contractor will manage and coordinate interfaces among parties involved in the Work including subcontractors, equipment suppliers and the Employer.

The Contractor shall undertake as a minimum all of the following services.

- Project management, including project administration, scheduling, cost control, and Quality, Health, Safety and Environment ('**QHSE**') management;
- Conduct reviews and incorporate outcome of reviews such as constructability, operability, accessibility, maintainability at appropriate stages of the design process and fully document and provide reports regarding these reviews to the Employer;
- Lead and participate in design, coordination and progress meetings with the Employer (and its engineers), GNSP or any other party as required;
- Technical support for the Employer's permitting and licensing activities including compliance with all relevant requirements of the Employer's Authorisations;
- The planning and design of the Work; and
- Coordinate all work with others as required including its Subcontractors, the landowner, the Employer and the Employer's personnel, the GNSP and any other affected parties.

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3.2. Procurement

The Contractor shall be responsible for the overall management of procurement, including expediting, and QA/QC with respect to all elements constituting the Facility.

The Contractor shall, in order to satisfy the requirements contained in this ERs, identify the manufacturers and places of manufacture and ensure appropriate testing and inspection of major equipment (i.e. modules, inverters, transformers, trackers including mounting structures, drives, controls etc.) and switchgear before dispatch to Site.

Where major equipment is yet to be manufactured the Contractor must promptly alert the Employer accordingly, supplying the anticipated manufacture dates so that the Employer may (at its sole discretion) inspect the point of manufacture prior to manufacturing beginning.

Unpriced copies of purchase orders shall be expeditiously provided to the Employer if requested.

3.3. Construction Management

The Contractor shall be responsible for the overall management of the Facility and operation and maintenance until Completion. These services include but are not limited to:

- Management of the Contractor's staff and its Subcontractors;
- The provision of suitable and adequate security for the Site for the duration of the construction period and until Completion;
- Conducting risk assessment and implementing resulting mitigations for all activities related to the Works;
- Provision of construction power, water, fire protection, lighting, compressed air, telephone, data transmission and sanitary facilities;
- Construction of all necessary access roads and roads on Site and reinstatement of existing roads after the construction, if required;
- Provision of all required tools, components, machinery, and test equipment;
- The positioning of the component parts forming part of the Facility, such that they can be operated and maintained in a safe manner wherever possible without requiring specialist Third Party equipment to access, operate, maintain, exchange, or replace. For example, inverters should be placed in an easily and safely accessible area;
- The supply and transportation of all components constituting the Facility to the Site and to the specific installation locations;
- Transportation, handling and installation methodology of all components which is in line with manufacturers' recommendations and which does not compromise the integrity or warranties of any components;
- Equipment and materials-receiving, handling, laydown areas and storage (indoor and outdoor as required). No additional land will be provided by the Employer for laydown beyond the boundaries of the Site;
- The construction and foundation of all supporting or mounting structures as necessary;
- The assembly and installation of the components;
- The installation of an approved energy meter and associated communication equipment;

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- The registration of the Facility with any applicable authorities, industry bodies, etc;
- The design, installation and integration of the Facility earthing and bonding systems;
- The design, installation and integration of the Facility Lightning Protection Systems; and,
- Coordination and cooperation with the party responsible for the Grid Connection Works to facilitate the connection of the Works to the Grid in accordance with the requirements of the GNSP and the CUOSA and PPAs.

3.4. Progress Reporting and Meetings

The Contractor shall produce weekly and monthly progress reports, at dates to be agreed with the Employer. Reporting format and contents are to be agreed by the parties within 30 days of NTP.

The Contractor shall attend monthly site meetings along with any other meetings necessary to complete the Works or reasonably required by the Employer.

4. Quality Assurance / Quality Control

The Contractor shall be responsible for implementing its Quality Plan, including, but not limited to design, construction, transportation, storage, installation, materials, equipment, checkout, start-up and operation until the Contractor has discharged its obligations in terms of the Contract.

The Quality Plan shall be enforced to assure that the Works are conforming to the Contract requirements and shall include as a minimum:

- Contractor's quality policy;
- Qualifying material vendors in line with the technical specification;
- On site material inspections;
- Factory expediting and testing;
- Employer's hold and witness points;
- Material acceptance tests when required (concrete, steel, specific components, etc.);
- Field quality inspections;
- Field testing documentation;
- Coverage of electrical works;
- Documentation of all changes to drawings and specifications;
- Full Inspection and Test Plan for the Works; and,
- Defects, deficiencies, non-conformance's and punch list items.

The Contractor shall develop and maintain a record of defects, deficiencies and non-conformances identified during construction, which shall be included in weekly progress reports.

The rejection criteria for major equipment delivered to the Site shall be equivalent to the factory-leaving acceptance criteria.

4.1. Factory Acceptance Tests

All goods, Materials and other items forming part of the Facility shall be tested in accordance with Law, Authorisations, Standards and the Quality Plan. Quality checklists and test protocols shall be submitted to the Employer prior to factory tests.

Further requirements for Factory Acceptance Tests are contained in Schedule 8 [Tests].

4.2. Inspection and Test Plan

The Contractor shall submit an Inspection and Test Plan ('ITP') covering the whole of the Works within 60 days of Notice to Proceed. The Inspection and Test Plan means a document detailing all inspections and tests to be performed by the Contractor, Third Party auditors and the Employer, in order to ensure that the Facility is completed in line with requirements of the Contract. The Inspection and Test Plan will include an overview of all tests to be performed, along with detailed test sheets which will be completed during each test or inspection. All test sheets will be provided

to the Employer once relevant tests are completed. The ITP shall be provided in order that the Employer can confirm all tests are being performed to Contract requirements, and attend relevant tests.

Further ITP requirements are contained in Section Schedule 8 [*Tests*].

5. Health and Safety Plan

The Contractor's Health and Safety Plan shall document which relevant and current Health and Safety Law and requirements the Facility falls under, and will describe how the Contractor will ensure the Works are completed in line with such Law, requirements and good industry practise.

The Health and Safety Plan shall include a Health and Safety policy defining the Contractor's commitment to Health and Safety matters to the satisfaction of the Employer.

The Contractor acknowledges is responsible for:

- Promoting and maintain a safe working environment, implementing the requirements of Schedule 18 [*Health and Safety Specification*] in the Contractor's QHSE policies;
- Management and control of all Works carried out on the Site and the supervision of all employees and Subcontractors on the Site;
- The safety of all personnel on the Site;
- Management and regular review and updating of all Health and Safety documentation, including sub-contractor risk assessments and method statements;
- Provision of all personal protective equipment and clothing required to comply with all Health and Safety legislation;
- Providing induction and appropriate training of all personnel attending site and maintain appropriate records;
- Immediate notification (to the Employer and relevant authorities as applicable), investigation and reporting of all incidents that caused or could have caused injury to personnel or caused damage to equipment or structures on the Site;
- Provision of first aid facilities and trained first aid personnel on the site at all times that work is being carried out including the provision of a site ambulance and qualified paramedics; and
- Developing, tracking and review of Health and Safety key performance indicators.

5.1. Incident Reporting

The Contractor must notify the Employer, and any other parties nominated by the Employer, of any incident involving injury, property damage or environmental damage, any near misses and all hazardous observations. The incident reporting procedure shall be defined in the Health and Safety Plan. Incidents must be investigated within seven days and lessons learned reported to the Employer.

The Contractor must ensure that all reportable incidents are reported to the relevant authorities immediately or as required by Law.

5.2. Hazardous Areas

Areas where a potential flammable atmosphere may exist shall be classified to the relevant sections of Law, Authorisations, and Standards.

Only suitably certified equipment shall be kept or used in designated hazardous areas. To the maximum extent practicable, equipment requiring operator attention and/or electrical equipment shall not be installed in hazardous areas.

5.3. Fire Protection and Fire Fighting Systems

The fire alarm and detection, fire protection and firefighting systems shall accord with recognised good practice and shall comply to all applicable Law, Authorisations, and Standards.

The Facility shall be designed, installed and commissioned so as to ensure a safe operating environment for equipment and personnel. This shall be achieved through the separation and segregation of equipment with sufficient distances and by selection of suitable equipment and materials with respect to their intended purpose. A reasonable degree of self-sufficiency shall be designed for taking into account the location of the nearest fire department or formally constituted and adequately maintained and resourced fire-response cooperative, shall be designed for.

For the protection of personnel and the Works the Contractor shall ensure adequate on-site fire-fighting facilities and water storage are available on the Site. The Contractor shall liaise with local authorities so as to inform themselves of requirements, capability, fire prevention practices and in order to determine the scope of the facilities to be provided.

Notwithstanding the requirements outlined above the Contractor shall:

- Conduct a Fire Risk Assessment in accordance with Best Industry Practice and applicable to both construction and operation of the Works;
- Design, plan, construct, test, commission and operate the Works in such a way as to minimise the fire risk of the Work;
- Ensure that the Site and Work is suitably equipped to respond to any fires on Site;
- Notify the relevant local emergency management committee following construction of the Works, and prior to the commencement of operations; and,
- The Emergency Response Plan shall identify fire risks and controls, and procedures that would be implemented if there is a fire on site or in the vicinity of the site.

6. Environmental Plan

The Environmental Plan shall document how the Contractor will ensure compliance with all statutory obligations, including Law, legislation, and requirements of Employer's Authorisations and Contractor's Authorisations. The Contractor shall, to the greatest extent possible, complete the Work to minimise disruption and damage to the environmentally conscious and minimise where possible the impact of the Facility on the environment. The Contractor shall comply with the Employer's social responsibility requirements during the completion of the Work.

7. Equipment and System Requirements

7.1. Security System

The Contractor shall design, install, and commission a security system that shall meet the minimum requirements outlined in this section and put in place a security strategy that is satisfactory to the Employer. The design of the security system and security strategy shall be submitted to the Employer for approval.

The security system shall accommodate for lightning activity and the consequences thereof i.e. be so constructed as to avoid down-time consequent to lightning and lightning strike activity.

7.1.1. Fence and Gate

Before the commencement of the works at Site, the Facility area shall be secured by installing appropriate fencing.

The final fencing design (including gates for access) shall be approved by the Employer, prior to installation.

The fence shall be continuous along the perimeter and no interruptions, temporary or permanent, are allowed. The fence can be opened only at the site entrance.

Galvanised welded steel wire fence of at least 2 metres (above ground height) shall be installed. Thickness of wires shall be at least 3 mm. Barbed wire (3 straight rows or 1 coil/spiral) shall be mounted on top of the fence as an anti-climb guard. The fence shall be electrified on the inside with strands spaced no more than 15cm apart running the full height of the fence panel. The electric fence shall be linked to the Facility security and SCADA systems, thereby alerting security personnel to breaches or attempted breaches. The aperture of the welded steel mesh shall be small enough to prevent complete penetration of a standard test finger (as defined in IEC 60529).

There shall be a gate for pedestrian access with electronic access control measures (e.g. NFC tag activated turnstile) and a separate motorised sliding gate for vehicular access of at least 6m wide. The gate shall be rigid and similar in design to the fence in terms of material, mesh aperture, and electrified strands.

7.1.2. Permanent Security Arrangements

The Contractor shall provide an integrated and complete operational security system for the Facility. Intruder detection and surveillance equipment shall be provided for the Site to deter unauthorized access to the Site while permitting ease of access to authorized staff and visitors.

All security measures shall be fully integrated to allow an automatic response to events to aid operator decisions.

The Facility is to be protected from both casual and malicious intrusion.

The security system shall have at minimum the following equipment and systems installed:

- Perimeter security fence and motorised gates;
- Continuous CCTV coverage of the entire perimeter fence and key internal areas including (but not limited to) the O&M building, the workshop and stores, the substation and the main gate;
- CCTV cameras must have low Lux response and be supplemented with infrared illuminators if necessary to maintain visuals throughout the night;
- CCTV cameras shall have a minimum optical resolution of 1920x1080 and minimum infrared resolution of 640x480;
- CCTV cameras shall have a minimum bitrate of 4mbps per camera;
- CCTV cameras shall record at a minimum of 25fps per channel;
- A motion detection system and infra-red (thermal) detection system shall be incorporated;
- All cameras must link to a local central station;
- The central station shall have a minimum recording capacity of 10hrs per day per camera of at least 30 days;
- The central station shall be capable of simultaneous playback and recording on all channels; and
- The surveillance and alarm system shall communicate with the central alarm system, which should also communicate with the system SCADA system.

Forced intrusions and attempts shall be detected by the automatic surveillance and alarm system. The alarm must be able to alert a remote central security location and an appointed representative of the Employer.

All security measures shall be fully integrated to allow an automatic response to events to aid operator decisions. It is the responsibility of the Contractor to ensure that the security systems comply with local regulations.

8. Form of Progress Reports

The monthly progress report shall be provided in electronic format (.pdf or similar) and shall contain at least the following:

- Facility reference;
- Date;
- Report progress number;
- Brief summary;
- QHSE risks identified, incidents and near misses;
- Environmental events (including near-misses) and issues;
- Major activities executed in the month;
- Major activities planned for the following weeks;
- Project risks and mitigating actions implemented;
- Opportunities for reduced construction time;
- Record of milestones claimed and status of payment (including variations);
- Forecast of upcoming milestone completion dates;
- Resource levels assigned to activities (including person-power allocated);
- Significant existing and anticipated problems / issues / challenges with discussion of potential resolution and/or mitigation;
- Progress of;
- Engineering / design;
- Procurement and material delivery on site;
- Construction;
- After construction services (testing, commissioning, etc.);
- Deliveries to site;
- Connection Works (Owner's and GNSP's side);
- The progress shall be identified with percentages of completion for each of the sub-tasks (i.e. electrical design 50%, civil works design – foundations 80%, etc.). Moreover, progress shall be represented as follows;
- Current progress against Schedule (e.g. Gantt chart);
- S-curve (budget and work completion);
- Critical path activities and reserves;
- Milestone completion;
- Third party approvals or statements required and actual progress;
- Variation order requests (indicating variation, order request status, extra costs, impact on Schedule, mitigants);
- QA/QC facts, including;
- Factory inspections and outcomes;
- Material acceptance at Site;
- Completeness of documentation;
- Post-installation Test Results;
- Status of permits, licenses and authorisations to be obtained, including any changes;

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- Photographic report (photos of main components and photos of works); and
- Environmental, Social and Governance ('ESG') related data (e.g. job creation, local content spend, etc.).

The weekly progress report shall be provided in electronic format (.pdf or similar) and shall contain at least the following:

- Site weather conditions;
- Onsite resources (staffing and equipment);
- QHSE incidents and near misses;
- Environmental incidents or near misses;
- Local community incidents or issues;
- Major activities executed in the week;
- Major activities planned for the following week;
- General progress against Schedule;
- Project risks and mitigating actions implemented;
- Opportunities for reduced construction time;
- Engineering documentation status;
- Resource plan and allocation of personnel;
- Facility planned vs. actual % complete;
- Record of achieved milestones;
- Forecast of upcoming milestone completion dates;
- Significant existing and anticipated problems / issues / challenges with discussion of potential resolution and/or mitigation;
- Problems / issues / challenges specifically affecting progress; and
- Photographic report.

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9. Project Specific Contractor Documents

This section contains a non-exhaustive list of Contractor documents which shall be provided during the Contract and execution of the Works.

Up to date copies of all documents, drawings and contract documents including permits and licenses shall be kept at the Contractor's office at the Site, available for use at all times.

The Contractor shall maintain a record of all field deviations from the design drawings and shall submit to the Employer a set of Contractor's Documents in line with the terms prescribed in the Contract.

Contractor's Documents include the following:

- General documents;
- As-built and design documents;
- Design documents;
- Surveys and studies;
- O&M manuals;
- Installation manuals;
- Specifications and data sheets;
- Training material; and
- Other documents.

All Contractor's Documents shall be submitted to the Employer for comment. For the avoidance of doubt this section is not an exhaustive list of documentation, and any other documents mentioned in the Contract or identified by the Contractor as necessary to complete its scope of work must be identified by the Contract and submitted to the Employer for comment.

9.1. General Documents

The following general documents shall be submitted by the Contractor:

- Exhaustive list of codes and standards which shall apply to the Work;
- Traffic management plan;
- Project Execution plan;
- Module handling plan;
- Health and Safety plan;
- Quality plan;
- Environmental plan;
- Emergency response plan;
- Social responsibility plan;
- Interface Management plan; and
- Licence and permitting compliance matrix.

9.2. As-Build and Design Documents

As-built documents shall be in accordance with IEC 62446 and should include, but not be limited to:

- Site plan;
- Array layout;
- Piling depth records and plan;
- Foundation plans;
- Foundation design calculations;
- Structural design calculations;
- Geotechnical report;
- Topographic survey;
- Drainage system design and calculations;
- Site surveys;
- Single line diagrams;
- Electrical plan diagram;
- Electrical cable and conduit lists;
- Electrical conduit, earthing and lightning protection system drawings;
- Earthing designs and layout drawings;
- Final project specifications;
- Design studies and evaluations;
- Detail design drawings of all components installed/works completed;
- Instrument calibration certificates;
- Equipment drawings;
- Schematic diagrams;
- Wiring diagrams;
- System descriptions;
- Calibration certificates;
- SCADA as-built design package;
- Data sheets and specifications of each component;
- Complete component warranty certificates; and
- Bill of materials.

Where applicable, as-built documents should include the design documents listed in Table 6 and be provide in both a native format (DWG, Word, Excel, etc.) and PDF.

Table 1: Design and as-built documentation list

Design and As-Built Documentation List
SECURITY SYSTEM
Documentation
Technical description of the security system (civil infrastructures and network)
Technical description of the fence design
Manuals of each component
Bill of Quantities
Drawings
Security and surveillance system block diagram
Layout of security system (including location of pylons, cabinets, fence)
Communication cabling paths (optic-fibre or similar)
Typical trenches for communication cables
Single-line diagram auxiliary services
CCTV pylons – details (incl. foundations)
Fence – details (incl. foundations)
Gate – details (incl. foundations)
Fence layout with coordinates
Security cabinet – details
Security cabinet – foundations
Security cabinet – cabling details
Specifications
Thermal camera
Keyboard, computer, monitor, server

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Illuminator (IR)
Video encoder
Cables (optic-fibres, RS485, RS232, ...)
Ethernet switches
Other