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Document Title:	TECHNICAL SPECIFICATION FOR FENCE & GATE		

Client:	Anthem 
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1 PROJECT DESCRIPTION

The 475MWAC Notsi solar PV facility comprises of PV solar farm, IPP substation, Eskom switching station. The Facility lies around the coordinates -28.76°S, 25.65°E and at an altitude of approximately 1249 m, above mean sea level. 475 MWAC Notsi Solar PV Facility is located approximately 15 km south-west of Dealesville, in the Free State Province, South Africa. The Project has been permitted as five (5) separate facilities with a capacity of up to 100MWAC each. These facilities accumulatively become a single 475 MWAC Project. Within the project area there are certain interruptions and existing features (natural, ESKOM servitudes, built structures etc.) and reflected in KMZ file, Attachment-1.

The Project has secured approximately 1000 ha of land. The Project is planned to be accessed off the S322 secondary road which branches off the R64 regional road at Dealesville.

2 INTRODUCTION

This document covers minimum specifications for configuration, material, and assembly of anti-intruder security fencing to be installed all around the PV area. Sub-contractor shall be solely responsible for its supplied items while ensuring the strength, suitability, and durability of the fence. Each supplied fence item shall have sufficient protective coating to resist corrosion for the desired design life of 30 years. The sub-contractor shall furnish detailed drawings of its product (fence and gate details) clearly mentioning the size, material of each component like posts, brace, mesh etc. The selected sizes and material should be compatible to withstand envisaged loading scenarios. If deemed necessary, sub-contractor could be asked to justify the selected sizes and configuration through structural design report. Installation sequence to be clearly demonstrated in the documentation. Any deviation from these specifications shall be submitted to the EPC contractor first for approval prior to execution.

3 REFERENCE DOCUMENTS

1. NSI-MNA-00ER-DWG-001_00-GENERAL LAYOUT OF PV PLANT
2. PE310_Notsi 475 MW Solar PV_Prelim Geotechnical Report_Rev B

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4 COORDINATES SYSTEM

The local coordinate system should be followed for any georeferencing.

5 CODES AND STANDARDS

All supplied material and design calculations of fence components shall assure compliance to the local and international codes and Standards. Following is the list of relevant standards that need to be complied.

List of standards to be added.

- SANS 10222-3; Electrical security Installations, Electric fences (non-lethal) and manufacture requirements
- SANS 60335-2-76; electric fence energizers
- SANS 675; Zinc-coated fencing wires.
- IEC 60529: Degrees of protection provided by enclosures.

Listed above is not the exhaustive list of standards rather minimum requirements to be complied with. However, the sub-contractor shall document his own list of standards in detail design.

6 DEVIATIONS

All works shall be done in accordance with local & international standards or best industry practices; The sub-contractor must notify the Owner and the Client in writing about any deviation from this specification or standards. Deviations must be approved by the Owner and relevant authorities before their implementation. The Client reserves the right to select the final design.

7 FENCE & GATE ASSEMBLY/ CONFIGURATION

The sub-contractor shall ensure the overall stability of the fence and gates and guarantee the security of the perimeter through proper engineering, fabrication, and installation practices. Following points demonstrates the required configuration of fencing.

- **General:** The fence shall be continuous along the perimeter of plant and shall ensure no interruptions, temporary or permanent, except at the entry gates. The fence can be opened only at the site entrance. For assessment of the plot and required length of fence along the periphery, Attachment -1

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to be referred. However, in general the supplied fence shall serve the purpose of security and anti-intrusion in an efficient manner.

- **Fence Height:** The fence shall have a minimum **2.0 m** height above finished ground level. The sub-contractor shall specify the total post length required to achieve this height while providing sufficient embedment depth for stability and fixity with foundations.
- **Fence Mesh:** Fence panel shall comprise of welded steel mesh. 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). Aperture size of 76mm x 12.7mm is proposed, however sub-contractor may propose smaller size if deemed appropriate to comply with IEC 60529.
- **Above Fence Anti-Climb:** Extension arms shall be provided on all fence posts, extending adequately to hold three strands of straight barbed wire or 1 coil/spiral barbed wire. The proposed configuration shall extend at least 0.3m vertically above fence.
- **Electrification:** 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 sub-contractor to provide sufficient details for its mounting and installation at inner side of main fence.
- **Fence openings:** All fence openings shall be equipped with appropriate gate posts and sliding gate assemblies, Motorized gates shall be provided with option for manual operation as well. either manual or motorized as required.
- **Sliding Gates:** Sliding gates shall have an opening width of 6.0 m and an installed height matching the adjacent fence (minimum **2.0 m** above ground). The sub-contractor shall ensure the proposed gate frame is rigid enough to withstand the environmental conditions for the desired life as stated in section 2. Extension arms shall also be installed on gate posts, extending adequately to hold three strands of barbed wire or 1 coil/spiral barbed wire. The gate mesh, electric strands & anti-climb configuration should match with arrangement provided for fence. The gate shall have provision for pedestrian entry (at least 1m wide).
- **Earthing:** Each fence post/pile and gate (motorized or manual sliding) shall be provided with a dedicated connection point for earthing conductor termination using an M10 bolt assembly. This provision shall be integral to the post/pile and gate fabrication and shall ensure a secure, corrosion-resistant, and mechanically stable earthing connection throughout the service life of the installation. The manufacturer shall provide one of the following configurations:
 - Earthing termination point shall be provided at 300-400mm height from finished ground level. The manufacturer shall check for design compatibility.

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- A steel hook, stud, or welded boss shall be factory-welded onto the fence or gate post/pile, or its wall shall be drilled with hole, machined and tapped with threads to allow direct insertion of an M10 bolt.
- Minimum thread engagement length: ≥ 10 mm or equal to the bolt diameter, whichever is greater.
- If hot-dip galvanizing is used, threads shall be re-tapped or bolt-plugged before coating as required.

Fence design should be well intact with environmental conditions. To ensure this sub-contractor must comply with following as a minimum requirement.

- All fencing materials, components, and installation methods shall comply with applicable local standards and good engineering practice.
- Tops of all posts shall be closed with sub-contractor specified caps to prevent water ingress and corrosion.
- Posts shall be installed plumb, aligned parallel to the fence line, and spaced consistently as per the design and structural requirements.
- Fence mesh panels shall be installed between the posts, extending from approximately 0.05 m above ground to the full above-ground fence height of 2.0 m.
- Mesh panels shall be secured to each post using appropriate brackets and bolts, with a minimum of four fixing points per post to ensure rigidity and resistance to tampering.
- Extension arms shall be welded or bolted firmly to the posts to ensure stability under external loads.
- Gate frames shall be fabricated from suitable structural steel members designed to withstand operational loads and ensure smooth sliding action. Detailed configuration for sliding mechanism shall be submitted in drawings.
- Gate posts shall be supported on adequately designed concrete foundations sized to handle the loads from the gate operation and environmental effects.
- Concrete foundations for all fence and gate posts shall be designed based on local soil conditions, environmental exposure, and structural loading to ensure long-term performance and stability.
- All steel components shall receive appropriate corrosion protection suitable for local environmental conditions, typically through hot-dip galvanizing or equivalent protective treatment. Sub-contractor to specify the details.
- Integration of the electric fence with SCADA shall be the responsibility of the sub-contractor.

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- All cut edges, welded areas, or damaged protective coatings shall be repaired with suitable zinc-rich or equivalent paint to restore corrosion protection.
- The sub-contractor shall provide detail drawings for fence configuration, including all delineated specifications stated in this document. The justification or calculation report for stability and service life may be required from sub-contractor during detail design.

8 MATERIALS

All fence material should be compliant with relevant standards. Sub-contractor shall provide material description for each and every component and document in the form the drawings. This also includes outlining protective coating implemented for corrosion resistance. As a minimum requirement following should be complied, however sub-contractor is invited to propose best suited alternative as well if deemed necessary for durability.

- The fence panel mesh shall be made from galvanised welded steel wire fence of height as specified in above section. High strength wires should be used neatly welded to form mesh. Minimum wire diameter should be 3 mm.
- The anti-climb guard, barbed wire or coil/spiral shall utilize high strength wires with protection coating on them for corrosion resistance.
- Sub-contractor shall make sure the fence posts are adequately sized and spaced to ensure the stability of the fence and safety of the perimeter. Sub-contractor shall provide complete details of the fence posts i.e. height, cross-sectional dimensions, spacing, material, and coating etc.
- Sub-contractor shall provide complete details of the extension arms i.e. height, cross-sectional dimensions, spacing, material, and coating etc. to make sure they can hold the barbed wires.
- Complete details of all the fasteners, clips and brackets used to hold and tie the fence mesh with the posts shall be provided by the sub-contractor ensuring the connections are safe and meet the local standards.
- Sub-contractor shall provide complete details of the gate posts i.e. height, cross-sectional dimensions, spacing, material, and coating etc. ensuring their stability and safety of the perimeter.
- Electrified Strands: 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.

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9 ATTACHMENTS

1. NSI-MNA-00ER-DWG-001_00-GENERAL LAYOUT OF PV PLANT
2. PE310_Notsi 475 MW Solar PV_Prelim Geotechnical Report_Rev B