ATLANTIC RENEWABLE ENERGY PARTNERS (PTY) LIMITED

TECHNICAL DESIGN REPORT FOR THE GAETSEWE SOLAR FACILITY

Photo: ACCIONA

Prepared for:

Cape Environmental Assessment Practitioners (Pty) Ltd

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ABBREVIATIONS AND ACRONYMS

AC	Alternating Current
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
ha	Hectare
kV	Kilovolt
MW	Mega Watt
MWp	Mega Watt Peak (maximum peak power production)
OHL	Overhead Transmission Line
PV	Photovoltaic
SEF	Solar Energy Facility
Wp	Watt Peak

1. INTRODUCTION

K2018091776 (SOUTH AFRICA) (Pty) Ltd is proposing the establishment of a commercial photovoltaic (PV) solar energy facility (SEF), called Gaetsewe Solar, on the farm known as Legoko Farm No 460 portion 2, situated in the District of Kuruman Rd, Northern Cape Province, within the jurisdiction area of the Gamagara Local Municipality.

The technology under consideration is photovoltaic (PV) modules mounted on either fixed-tilt or tracking structures. Other infrastructure includes inverter stations, internal electrical reticulation, internal roads, an on-site switching station / substation, a 132 kV overhead transmission line (OHL), auxiliary buildings, construction laydown areas and perimeter fencing and security infrastructure. The on-site switching station / substation will locate the main power transformer/s that will step up the generated electricity to a suitable voltage level for transmission into the national electricity grid, via the OHL. Auxiliary buildings include, inter alia, a control building, offices, warehouses, a canteen and visitors centre, staff lockers and ablution facilities and gate house and security offices. Figure 1 below depicts a typical layout of a solar PV energy facility.

Figure 1: Typical Layout of a Solar PV Energy Facility
(Sempra Renewables, 2014)

This Technical Design Report provides an overview of the main components of a solar PV energy facility.

2. SOLAR ARRAY

Solar PV modules are connected in series to form a string. A number of strings are then wired in parallel to form an array of modules. PV modules are mounted on structures that are either fixed, north-facing at a defined angle, or mounted to a single or double axis tracker to optimise electricity yield.

3. MOUNTING STRUCTURES

Various options exist for mounting structure foundations, which include cast / pre-cast concrete, driven / rammed piles, or ground / earth screws mounting systems.

Figure 2: Cast Concrete Foundation
(Solar Power Plant Business, 2013)

The impact on agricultural resources and production of these options are considered to be the same, however concrete is least preferred due the effort required at a decommissioning phase in order to remove the concrete from the soil, and therefore its impact on the environment. The Gaetsewe Solar facility will therefore aim to make the most use of either driven / rammed piles, or ground / earth screws mounting systems, and only in certain instances resort to concrete foundations should geotechnical studies necessitate this.

Figure 3: Rammed/ Driven Steel Pile
(SolarPro, 2010)

Figure 4: Ground Screw
(PV MAGAZINE, 2014)

4. GRID CONNECTION AND CABLING

It is proposed to connect the SEF directly to the planned Sekgame Switching Station located ± 5km to the south of the existing Ferrum MTS. The SEF substation will be approximately 100m x 100m in size and feature a step-up transformer/s to transmit electricity via a 132 kV OHL directly to the Sekgame Switching Station. The OHL is envisaged to be ± 4km in length, a maximum height of 24m and occupy a servitude width of between 31m – 51m.

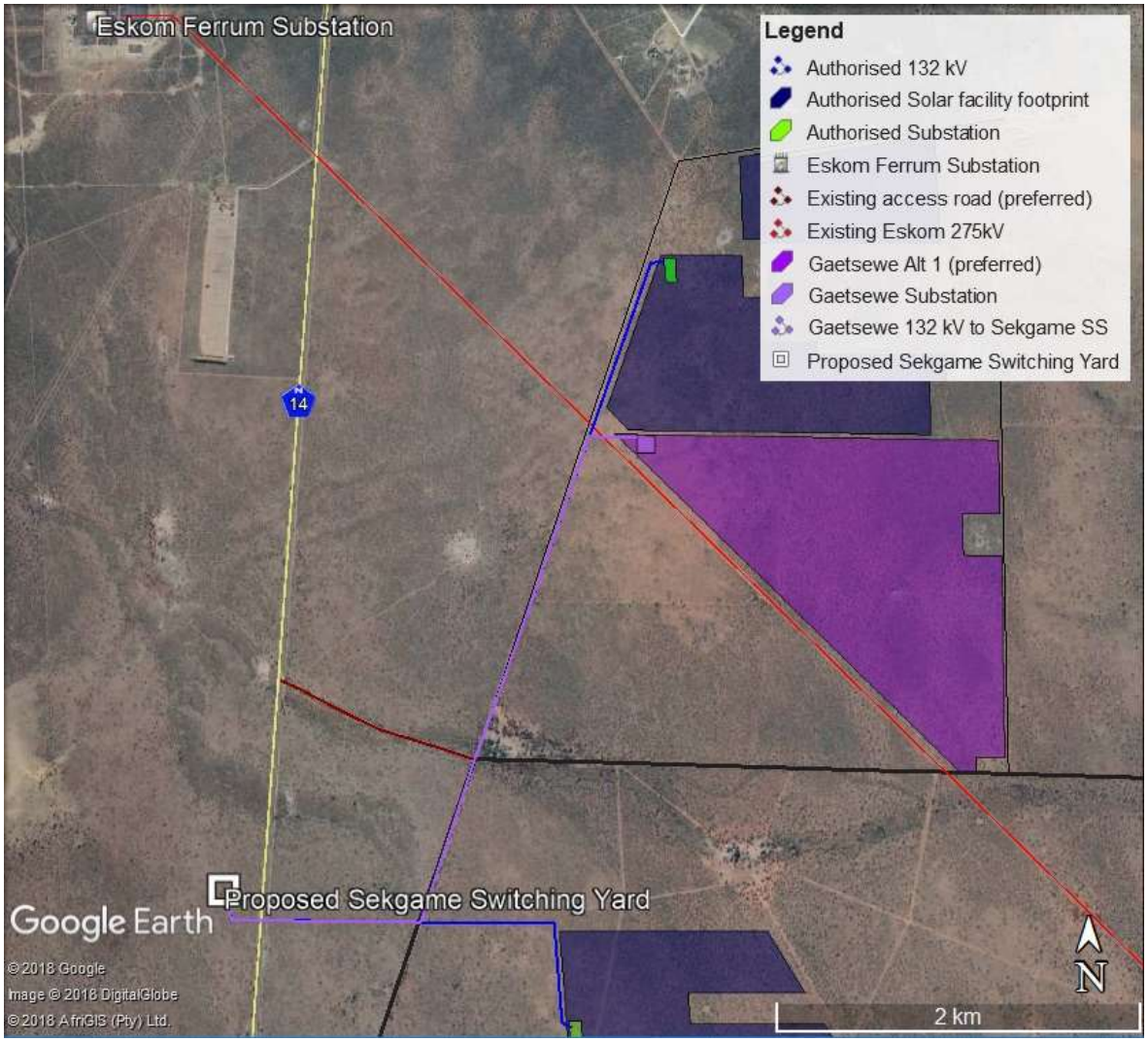

Figure 5: Proposed Grid Connection

A 75 MW_{AC} installation will require specific electrical components to meet the national grid code requirements in order to generate and supply electricity into the national grid.

The conversion from DC (modules) to AC is achieved by means of inverter stations. A single inverter station is connected to a number of solar arrays, are will be placed along the internal service roads for ease of access. A number of inverter stations will be installed for the SEF (up to maximum of ± 60), each of which is connected to the on-site / facility substation.

Final placement of the inverter stations and on-site / facility substation will need to take ground conditions into consideration. Interconnecting electrical cabling will be trenched where practical and follow internal access roads to the greatest extent. Sensitive areas will consequently be avoided as far as possible, or alternatively, cables will be fastened above- ground to the mounting structures so as to avoid excessive excavation works and clearing of vegetation.

5. AUXILIARY BUILDINGS

The auxiliary buildings will comprise of the following as a minimum:

- Control Building / Centre (± 31m x 8m);
- Office (± 22m x 11m);
- 2 x Warehouses (each ± 50m x 20m);
- Canteen & Visitors Centre (± 30m x 10m);
- Staff Lockers & Ablution (± 22m x 11m); and
- Gate house / security offices (± 6m x 6m).

The total area occupied is approximately 0.31 ha, excluding the facility substation.

6. ACCESS ROUTES AND INTERNAL ROADS

Two main access roads are being considered off the N14 to the proposed Gaetsewe Solar facility, as depicted in Figure 6 below (the orange and brown lines).

- Preferred Site Access (brown): follows an existing gravel access road to the site, and then an existing internal farm access road over Portion 2 of the Farm 460 Legoko. This option is in closer proximity to the farm homestead than the alternative, however it is shorter (±3km) than the alternative.
- Alternative Site Access (orange) follows an existing farm access road to Portion 2 of the Farm 460 Legoko. This option is located further from the farm homestead however it is longer (±5km) than the preferred access route.

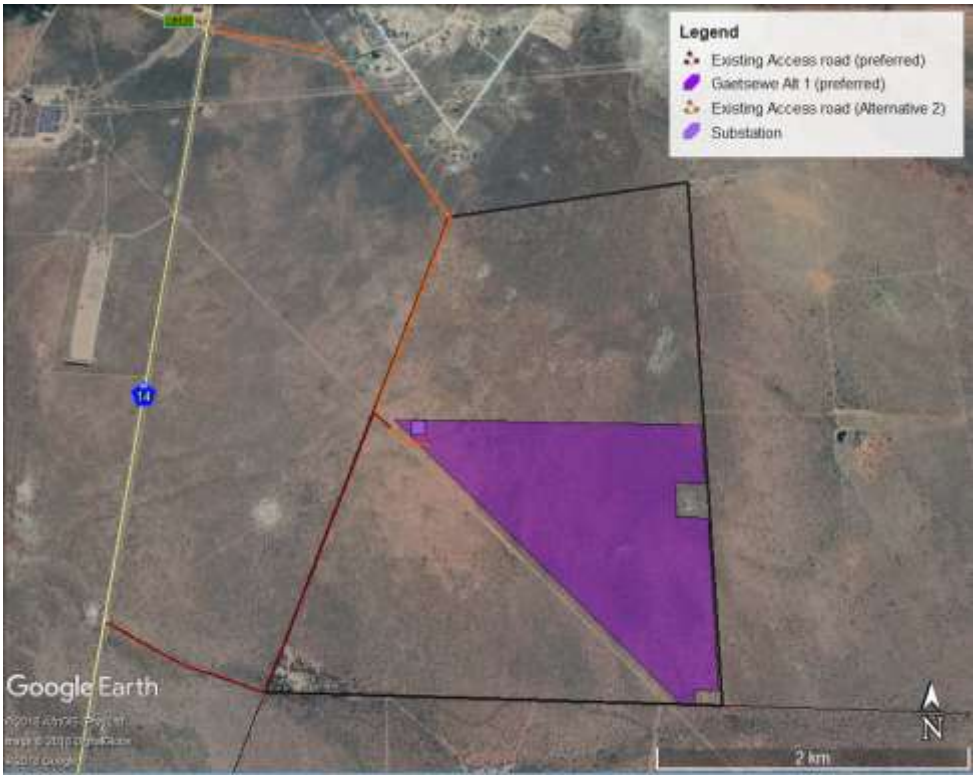

Figure 6: Access Routes to Gaetsewe Solar

The internal road network of the SEF will be gravelled roads, 4 – 5m in width, around the solar array periphery. Roads located in-between the solar modules will be un-surfaced tracks to be used for maintenance and cleaning of solar PV panels.

A detailed transport and traffic plan will be undertaken during the EIA phase of the project. Precautionary measures will be taken to mitigate the risk of ground disturbances where access roads will be constructed. Special attention will be given to drainage, water flow and erosion by applying appropriate building methods.

7. FIRE MANAGEMENT

Every owner on whose land a veldfire may start or burn or from whose land it may spread must prepare and maintain a firebreak on his or her side of the boundary between his or her land and any adjoining land. The procedure in this regard and the role of adjoining owners and the fire protection association are dealt with within the National Veld and Forest Fire Act (NVFFA) (Act 101 of 1998).

Veldfires in the solar development site are highly unlikely due to the arid and sparse, succulent nature of the vegetation, however, due to the presence of Tarconanthus the following fire management actions will be taken into account:

- There should be a perimeter road around the panel arrays forming a firebreak;
- Management of plant biomass within the site should be part of the management of the facility. Grazing by livestock is the simplest and most ecologically sound way to manage plant biomass and is recommended the preferred method to manage plant biomass at the site. Alternative management practices can include brush-cutting.
- Fires should only be allowed within fire-safe demarcated areas (preferably within the site camp); and
- No fuelwood collection should be allowed on-site.

8. CONCLUSION

Further assessment of all the variables and alternatives will be undertaken during the detailed EIA phase of the project.

9. LIST OF REFERENCES

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