DRAFT SCOPING REPORT

Draft Scoping Report for the proposed development of the Vhuvhili Solar Photovoltaic (PV) Facility near Secunda in the Mpumalanga Province.

CHAPTER 2:

Project Description

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2. PROJECT DESCRIPTION

This chapter provides an overview of the conceptual project design and technology for the proposed Vhuvhili Solar Energy Facility (SEF) and associated infrastructure.

The purpose of this chapter is to present sufficient project information on the proposed project to inform the Scoping and Environmental Impact Assessment (S&EIA) Process in terms of design parameters applicable to the project.

As noted in Chapter 1 of this Draft Scoping Report, the Project Applicant, Vhuvhili Solar RF (Pty) Ltd (hereafter referred to as the "Project Applicant"), is proposing to develop the Vhuvhili SEF and associated infrastructure, south-east of the town of Secunda in the Govan Mbeki Local Municipality and Gert Sibande District Municipality, in the Mpumalanga Province.

The proposed power line and associated electrical grid infrastructure (EGI), to connect the proposed Vhuvhili SEF to the grid at Sasol (or to the national grid), will be subject to a separate Basic Assessment (BA) Process which will be undertaken by the Project Applicant.

It is important to note that the project description and specification details are preliminary at this stage. It is likely that some of the specification details presented herein may change during the detailed design phase and upon further engineering investigations, however, the information provided below is seen as the worst-case scenario for the project. The Scoping Specialist Assessments have also been based on the worst-case scenario in terms of the project specifications (such as the development footprint, dimensions, height etc.).

2.1 Project development

The footprint of the proposed Vhuvhili SEF with a capacity of up to 300 MW will cover an approximate area of 650 hectares (ha). This excludes access roads leading to the site. It should also be noted that the project footprint may be refined as part of the detailed specialist studies to be undertaken in the EIA phase. Hence, an updated, refined footprint may be presented in the EIA Report. The total study area for the proposed Vhuvhili SEF is approximately 3 115 ha. The proposed Vhuvhili SEF will therefore comprise approximately 21 % of the total study area. Several specialists assessed larger areas on the affected farm portions to avoid environmental constraints and sensitivities (highlighted by the specialists), during the siting and final design of the facilities and associated infrastructure.

As part of this Scoping Phase, the specialists assessed and considered the Original Scoping Buildable Area which falls within the study area. Findings of the Scoping Level Specialist Assessments are included in Appendix G and integrated in relevant sections of the Draft Scoping Report. The sensitivities identified and verified by the specialists during the scoping phase will be used to develop the Revised Buildable Area which will be included and assessed by the specialists in the EIA phase. Refer to Chapter 3 (Figure 3-99) for a Sensitivity Map (showing the no-go areas) overlain with the Original Scoping Buildable Area.

2.2 Key components of the proposed Vhuvhili Solar Facility

The proposed Vhuvhili SEF will consist of the key components listed below in Table 2.1. The construction phase for the proposed project is expected to be up to 36 months. Once the commercial operation date is achieved, the proposed facility will generate electricity for a minimum period of 20 years.

It is important to note at the outset that the exact specifications of the proposed project components will be determined during the detailed engineering phase (subsequent to the issuing of the EA, should such authorisation be granted for the proposed project). In line with the precautionary approach and in order to ensure that any environmental impacts which may arise as a result of the project are adequately assessed during the EIA Phase, worst-case scenarios and estimates have been provided in this section as indicated above.

The proposed Vhuvhili SEF will comprise a maximum capacity of 300 MW. Associated infrastructure includes a construction laydown area (which includes the Operation and Maintenance (O&M) buildings), a Battery Energy Storage System (BESS) comprising of batteries within shipping containers or a suitable housing structure on a concrete foundation and an on-site Substation. The on-site Substation and BESS complex will be located within a complex of approximately 10 ha to allow for micro-siting of the BESS components and to accommodate internal roads (as required), a temporary construction laydown area and a firebreak around the BESS footprint.

The proposed Vhuvhili SEF and associated infrastructure include the main components and associated specifications as tabulated in Table 2-1.

Table 2-1: Description of the key components of the Vhuvhili Solar PV Project

Component	Description
Solar Field	
Type of Technology	PV Technology
Generation Capacity (Maximum Installed)	300 MW
Approximate area of the PV Array (i.e., Area occupied by the PV Modules)	Approximately 600 ha
Total developable area that includes all associated infrastructure within the fenced off area of the PV facility	Approximately 650 ha
PV Panel Structure (with the following possible tracking and mounting systems): ▪ Single Axis Tracking structures (aligned north-south); ▪ Fixed Axis Tracking (aligned east-west); ▪ Dual Axis Tracking (aligned east-west and north-south); ▪ Fixed Tilt Mounting Structure; or ▪ Bifacial Solar Modules.	Height: Approximately 3.5 m (maximum)
Building Infrastructure	
Warehouses/Workshops	▪ Footprint: Approximately 1000 m^2 ▪ Height: Up to 10 m
Site Offices and meeting room	▪ Footprint: Approximately 250 m^2 ▪ Height: Up to 10 m
Operational and Maintenance (O&M) Control Centre	▪ Footprint: Approximately 250 m^2 ▪ Height: Up to 10 m This will form part of the construction laydown area
Guard Houses	▪ Number of guard houses: Up to 6 ▪ Footprint of each guard house: Approximately 35 m^2 ▪ Height of each guard house: Up to 6 m

Component	Description
Ablution facilities	▪ Number of ablution facilities: Up to 6 ▪ Footprint of each ablution facility: Approximately 250 m^2 ▪ Height of each ablution facility: Up to 6 m
Inverter/Transformer Stations	▪ Preliminary total number of stations: 249 ▪ Footprint: Approximately 220 m^2 each ▪ Height: Approximately 3 m each
On-site Substation Complex	▪ Footprint: Approximately 4 ha ▪ Height: Up to 10 m ▪ Capacity: This varies according to the detailed design and requirements from potential clients. A transformation capacity of 200 - 250 MVA is assumed, and generally stepped up from 22 kV or 33 kV to 132 kV for connection to the Eskom grid (or to the Sasol grid via the proposed 150 MW Hydrogen electrolyser). ▪ The on-site Substation will accommodate 1 x 132 kV incoming feeder bay, 1 x 132 kV outgoing feeder bay and a motorised isolator with protection and metering.
Associated Infrastructure	
Battery Energy Storage System (BESS)	▪ Technology: It is proposed that Lithium Battery Technologies, such as Lithium-Ion Phosphate, Lithium Nickel Manganese Cobalt oxides or Vanadium Redox flow technologies will be considered as the preferred battery technology, however, the specific technology will only be determined following Engineering, Procurement and Construction (EPC) procurement. ▪ Footprint: Approximately 5 ha ▪ Height of BESS: Up to 10 m ▪ Capacity of BESS: Up to 300 MW/1200 MWh
On-site medium voltage (22 or 33 kV) internal power lines/underground cables	Depth: Maximum depth of 1.5 m
Underground low voltage cables or cable trays	Depth: Maximum depth of 1.5 m

Component	Description
Access roads (including upgrading and widening of existing roads)	Current width: Approximately 5 m Upgraded width: Approximately 10 m Two site access points are recommended for the site. The access points are proposed off the gravel sections of the D823 and D619 road.
Internal roads	Internal roads to be widened to approximately 10 m, including turning circle/bypass areas of up to 20 m at some sections during the construction phase. As such, the roads and cables will be positioned within a 20 m wide corridor. Existing roads will be upgraded wherever possible, although new roads will be constructed where necessary.
Length of internal access roads	To be determined based on final layout
Fencing around the PV Facility Perimeter	Type: Palisade or mesh or fully electrified Height: Up to 3 m
Storm water channels	Details to be confirmed once the Engineering, Procurement and Construction (EPC) contractor has been selected and the design is finalised. A detailed stormwater management plan would need to be developed.
Work area during the construction phase (i.e., laydown area)	Temporary Laydown area: Approximately: 4.5 ha. The need for a permanent laydown area will be confirmed during the EIA Phase.
Water Requirements	▪ Approximately 30 000 m^3 of water is estimated to be required for the construction phase, over an estimated up to a 36-month construction period. ▪ Approximately 5 000 m^3 of water is estimated to be required per annum for the operational phase for a minimum of 20-year operational lifespan. ▪ Water be sourced from the following potential sources: Local municipality, third-party water supplier (e.g., Sasol) or existing or drilled boreholes on site.

2.2.1 Solar PV Facility – Solar Field

The total area of the PV Array (i.e., area occupied by the PV Modules) for the proposed Vhuvhili SEF is approximately 600 ha.

The total developable area that includes all associated infrastructure within the fenced off area of the PV facility i.e., including the solar field, foundations, buildings and associated infrastructure but excluding access roads leading to the fenced off area, is approximately 650 ha.

The exact number of solar panels arrays, confirmation of the foundation type and detailed design will follow as the development progresses.

The smallest unit of a PV installation is a cell. A number of cells form a module, and several modules cumulatively form the arrays (Figure 2-1). An example of a Solar PV Facility is provided in Figure 2-2.

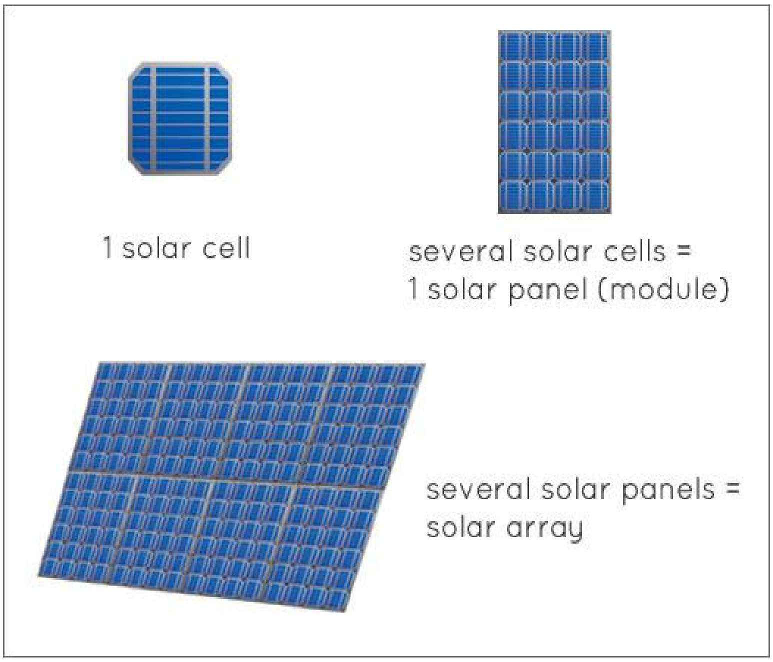

Figure 2-1: Components of the Proposed PV Installation

Modules are arranged into strings that form the solar field and are installed on racks which are made of aluminium or galvanised steel. Foundations will likely be drilled and concreted into the ground. The entire structure is not expected to exceed 3.5 m in height (measured from the ground). This system may be fixed, or may track the movement of the sun, either by adopting Fixed Axis Tracking (aligned east-west), Single Axis Tracking (aligned north-south), Dual Axis Tracking (aligned east-west and north-south), Fixed Tilt Mounting Structures or Bifacial Solar Modules as explained above. Bifacial panels can be up to 20 - 40 % more effective since it also utilises solar radiation reflected from the surfaces onto the rear side of the panels. The tracker design will be confirmed during the detailed engineering phase.

Figure 2-2: Example of PV Technology (DEFF, 2019)

2.2.2 Infrastructure within the PV Facility

2.2.2.1 Converters/Inverters, Low Voltage Cables, and Medium Voltage Cables

As mentioned above, the solar arrays are typically connected to each other in strings, which are in turn connected to inverters that convert Direct Current (DC) to Alternate Current (AC). Each inverter station is expected to extend approximately 3 m in height; with a footprint of approximately 0.022 ha.

The strings will be connected to the inverter stations by low voltage underground (internal) DC cables (to a maximum depth of 1.5 m) or cable trays. Power from the inverter stations will be collected in medium voltage transformers through underground (internal) AC cables, cable trays or AC cables which will be below ground or pole-mounted depending on voltage level and site conditions.

The inverter stations will in turn be connected to the proposed on-site Substation and BESS complex, via medium voltage (22 or 33 kV) internal underground cables. It is highly unlikely that above-ground 22 or 33 kV power lines will be utilised due to the shading created to the PV plant from the overhead lines. It is more likely that the 22 or 33 kV internal cables will be underground to a maximum depth of 1.5 m. This has also been recommended by the Avifaunal Specialist (as discussed in Chapter 6 and Appendix G.4 of this Draft Scoping Report).

As indicated above and in Chapter 1, the electrical connection from the on-site Substation and BESS complex to the step-down Substation at Sasol or the collector station and national grid will be discussed and assessed in a separate BA Report.

2.2.2.2 On-site Substation

The proposed project will also include an on-site Substation and BESS complex. The on-site Substation and BESS complex will comprise an area of approximately up to 10 ha and will have a height of up to 10 m.

A transformation capacity of 200 - 250 MVA is assumed, and generally stepped up from 22 kV or 33 kV to 132 kV for connection to the Eskom grid (or to the Sasol grid via the proposed 150 MW Hydrogen electrolyser).

The on-site substation will comprise the following components:

- On-site Independent Power Producer (IPP) or Facility Substation (+-2 ha). This will include the relevant section that will be maintained by the IPP or the Project Developer, and/or
- Switching Station and Collector Station (+-2 ha), and/or
- Battery Energy Storage System (BESS) (+-5 ha).

2.2.2.3 Battery Energy Storage Systems

The proposed project will also include a BESS which will form part of the on-site substation complex at the proposed Vhuvhili SEF site. The proposed BESS will cover an approximate area of up to 5 ha and a height of up to 10 m, with a capacity of 300MW/ 1 200 MWh.

Battery storage offers a wide range of advantages to South Africa including electricity supply reliability and quality improvement. The main purpose of the BESS is to mitigate intermittency of solar PV energy by storing and dispatching of electricity when needed i.e., to contribute to the grid 24 hours/day, during peak demand at night or during power outages. In essence, this technology allows renewable energy to enter the completely independent power generation market.

It is proposed that Lithium Battery Technologies, such as Lithium-Ion Phosphate, Lithium Nickel Manganese Cobalt oxides or Vanadium Redox flow technologies will be considered as the preferred battery technology, however, the specific technology will only be determined following EPC procurement.

Additional information on the some of the BESS technologies that are being considered is provided below.

- **Lithium-Ion Batteries**

Lithium-Ion batteries are solid state, sealed systems i.e., pre-assembled off site and then delivered to site for placement as per specifications of the supplier. This BESS system consists of multiple battery cells that are assembled together to form modules. A module may consist of several cells working in conjunction. Each cell contains a positive electrode, a negative electrode and an electrolyte. The negative electrode for a lithium-ion cell is typically carbon. The positive electrode can be lithium iron phosphate or a lithium metal oxide. The electrolyte is usually a lithium salt dissolved in an organic solvent (CSIR, 2014).

It is proposed that the Lithium-Ion BESS would be housed in containers, with associated operational, safety and control infrastructure. The BESS will be a sealed unit and will remain sealed during operations. The BESS will be located adjacent to the on-site or step-down substation complexes. Based on various discussions with the national Department of Forestry, Fisheries and the Environment (DFFE) on previous occasions, it has been confirmed that Lithium-Ion BESS's are not classified as containers or structures for the development and related operation of facility or infrastructure, for the storage, or for the storage and handling, of a dangerous good. Hence, listed activities pertaining to this aspect in the 2014 NEMA EIA Regulations (as amended) do not apply. Figure 2-3 is an illustration of a 25MW / 50MWh Lithium-Ion BESS located at the 60 MW Gannawarra Solar Farm in Australia.

Figure 2-3: Example of PV Technology with Lithium-Ion BESS (ARENAWIRE, 2018[1])

- **Redox Flow Batteries (RFB): Vanadium Redox Flow Battery (VRFB)**

Flow batteries generally comprise of three major components; a cell stack, auxiliary parts and electrolyte storage. The active chemical species in a flow battery are stored mostly externally in above-ground storage tanks, which contain the positive and negative electrolytes separately. The energy is stored in two chemical components, which are dissolved in a liquid to form electrolytes during operation. The energy density of a RFB is thus dependent on the size of the storage tanks (Parsons, 2017).

A schematic representation of a typical RFB is provided in Figure 2.4.

There are two types of RFB's i.e., a 'true' RFB and a hybrid RFB. In a 'true' RFB the electro-active materials used to store energy remain dissolved in solution. Therefore, the energy is determined by the volumes of electrolyte available. Examples of a 'true' RFB is the VRFB and iron-chromium systems. Hybrid RFBs deposit at least one chemical species as a solid during the charge cycle, therefore preventing the complete separation of power and energy characteristics (Parsons, 2017).

[1] Arenawire (2018). Solar battery storage in Victoria charging up for summer. https://arena.gov.au/blog/solar-battery-storage-in-victoria-charging-up-for-summer/ [online]. Accessed November 2021.

Examples of electrolytes for RFBs include Hydrochloric Acid and Sulphuric Acid, which are considered as dangerous goods in terms of the 2014 NEMA EIA Regulations (as amended).

The risk of spillage tends to be higher for an RFB than a Lithium-Ion BESS. Solid State Batteries carry less of a potential short-term risk to the environment in terms of potential spillages.

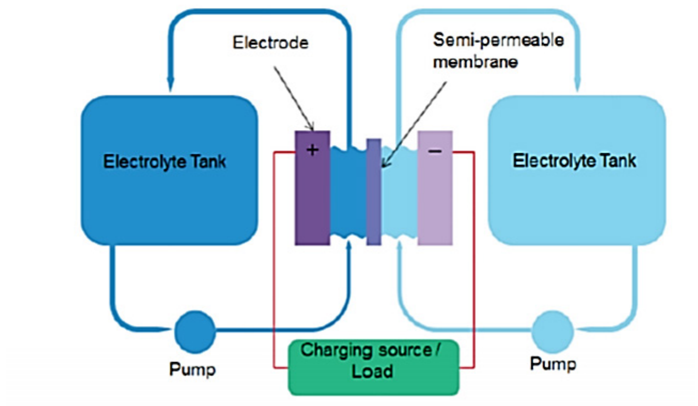

Figure 2-4: Schematic diagram of a typical Redox Flow Battery (Source: Parsons, 2017)

Refer to Appendix G.11 of this Draft Scoping Report for a High-Level Safety, Health and Environment Risk Assessment Scoping Input Report (ISHECON (2022).

The supplier of the BESS will be confirmed during the detailed design phase. The potential risks associated with the various BESS technology being considered, and the required mitigation measures will be included in the EIA Report, as well as the EMPr.

2.2.2.4 Panel Maintenance and Cleaning Area

During the operational phase, the accumulation of dust on solar panels generally negatively influences the productivity of the solar facility. As such the panels require regular cleaning. It is proposed that panel cleaning will take place quarterly; however, this may be revised should the site conditions warrant more frequent cleaning. A dedicated panel maintenance and cleaning area will be required on site during the operational phase. Water that emanates from the cleaning process will be free from harmful detergents or will comprise of approved biodegradable substances.

2.2.2.5 Storm water

It is proposed that the area where the solar panels will be installed will not be cleared of vegetation. It is planned for the vegetation to be trimmed and the panels will be installed on steel supporting structures above the height of the vegetation. The solar panels will not replace the vegetated area and thus storm water runoff is not expected to increase specifically due to the proposed PV panel placement.

Stormwater infrastructure, such as channels, will be constructed on site to ensure that stormwater run-off from site is appropriately managed. Water from these channels is not likely to contain any chemicals or hazardous substances and will be released into the surrounding environment based on the natural drainage contours. It is important to verify that the on-site Substation and BESS complex and other building infrastructure are not located in an area of stormwater accumulation.

Details of storm water management are to be confirmed once the Engineering, Procurement and Construction (EPC) contractor has been selected and the design is finalised. It is proposed that a detailed storm water management plan be developed during the detailed design phase (post EA, should such an authorisation be granted) and to be implemented during all phases of the project. The plan must ensure compliance with applicable regulations and prevent off-site migration of contaminated storm water or increased soil erosion. The plan should also include the installation of appropriate design measures that allow surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows. Drainage measures promote the dissipation of storm water run-off. Recommendations for the management of stormwater will be discussed in the EMPr during the EIA Phase.

2.2.2.6 Building Infrastructure

As indicated in Table 2.1, there will be a warehouse/workshop, office, O&M control centre, guard houses and ablution facilities at the proposed Vhuvhili SEF site as indicated below:

- Warehouses/workshops for storage of equipment (height up to 10 m and footprint approximately 1000 m^2);
- Site Office and meeting room (height up to 10 m and footprint approximately 250 m^2);
- Operational and Maintenance (O&M) control centre which will form part of the construction laydown area (height up to 10 m and footprint approximately 250 m^2);
- Guard Houses / security enclosures (height up to 10 m, footprint approximately 35 m^2).
- Ablution facilities (height up to 6 m and footprint approximately 250 m^2);
- Inverter/Transformer stations (height of approximately 3 m and footprint approximately 220 m^2); and
- On-site substation building (height of up to 10 m and footprint approximately 4 ha).

A temporary construction laydown area with a maximum footprint of approximately 4.5 ha will also be constructed. The need for a permanent laydown area will be confirmed during the EIA Phase.

Note that the details provided above in terms of heights and footprint are estimates and will be confirmed during the detailed design.

2.2.2.7 Additional Infrastructure

2.1.1.1.1 Fencing

For various reasons such as security, public protection and lawful requirements, the proposed built infrastructure on site and the entire Vhuvhili SEF, will be secured via the installation of appropriate fencing. The PV facility fencing type could be palisade or mesh or fully electrified, with an estimated height of up to 3 m. Existing livestock fencing on the affected farms portions may be upgraded in places deemed insufficiently secure, whereas permanent fencing will be required around the O&M area and on-site substation and BESS complex. Access points will be managed and monitored by an appointed security service provider. The type and height of fencing to be installed will be confirmed during detailed design as the development progresses.

2.1.1.1.2 Concrete batching plant

The Project Applicant may establish a concrete batch plant on site (within the laydown area) for purposes of the construction phase. Only a limited amount of water will be utilised during construction for the batching of concrete. Details of the concrete batching plant, including the footprint will be confirmed by the EPC contractor during the detailed design phase as the development progresses.

2.1.2 Internal Roads

It is proposed that existing roads will be upgraded wherever possible, although new roads will be constructed where necessary. Existing internal roads will be widened to approximately 10 m, including turning circle/bypass areas of up to 20 m at some sections during the construction phase. As such, the roads and cables will be positioned within a 20 m wide corridor. The length of the internal road network is largely dependent on the revised project layout and will therefore be confirmed during the EIA phase. The internal roads will provide access to the solar panels and will accommodate cable trenches and stormwater channels, as required. The total internal road length will be determined by the EPC contractor. The total internal road length may vary slightly, depending on the final design.

The geometric design and layout for the internal roads from the access points needs to be established at a detailed design stage. Existing structures and services, such as drainage structures, signage, street lighting and pipelines will need to be evaluated if impacting on the roads. It needs to be ensured that gravel sections remain in good condition and will need to be maintained during the additional loading of the construction phase and then reinstated after construction is completed. The geometric design constraints encountered due to the terrain should be taken into consideration by the geometric designer. Preferably, the internal roads need to be designed with smooth, relatively flat gradients (recommended to be no more than 8%) to allow a larger transport load vehicle to ascend to the respective laydown areas (Wink, 2021).

2.1.3 External Access Roads

Traffic inputs (Scoping Phase) have been provided by the traffic specialist and are included in Appendix G.10 of this Draft Scoping Report. The Traffic Scoping study will be expanded on and finalised during the EIA Phase. The following information has been obtained from the Traffic study (Wink, 2021).

The proposed Vhuvhili SEF site is located near Secunda, Mpumalanga Province. The road network surrounding the site includes the D772 to the north, the D619 to the east and south, and the D823 to the west as shown in Figure 2-4 below. Based on an access investigation conducted for the site (Iris, 2021), two site access points are proposed off the gravel sections of the D823 and D619 road (Figure 2-5). The current width of these roads is approximately 5 m. It is proposed that these existing roads will be upgraded and widened to a maximum width of 10 m. The access points are located off existing gravel access roads thus access spacing restrictions are not envisaged. Sight lines along the access points are within the recommended limits. The final site access points will be based on the access investigation findings, geometric considerations and site layout restrictions.

Exact specifications of the widening and upgrading of the farm gravel roads will be confirmed during the detailed design phase. Such upgrading and widening have been accommodated in the relevant listed activities applicable to the proposed project. Refer to Chapter 4 of this Draft Scoping Report.

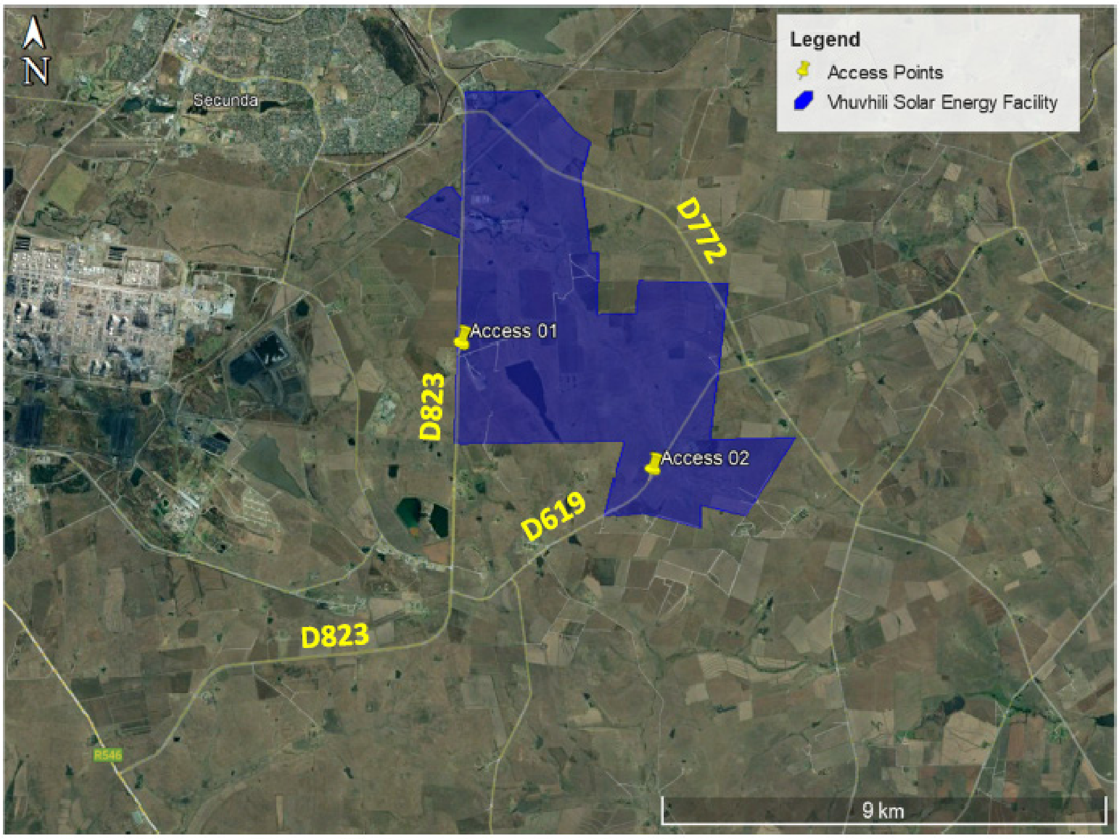

Figure 2-5: Proposed site access points to the proposed Vhuvhili Solar PV Facility (Wink, 2021)

It must however be noted that the layout of the solar panels has not been finalised, as such, the access points may need to be adjusted to accommodate the needs of the site. There are additional existing farm access gates that can potentially be utilised to access the site (Figure 2-6). The access points have good site lines in both directions.

The access points to the site will need to be able to cater for construction and abnormal load vehicles. A minimum road width of 8 m is recommended for the access points and the internal roads can have a minimum width of 5 m. The radius at the access point needs to be large enough to allow for all construction vehicles to turn safely. It is recommended that the site access be controlled via a boom and gatehouse. It is also recommended that security staff be stationed on site at the access booms during construction. A minimum stacking distance of 25 m is recommended between the road edge of the external road and the boom. All road markings and signage need to be in accordance with the South African Road Traffic Signs Manual (SARTSM) (Wink, 2021).

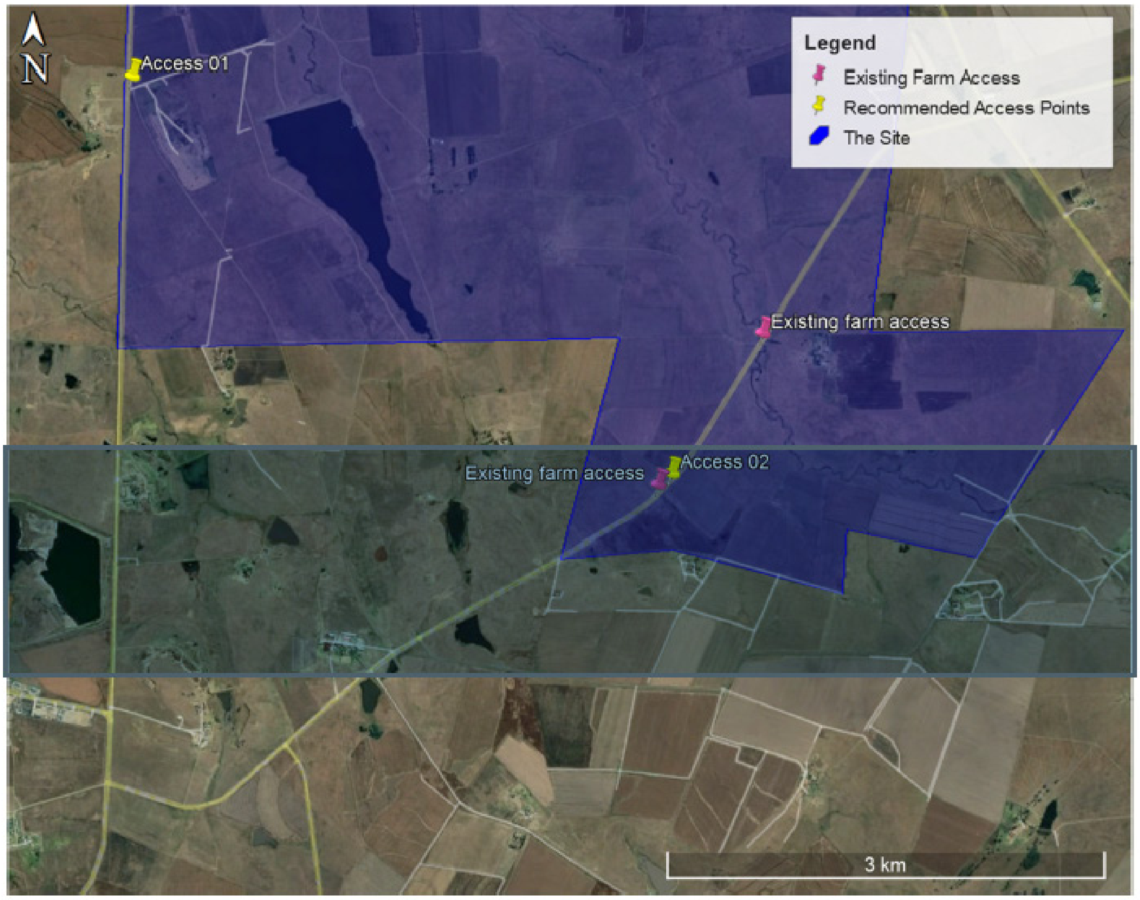

Figure 2-6: Potential access points to the proposed Vhuvhili Solar PV facility (Wink, 2021)

2.1.4 Port of Entry

It is envisaged that the components will be imported to South Africa via the Port of Durban or the Port of Richards Bay as the closest ports to the site. The Port of Durban is located approximately 524 km south-east of the site and the Port of Richards Bay is located approximately 488 km south-east of the site. The travel routes to the site from the ports comprise mostly high order routes and the solar PV panels are expected to be delivered by vehicles within the freight limitations. Road geometry limitations are thus not envisaged. Due to the shorter travel distance to site, the Port of Richards Bay is considered the preferred port of entry. It must however be noted that the availability at any of the considered ports will need to be confirmed with the Transnet Port authority.

The Port of Durban

The Durban container terminal is the busiest container terminal in Africa and operates as two terminals Pier 1 and Pier 2, handling 65% of South Africa's container volumes. It is ideally located to serve as a hub for containerised cargo from the Indian Ocean Islands, Middle East, Far East and Australia. The Durban Container Terminal is Africa's biggest and busiest - home to the state of the art, twin lift ship-to shore cranes. Various capacity creation projects are currently underway, including deepening of berths and operational optimization. The terminal currently handles 65% of South Africa's container volumes. (Transnet Port Terminals, n.d.) (Wink, 2021). The proposed route from the Port of Durban to the project site is indicated in Figure 2-7.

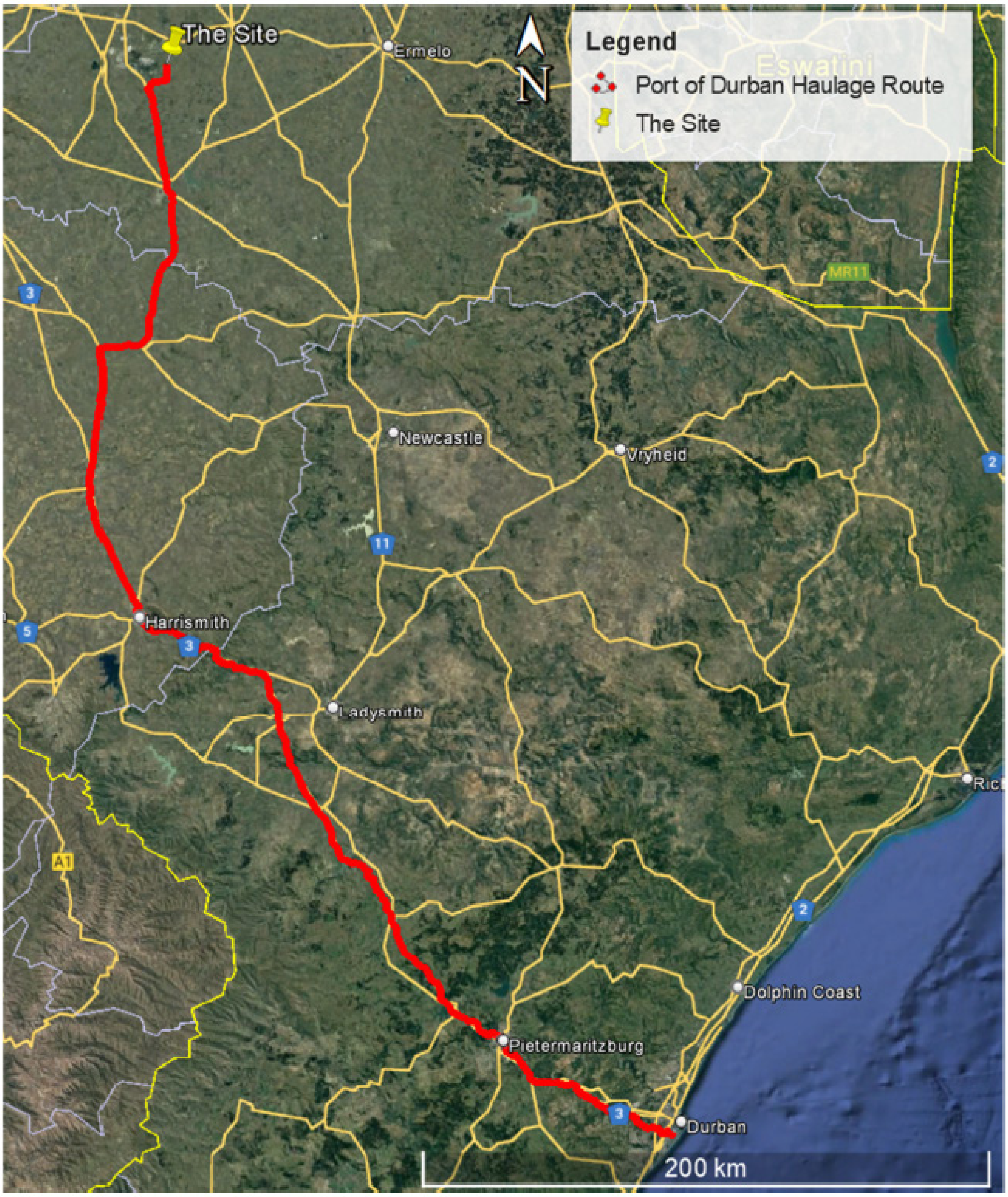

Figure 2-7: Route from the Port of Durban to the proposed Vhuvhili SEF site (Source: Wink, 2021).

The Port of Richards Bay

The Port of Richards Bay is situated in the northern industrial hub of KwaZulu-Natal and accessible via rail and road. The port is a deep-sea water port with 13 berths. The Port can handle dry bulk ores, minerals and break bulk with a draft that easily accommodates Cape size and panamax vessels. The Port is currently creating capacity, investing in new equipment and undergoing extensive refurbishments. The Richards Bay port will not only be a deep-sea water port, but South Africa's premium bulk mineral port within the next six years. The Richards Bay Expansion Programme is currently in progress, adding new berths and extending rail capacity within the port (Transnet Port Terminals, n.d.). The proposed route from the Port of Richards Bay to the project site is indicated in Figure 2-8.

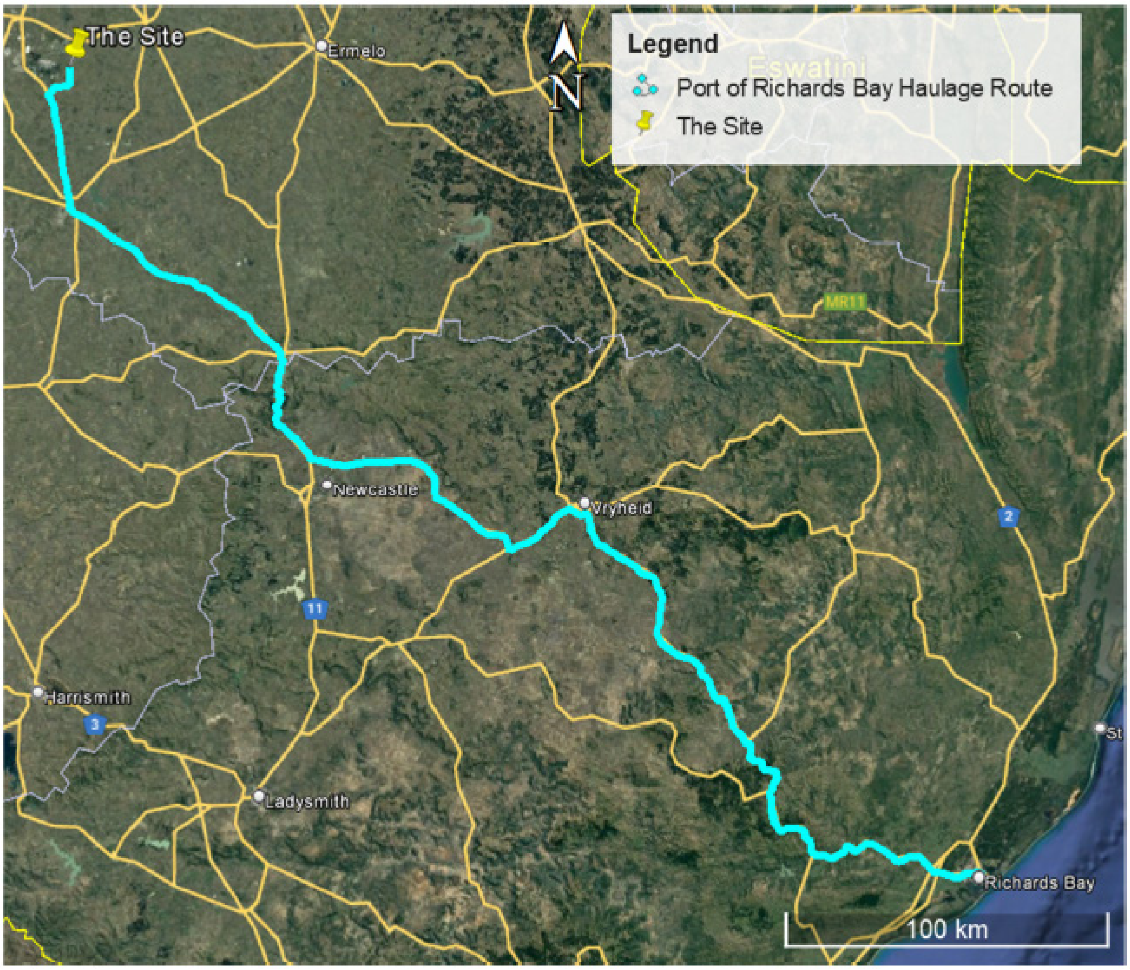

Figure 2-8: Route from the Port of Richards Bay to the proposed Vhuvhili SEF site (Source: Wink, 2021).

2.1.5 Transportation of materials and workers to site

The closest major commercial centre to the proposed development for domestically supplied and manufactured components is located in the greater Johannesburg area.

It is proposed that the materials, plant and workers will be sourced from the surrounding towns as far as possible. The closest towns to the site are Secunda, Trichardt, Evander, Embalenhle, Kinross and Bethal (Figure 2-9).

Should concrete batch plants or quarries not be available in the surrounding areas, mobile concrete batch plants and temporary construction material stockpile yards could be commissioned on vacant land near the proposed Vhuvhili SEF site. Delivery of materials to the mobile batch plant and the stockpile yard could be staggered to minimise traffic disruptions.

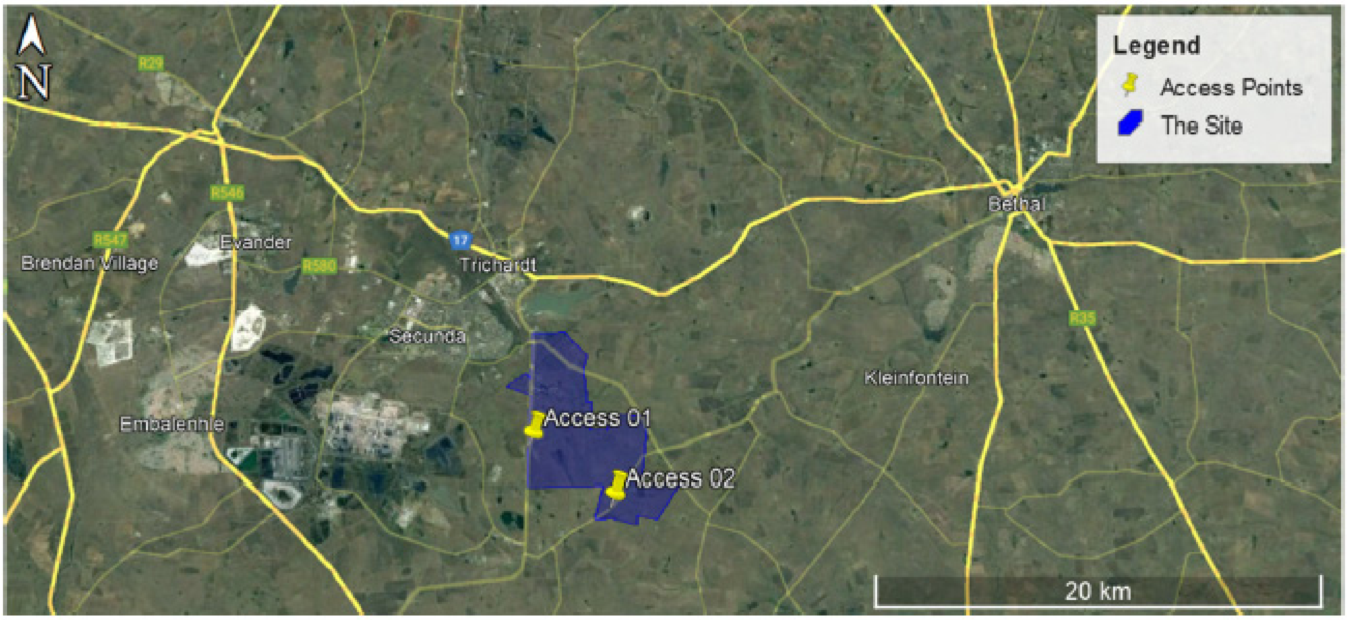

Figure 2-9: The surrounding towns from the proposed Vhuvhili SEF site (Source: Wink, 2021).

Refer to the Traffic Scoping inputs included in Appendix G.10 of this Draft Scoping Report for additional information.

2.1.6 Service Provision: Water Usage, Sewage, Solid Waste and Electricity Requirements

The Project Developer will consult with the Govan Mbeki Local Municipality during the EIA Phase to confirm the supply of services (in terms of water usage, sewage removal, solid waste removal, and electricity requirements) for the proposed project. The municipality will also be consulted as part of the 30-day public review period of the Draft Scoping Report and the Draft EIA Report.

Should the local municipality not have adequate capacity available for the handling of waste, provision of water and sewage handling provisions; then the Project Applicant will make use of private contractors to ensure that these services are provided. An outline of the services that will be required are discussed below.

2.1.6.1 Water Usage

During the construction phase, approximately 30 000 m^3 of water will be required over an estimated 36-month construction period. This equates to approximately 833 m^3 of water per month during the construction phase. Water will be required for human consumption and construction activities. This is also classified as potable water and should be from a reputable source and conform to South African National Standards (SANS) quality standards. The decommissioning phase is expected to have a water usage less than the construction phase. It is estimated at half the usage.

During the operational phase, it is estimated that the panel washing process, and human consumption as well as other operational phase activities will require approximately 5 000 m^3 of water per year for a minimum 20-year operational lifespan. This equates to approximately 416 m^3 of water per month during the operational phase of the proposed Vhuvhili SEF project. The water for panel washing does not need to meet the same quality standards as that required for potable water, however the water should be tested to ensure that it does not negatively impact on the mechanical equipment.

Water required for the construction, operational and decommissioning phases will either be sourced from the following sources (in order of priority and likelihood):

- The **Govan Mbeki Municipality** - specific arrangements will be agreed with the local municipality in a Service Level Agreement (SLA). The water will most likely be trucked in, or made available for collection at the Local Municipal Water Treatment Plant via a metered standpipe. Should the water be trucked in, such impacts will be considered in the Traffic Impact Assessment during the EIA Phase. Should the water be transferred from the Local Municipal Water Treatment Plant via a pipeline, the relevant listed activities, as discussed in Chapter 4 of this Draft Scoping Report, will need to be considered. The route of this pipeline will be confirmed during the detailed design.
- Investigation into a third-party water supplier which may include the nearby Sasol refinery or other private services companies.
- An existing borehole or a new borehole will be drilled on site. The borehole will be subject to complete geohydrological testing and an assessment, as well as a Water Use Licence Application process. This will be undertaken as a separate process, once more detailed information becomes available, outside of these current EA Application for the Vhuvhili SEF.

2.1.6.2 Sewage or Liquid Effluent

The proposed project will require sewage services during the construction, operational and decommissioning phases. Low volumes of sewage or liquid effluent are estimated. More specifically, it is estimated that a peak of approximately 28,000 l per month of sewage will be generated during the construction phase. During the operational phase, it is estimated that 10,000 l of sewerage per month will be generated.

Liquid effluent will be limited to the ablution facility during the construction and operational phases. Portable sanitation facilities (i.e. chemical toilets) will be used during the construction phase, which will be regularly serviced and emptied by a suitable and registered contractor on a regular basis. A permanent ablution facility may be installed during the operational phase, as indicated above. It is intended that sewage will be disposed of in the municipal waterborne sewage system. However, should this not be possible, the effluent will be stored on site in watertight concrete structures (conservancy tanks) and thereafter transported to and disposed of at the Local Municipal sewerage treatment works or similar facility by a registered service provider. As noted above, the Project Developer will consult with the Govan Mbeki Municipality during the EIA Phase to confirm the provision of services.

2.1.6.3 Solid Waste Generation

The quantity of waste generated will depend on the construction phase, which is estimated to extend over 36 months. However, it is estimated that approximately 2 000-5 000 kg of general waste will be generated every month during the construction phase. During the construction phase, the following waste materials are anticipated:

- Packaging material, such as the cardboard, plastic and wooden packaging and off-cuts;
- Hazardous waste from empty tins, oils, soil containing oil and diesel (in the event of spills), and chemicals;
- Building rubble, discarded bricks, wood and concrete;
- Domestic waste generated by personnel; and
- Vegetation waste generated from the clearing of vegetation.

Solid waste will be managed via the EMPr during all project phases. The EMPr will be provided in the Draft EIA Report, which will incorporate waste management principles. During the construction phase, general solid waste will be collected and temporarily stockpiled in skips in a designated area on site and thereafter removed, emptied into trucks, and disposed at a registered waste disposal facility on a monthly basis by an approved waste disposal Contractor (i.e. a suitable Contractor) or the municipality. In addition, a skip will be placed on site and any damaged or broken PV panels (i.e. those not returned to the supplier) will be stored in this skip. A specialist waste management company will be commissioned to manage and dispose of this waste.

Any hazardous waste (such as contaminated soil as a result of spillages) will be temporarily stockpiled (for less than 90 days) in a designated area on site (i.e., placed in leak-proof storage skips), and thereafter removed off site by a suitable service provider for safe disposal at a registered hazardous waste disposal facility.

Waste disposal slips and waybills will be obtained for the collection and disposal of the general and hazardous waste. These disposal slips (i.e., safe disposal certificates) will be kept on file for auditing purposes as proof of disposal. The waste disposal facility selected will be suitable and able to receive the specified waste stream (i.e., hazardous waste will only be disposed of at a registered/licenced waste disposal facility). The details of the disposal facility will be finalised during the contracting process, prior to the commencement of construction. Where possible, recycling and re-use of material will be encouraged.

During the operational phase after construction, the facility will produce minor amounts of general waste (as a result of the office). It is estimated that approximately 2.5 m^3 of waste will be generated every month during the operational phase.

2.1.6.4 Electricity Requirements

In terms of electricity supply for the construction and operational phase, the Project Developer will make use of existing Eskom or municipal infrastructure supply services or Sasol infrastructure in the area. Should this not be available the developer will make use of generators on site during construction.

2.2 Socio-Economic

It should be noted that the employment opportunity specifications provided in this report are estimates and are dependent on the final engineering design and the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) or any other bidding process Request for Proposal provisions at that point in time.

2.2.1 Employment during Construction

During the construction phase, skilled, medium-skilled and low-skilled temporary employment opportunities will be created. It is difficult to specify the actual number of employment opportunities that will be created at this stage; however, approximately 300 employment opportunities are expected to be created during the construction phase at peak conditions. The skill breakdown of employment opportunities is estimated as 50% low-skilled (construction labourers, security staff etc.), 30 % medium-skilled (Patterson B and above) (drivers, equipment operators etc.) and 20 % skilled personnel (engineers, land surveyors, project managers etc.).

Employees will most likely be housed in local nearby towns and villages. Workers will only be housed in worker camps on-site if suitable accommodation is available. However, this will still be confirmed. The Socio-Economic Assessment will also consider this during the EIA Phase. Typically, the EPC contractor will be responsible for the provision of transport of construction personnel to and from site.

All efforts will be made to ensure that all construction work will be undertaken in compliance with local, provincial and national legislation, local and international best practice, as well as the compiled EMPrs which are to be included in the EMPr in the EIA Reports. An independent Environmental Control Officer (ECO) will be appointed during the construction phase and will monitor compliance with the recommendations and conditions of the EMPrs and EA respectively.

2.2.2 Employment during Operations

Approximately 60 full time employment opportunities will be created over the 20-year lifespan of the proposed facility. The employment breakdown is estimated as 60 % low-skilled, 30 % medium-skilled and 10 % skilled. The low and medium-skilled jobs will be linked to services such as panel cleaning, maintenance and security. The percentage of temporary workers that may be offered permanent employment once the construction phase is completed will be dependent on the investor requirements, however, will meet the requirements of the REIPPPP or other bidding process at the time as well.

2.2.3 Socio-Economic Investment and Development

The Applicant will ultimately own the project, if successful, and will compile an Economic Development Plan which will be compliant with REIPPPP or any other bidding requirements and will *inter alia* set out to achieve the following:

- Create a local community trust or similar (as required by REIPPPP) which has an equity share in the project life to benefit historically disadvantaged communities;
- Initiate a skills development and training strategy to facilitate future employment from the local community;
- Give preference to local suppliers for the construction of the facility; and
- Support local community upliftment and entrepreneurship through socio-economic and enterprise development initiatives.

2.3 Overview of the Project Development Cycle

This section provides an outline of the main activities that are proposed during each phase of the proposed project, i.e. extending from the Planning and Design phase through to the Decommissioning phase. The operational life of the proposed Vhuvhili SEF is expected to be approximately 20 years, which could be extended through regular maintenance and/or upgrades in technology.

The project can be divided into the following main phases:

- Detailed Planning and Design Phase;
- Construction Phase;
- Operational Phase; and
- Decommissioning Phase.

Each activity undertaken as part of the above phases may have environmental impacts and, where applicable, has therefore been assessed at a high-level in the specialist studies for the Scoping Phase (summarised in Chapter 6 and in specialist scoping inputs provided in Appendix G of this Scoping Report), and will be detailed further during the EIA Phase.

2.3.1 Planning and Design Phase

The project layout, including the exact placement of building infrastructure and the proposed internal road network will be finalised in the EIA Phase. The project layout will be informed by the findings of the specialist assessments. The specialists will be requested to comment on the final project layout. The panel mounting system will only be confirmed during the detailed design phase.

2.3.2 Construction Phase

The construction phase will take place subsequent to the issuing of an EA (should such EA be granted) and if a successful bid in terms of the REIPPPP or a similar tender process is issued, and once a power purchase agreement (PPA) is signed with a suitable energy off-taker (either national government or private). As indicated above, the construction phase is expected to extend up to 36 months for the proposed Vhuvhili SEF project. The main activities that will form part of the construction phase are:

- Removal of vegetation for the proposed infrastructure, where necessary, within the approved development footprint to facilitate the construction and/or establishment of infrastructure;
- Stockpiling of topsoil and cleared vegetation, where necessary;
- Excavations for infrastructure and associated infrastructure;
- Establishment of a temporary laydown area to enable the storage of construction equipment and machinery and will include the establishment of the construction site camp (including site offices and other temporary facilities for the appointed contractors);
- Construction of the solar field, and additional infrastructure;
- Creation of employment opportunities;
- Transportation of material and equipment to site, and personnel to and from site; and
- all efforts will be made to ensure that construction work will be undertaken in compliance with local, provincial and national legislation, local and international best practice, as well as the EMPr that will be compiled and included in the EIA Report. An independent Environmental Control Officer (ECO) will be appointed during the construction phase and will monitor compliance with the recommendations and conditions of the EMPr and EA, respectively.

2.3.3 Operational Phase

The following activities will occur during the operational phase of the project:

- The generation of electricity from the proposed solar facility; and
- Maintenance of the solar field and associated infrastructure.

As indicated above, the operational lifespan of the proposed Vhuvhili SEF is expected to be approximately 20 years. During the life span of the proposed project, on-going maintenance will be required on a scheduled basis to ensure the continued optimal functioning of the infrastructure. In general, maintenance on the structures will involve visual inspection, and only equipment that fails will be replaced in a manner similar to that of construction activities. The EMPr that will be compiled and included in the EIA Report will include the requirement for method statements to be compiled prior to the operational phase to describe the manner in which maintenance will be undertaken to ensure environmental impacts are minimised.

2.3.4 Decommissioning Phase

At the end of the operational phase, the Vhuvhili SEF may be decommissioned, or may be repowered i.e. redesigned and refitted so as to operate for a longer period. The main aim of decommissioning is to return the land to its original, pre-construction condition. Should the unlikely need for decommissioning arise i.e. if the facility becomes outdated or the land needs to be used for other purposes, the decommissioning procedures will be undertaken in line with the approved EMPr and relevant legislation at the time, and the site will be rehabilitated and returned to its pre-construction state.

Various components of the proposed Vhuvhili SEF which are decommissioned will be reused, recycled or disposed of in accordance with the relevant regulatory requirements. All of the components of the solar PV facility panels are considered to be reusable or recyclable. The decommissioning phase of the project is also expected to create skilled and low-skilled employment opportunities.