1. Introduction

1.1 This document

This Non-Technical Summary (NTS) provides an overview of the Basic Assessment (BA) process for the proposed Naos Solar PV Project Two, near Viljoenskroon, Free State Province. It has been prepared by SOLA and reviewed by Environamics. The BA was undertaken in compliance with the National Environmental Management Act (Act 107 of 1998), as amended, and the EIA Regulations, as amended.

The NTS describes the project proposal, and the potential impacts the Project may have on the biophysical and socio-economic environments. It also addresses the measures that the Project will implement to reduce significant negative impacts and to enhance potential social benefits, and how environmental and social issues will be managed during the construction, operation and decommissioning phases. The NTS is a short document written in non-technical language that can be used to share the findings of the BA process to the general public.

1.2 Overview of Project

Naos Solar PV Project Two (Pty) Ltd intends to develop a photovoltaic solar facility and associated infrastructure on Portion 2 of the Farm Waterford No. 573, Registration Division Viljoenskroon, Free State Province situated within the Moqhaka Local Municipality and the greater Fezile Dabi District Municipality. The solar facility will have a generating capacity of up to 200MW. The town of Viljoenskroon is located approximately 24km to the south and the town of Orkney is located approximately 12km east of the proposed development. The total development footprint of the project will approximately be 300 hectares. The Power line will connect the facility from a collector substation to the national grid by connecting into the existing 400kV Mercury Main Transmission Substation (MTS).

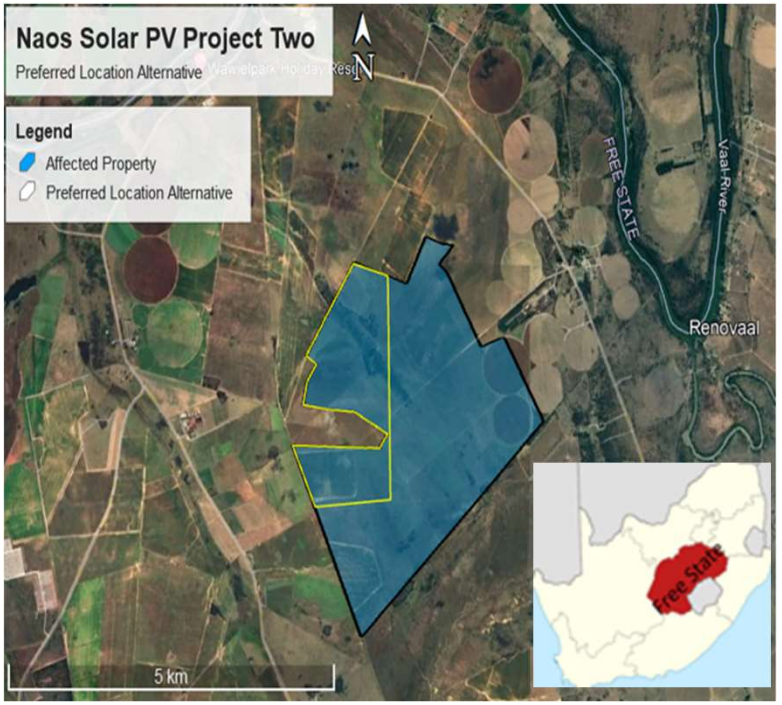

Figure 1:Project Location

1.3 Project Justification

The proposed activity is a direct result of the growing demand for electricity and the need for renewable energy in South Africa. According to Eskom, the demand for electricity in South Africa has been growing at approximately 3% per annum. This growing demand, fuelled by increasing economic growth and social development, is placing increasing pressure on South Africa's existing power generation capacity. The proposed project is intended to form part of the Department of Mineral Resources and Energy's (DMREs) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme or any other appropriate energy generation programmes / opportunities. These Programmes aim to secure the generation of electricity from Renewable energy sources (Wind, Solar and Hydro), while simultaneously diversifying South Africa's electricity mix.

2. How does a Typical PV Facility work?

2.1 Project Justification

Solar Panels capture light energy from the sun to generate electricity through a process known as the Photovoltaic effect, where light energy energise the electrons to produce electricity. Each PV cell is made of silicon which is positively and negatively charged on either side, with electrical conductors attached to both sides to form a circuit. This circuit captures the electric current which is transmitted along power lines to nearby substations and ultimately distributed to the consumers as indicated in figure 2

Figure 2: The Solar Energy process (source: https://www.eeweb.com/solar-power-plant-working-and-benefits/)

2.3 Services provision

Water: Water for the development will most likely be obtained from the local municipality, or alternatively from ground water resources.

Sanitation: Portable chemical toilets will be utilised, that will be serviced privately or by the local municipality**.**

Waste: Waste will be disposed of at a licensed landfill site.

Electricity: During construction, electricity will either be generated on site through a small solar system or through the use of generators or the existing Eskom supply on the affected property will be utilised.

2.2. Key components of the Proposed project

- **PV Panel Array:** To produce up to 200MW the facility will require numerous linked cells placed behind a protective glass sheet to form a panel. Multiple panels will be required to form the solar PV arrays which will comprise the PV facility.
- **Battery Energy Storage System (BESS):** The BESS will make use of Lithium-ion or Vanadium Redox technology and will have a capacity of up to 4.5GWh. The extent of the system will be ~4.59ha.
- **Inverters:** The inverter is a pulse-width mode inverter that converts direct current (DC) electricity to alternating current (AC) electricity at grid frequency.
- **Connection to grid to transform voltage from 33kV to 132kV:** Connecting the array to the electrical grid requires the transformation of the voltage from 33kV to 132kV.
- **Grid Connection:** The onsite substation will be required on site to step the voltage, after which the power will be evacuated into the national grid via the new proposed power line from the proposed collector substation to the 132kV/400kV Mercury Main Transmission Substation (MTS).
- **Electrical reticulations network**: The internal network will be laid ~2.4m underground as far as practically possible.
- **Supporting infrastructure:** The following auxillary building will be required on site and will include water and electricity: Operations & maintenance building, Switch gear and relay room, Staff lockers and changing rooms, security control, permanent laydown area and temporary batching plant.
- **Roads:** Access will be obtained via the existing Vermaasdrift Road, R59, R501 and S643 roads. Internal site road network will also be required to provide access to the solar field.
- **Fencing:** For health, safety and security reasons, the facility will be required to be fenced off from the surrounding farms. The project will have permanent security on site for 24hrs per day, 7 days a week.

Decommissioning: The operating period will be up to 30 years from the commencement date of the operation phase. Thereafter two rights of renewal periods of 40 years and 30 years will be relevant.

3. Alternatives

3.1 No-go Alternative

This alternative considers the option of 'do nothing' and maintaining the status quo. The site is currently zoned for agricultural land uses. Should the proposed activity not proceed, the site will remain unchanged.

Figure 3: Photograph of the site

3.2 Location Alternatives

No other properties have at this stage been secured by Naos Solar PV Project Two (Pty) Ltd in the Orkney/ Viljoenskroon area to potentially establish the solar energy facility. From a local perspective, Portion 2 of the Farm Waterford No. 573, is preferred due to its suitable climatic conditions and solar resource, topography, environmental conditions, proximity to a feasible grid connection point, as well as site access.

3.3 Activity Alternative

The BA process also needs to consider if the development of a solar PV facility would be the most appropriate land use for the particular site. solar PV technology is appropriately suited to the site, given the high irradiation values for the Orkney / Viljoenskroon area.

3.4 Technical Alternatives

Possible technical alternatives for the development of a solar PV facility needs to be considered during the BA process. These include:

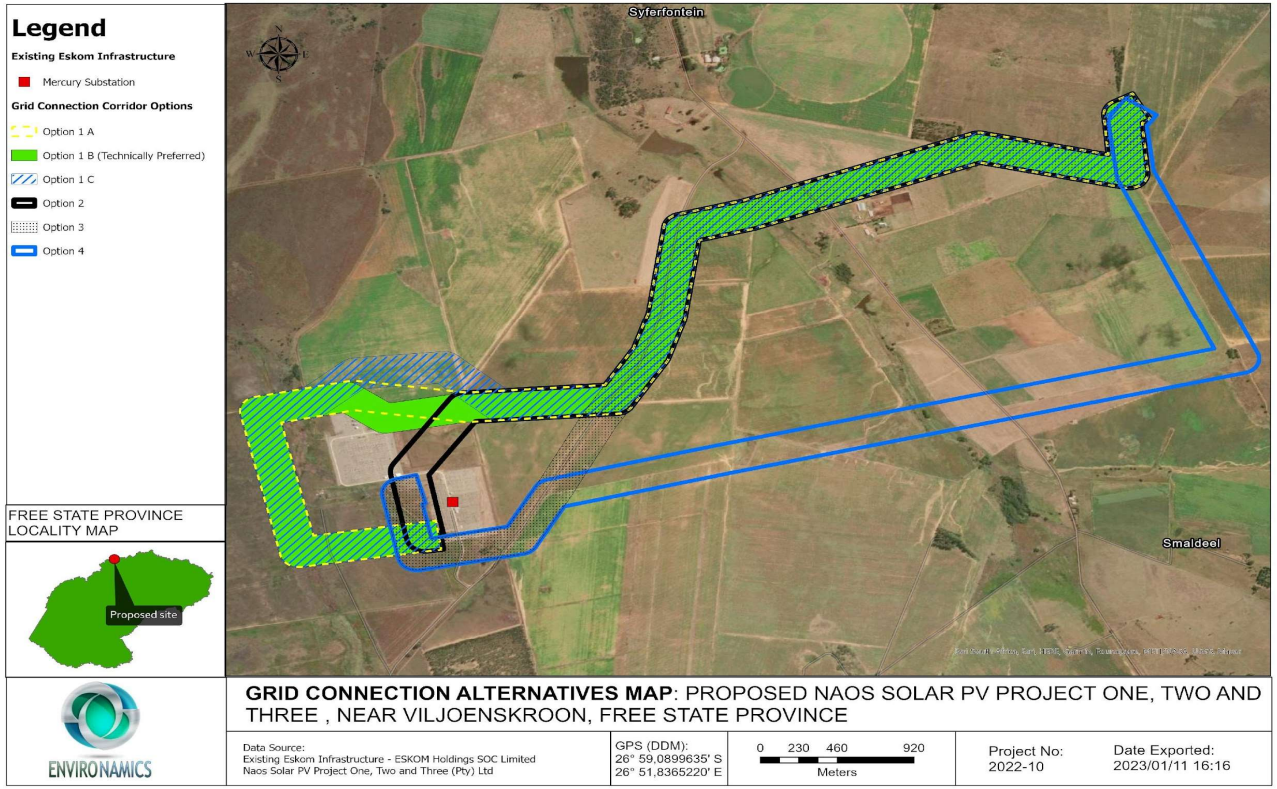

Figure 4: Grid connection Alternatives

3.4.1 Grid Connection: Two collector substation alternative locations are under assessment. Specific internal power lines to connect the collector substation to the main grid connection corridor, which will ultimately evacuate the generated power into the national grid, is also being proposed as part of the required grid connection infrastructure. Similarly, six alternative routes are being assessed to connect the facility to the Mercury Substation. Power lines can either be overhead or underground. A 132kV overhead distribution line is the preferred alternative .

3.4.2 BESS: While there are various battery storage technologies available, the preferred alternative is the utility-scale Lithium-ion (Li-ion) battery energy storage. Li-ion batteries have emerged as the leading technology in utility-scale energy storage applications because it offers the best mix of performance specifications, such as high charge and discharge efficiency, low self-discharge, high energy density, and long cycle life.

3.4.2 Main Access Road: Four alternative main access routes are being proposed for the development. The Preferred access road follows the S643m where it crosses over the Vaal River via the Vermaasdrift bridge.

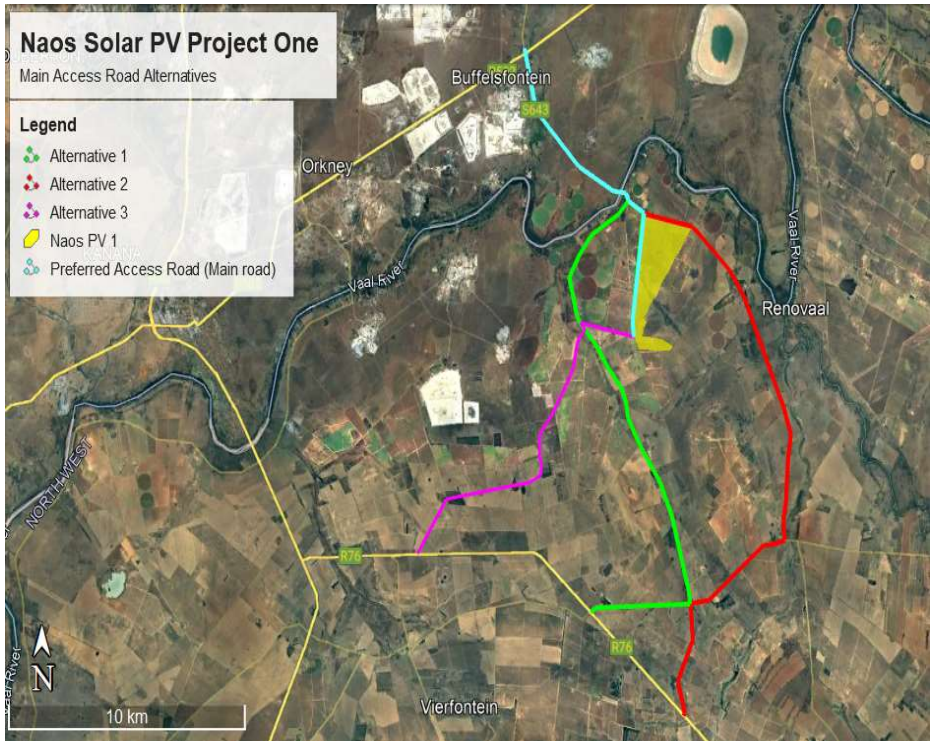

Figure 5: Main Access Route Alternatives

3.5 Design and layout alternatives

Design alternatives were considered throughout the planning and design phase. The layout follows the limitations of the site and aspects such as environmental sensitive areas, roads, areas under crop production considered as valuable by the landowner, fencing and servitudes are considered.

With regards to the structure orientation, the panels will either be fixed to a single-axis horizontal tracking structure where the orientation of the panel varies according to the time of the day, as the sun moves from east to west or tilted at a fixed angle equivalent to the latitude at which the site is located in order to capture the most sun.

The choice of pylon structure to be used for the power lines will be determined in consultation with Eskom. The structures to be utilized for the powerline towers include the steel lattice towers, steel monopoles and wooden poles

3.6 Technology Alternatives

There are several types of semiconductor technologies currently available and in use for PV solar panels. Two, however, have become the most widely adopted, namely crystalline silicon, thin film or bifacial PV panels. The technology that (at this stage) proves more feasible and reasonable with respect to the proposed solar facility is crystalline silicon panels, due to it being non-reflective, more efficient, and with a higher durability. However, due to the rapid technological advances being made in the field of solar technology the exact type of technology to be used, such as bifacial panels, will only be confirmed at the onset of the project.

4. Legal Framework &Public Participation

4.1 Environmental Management and Coordination Act

Environmental decision making with regards to solar PV plants and associated infrastructure is based on numerous policy and legislative documents. The National Environmental Management Act identifies listed activities (in terms of Section 24) which are likely to have an impact on the environment. These activities cannot commence without obtaining an Environmental Authorisation (EA) from the relevant competent authority. Sufficient information is required by the competent authority to make an informed decision and the project is therefore subject to an environmental assessment process which can be either a Basic Assessment Process or a full Scoping and Environmental Impact Assessment process.

The EIA Regulations No. 324, 325, and 327 outline the activities that may be triggered and therefore require EA. The activities triggered under Listing Notice 1, 2 and 3 for the project implies that the development is considered as potentially having an impact on the environment and therefore require the implementation of appropriate mitigation measures. Based on the location of the entire extent of the project within the Klerksdorp REDZ, the process to be followed will be a Basic Assessment process and not a full EIA process, as well as a shortened timeframe for the processing of the Application for Environmental Authorisation by the Department of Forestry, Fisheries and the Environment (DFFE).

4.2 Public Participation

Public participation is an integral part of the BA process and aims to involve I&APs in the process by notifying them of the proposed project and encouraging them to voice their issues and concerns.

Through the BA process of the project, the process is transparent and allows I&APs to comment on the project or raise concerns, which are included in the Basic Assessment Report and are taken into consideration during the authorities' assessment of the project. Table 1 indicates the key steps of the BA processes and the timelines for the projects.

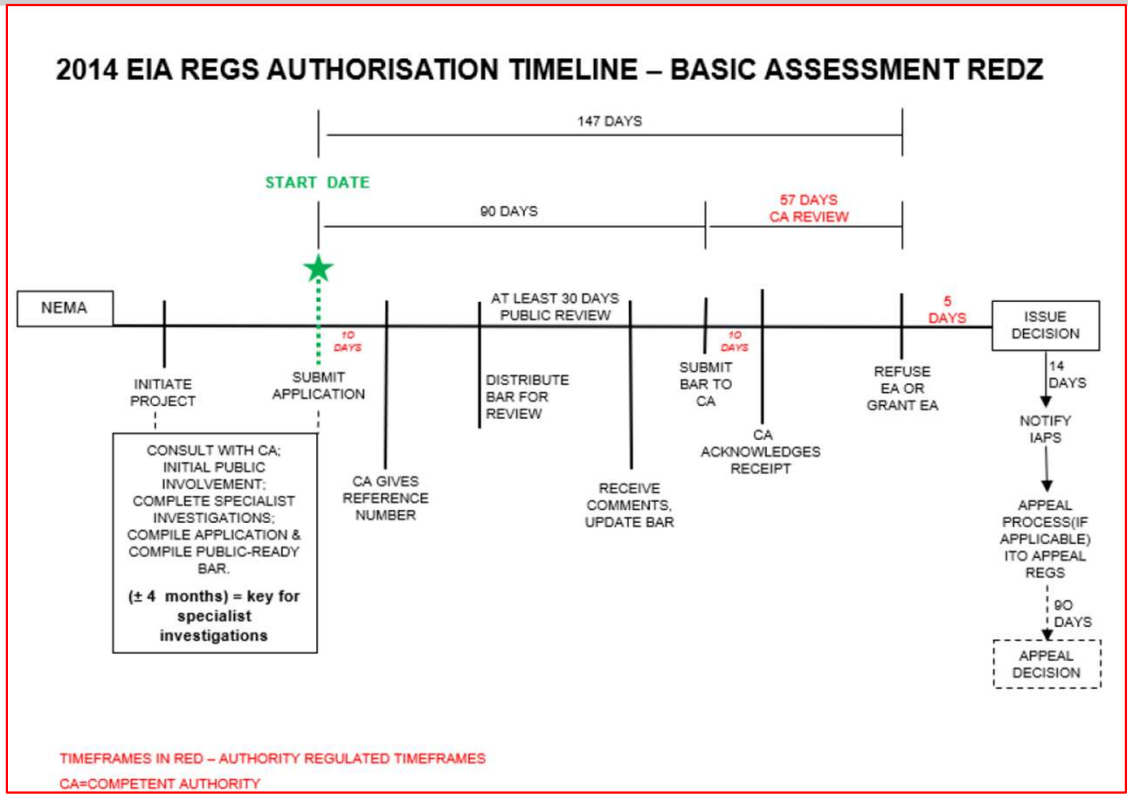

Figure 5:REDZ Timeline

Table 1: Key steps of the BA process

Activity	Prescribed timeframe	Timeframe
Public Participation (BID)	30 Days	25 Aug – 27 Sept 2022
Placement of site noticed and advert	1 Month	21 & 22 July 2022
Submit Application and DBAR to I&APs	-	3 February 2023
Public Participation (DBAR)	30 Days	03 February – 06 March 2023
Submit FBAR to DFFE	90 Days	March 2023
Decision	57 Days	May 2023
Appeal period for the decision on the Application	20 Days	June 2023

5. Key Baseline Conditions

5.1 Biophysical Environment

The biophysical environment is described with specific reference to geology, soils, agricultural potential and land capability, vegetation and landscape features, climate, biodiversity, heritage features (in terms of archaeology and palaeontology), the visual landscape and the social environment to be affected.

5.1.1 Geology, soils and terrain

The site is characterised by the Bc 25 and Bd 13 land types. Soil profiles were studies up to 1.2m and included the soil types of Orthic topsoil, Lithic horizon, Hard rock Horizon, Yellow-Brown apedal, Albic Horizon, Soft Plinthic Horizon and Gley Plinthic Horizon.

5.1.2 Agriculture potential, Land capability, erosion potential and existing agricultural activities

The capability has been determined as “C8” for the project area. The limitation rating is listed as “Very Severe” which indicates that the area is very severely restricted in terms of the choice of crops due to heat and moisture stress. Suitable crops at high risk of yield loss. The area has a moderate to high potential for soil erosion.

5.1.3 Vegetation and landscape features

The site is located within the Middle Vaal Water Management Area (WMA) and entirely within the Highveld ecoregion. The topography of the general area is characterised by slightly undulating plains with wetlands and / or drainage channels bisecting the broader area. The Vaal River is located directly to the north of the site. The surrounding areas are being used for livestock and crop cultivation. Furthermore, the site is surrounded by agricultural areas, mining areas in the north and west and the Vaal River in the north and thus little connectivity with natural areas are generally present within the landscape.

5.1.4 Surface water resources

While the Vaal River borders the site, there are no NFEPA wetlands or rivers inside the site. Wetlands associated in the areas are Exorheic depression (artificial dams) and Unchannelled valley bottom wetlands.

5.1.5 Climate

The climate for Klerksdorp is given, as it is the closest town with weather data available. Klerksdorp is 1308m above sea level. Klerksdorp's climate is a local steppe climate. The average annual temperature for the region is 18.1 °C. The annual rainfall is around 610 mm.

5.1.6 Biodiversity

It is estimated that a total of 211 birds species occur in the broader area of the proposed site. The overall avifaunal species occurring at the proposed site are dominantly represented by chats, swifts, pipits, kites, martins, wagtails, lapwings, herons and cisticolas. The Lanner Falcon is present in the area, No amphibian or reptile species of conservation concern distribution overlaps with the site. Two fauna species of conservation concern, namely Hydrictis maculicolis (Spotted-necked otter) and Hydroprogne caspia (Caspian Tern) may potentially be present at site.

5.1.7 Visual landscape

The area is characterised by a low significance in elevation differences, except to the north where the Vaal River slopes down towards the river. Sudden differences in elevation are scattered throughout the area in the forms of mine dumps and tailing dams. The landform and drainage described above is unlikely to limit visibility except adjacent to the Vaal River. Areas within 5km from the proposed development might have a clear view without taking existing screening into account.

5.1.8 Socio-Economic conditions

Free State Province is the third biggest province of South Africa in terms of size, and primary agriculture is a key economic sector. Mining is also important but has been declining steadily since 2008. It has the second-smallest population and the second-lowest population density. Languages spoken include Sesotho, Afrikaans and Zulu.

The Fezile Dabi District Municipality is the smallest district in the province, covering an area of 20 660km2. In 2011 the Municipality had a population of 488 036 with an unemployment rate of 33.9%. By 2016 only 48.3% of dwellings had piped water inside their dwellings and 7.7% of household still did not have electricity in their dwellings.

5.1.9 Cultural and Heritage aspects

Very little habitation of the highveld area took place during Stone Age times. Tools dating to the Early Stone Age period are mostly found in the vicinity of larger watercourses, e.g. the Vaal River, or in sheltered areas such as the mountainous regions north of Klerksdorp and as far east as the Vredefort Dome area. As far as is known, no Early Iron Age sites have yet been identified in the Free State Province. The occupation of the larger geographical area did not start much before the 1500s.

In 1837 the establishment of a trekker settlement at Klerksdorp marked the beginning of a new phase in the history of the region. Originally twelve trekker families settled on the farm Elandsheuvel, belonging to C.M. du Plooy. This settlement, known as ‘Oude Dorp’.

The area is underlain by Quaternary soils and the Vryheid Formation (khaki, Pv Ecca Group, Karoo Supergroup), while the northern portion is underlain by the Hekpoort; Stubenkop and Daspoort Formations of the Pretoria Group.

6. Specialist Studies and Impact Assessment

6.1 Specialist Assessments

To address the key issues highlighted in the previous section the following specialist studies and processes were commissioned:

Table 2: Specialist Studies

Specialist Name	Field of Study
M Van der Westhuizen	Terrestrial Biodiversity Impact Assessment
Mora Ecological Services	Avifaunal Impact Assessment
Donaway Environmental Consultants	Visual Impact Assessment
The Biodiversity Company	Soils and Agriculture Impact Assessment
JA van Schalkwyk Heritage Consultant	Heritage Impact Assessment
Banzai Environmental Consultants	Palaeontology Impact Assessment
Donaway Environmental Consultants	Social Impact Assessment
M Van der Westhuizen	Wetland Impact Assessment
PJ Botha	Agricultural Economic Assessment

Each specialist has identified potential impacts and the significance they will have before and after mitigation. Table 3 below indicates the significance rating per impact for the Construction (C), Operation (O) and Decommissioning (D) phases.

Impact	C	O	D
Direct habitat destruction	- Low	- Low	- Low
Habitat fragmentation	- Low	- Low	- Low
Increased soil erosion and sedimentation	- Low	- Low	- Low
Soil and water pollution	- Low	- Low	- Low
Air pollution	- Low	- Low	- Low
Spread and establishment of alien invasive species	- Low	- Low	- Low
Negative effect of human activities and road mortalities	- Low	- Low	- Low
Compaction, soil erosion and sedimentation	- Low	- Low	x
Disturbance of watercourse habitat and fringe vegetation	- Low	- Low	
Loss of priority avian species from important habitats	- Low	x	x
Long-term or permanent degradation and modification of the receiving environment resulting to in the loss of important avian habitats	x	- Low	x
Loss of resident avifauna through increased disturbance	- Low	- Low	x
Collisions with PV panels and electrocution risks leading to injury or loss of avian life which decreases avifauna species diversity	x	- Low	x
Collisions with overhead lines and electrocution risks leading to injury or loss of avian life which decreases avian diversity	x	- Low	x
Long-term or permanent degradation and modification of the receiving environment	- Low	x	x
Loss of land capability	- Low	- Low	x
Loss or damage to sites, features or objects of cultural heritage significance	- Low	- Low	x
Destroy or permanently seal-in fossils at or below the surface that are then no longer available for scientific study	- Low	- Low	x
Visual impact of construction of the solar facility and grid connection	- Low	x	x
Direct and indirect employment opportunities and skills development	+ Medium	x	x
Economic Multiplier effect	+ Medium	x	x
Improvement to shared infrastructure	(+Low)	x	
Potential loss of productive farmland	- Low	x	x
In-migration of people (non-local workforce and jobseekers)	- Low	x	x
Safety and security impacts	- Low	x	x
Impacts on daily living and movement patterns	- Low	x	x
Nuisance impacts (noise and dust)	- Low	x	x

6. Impact Assessment Continued

Impact	C	O	D
Increased risk of potential veld fires	- Low	N/A	x
Visual and sense of place impacts	- Low	- Low	x
Potential visual impacts on sensitive visual receptors for the solar facility and Grid connection (1km, 1-3km, 3-5km, 5-10km)	x	- Low	x
Lighting Impacts of the solar facility	x	- Low	x
Solar glint and glare impacts of the solar facility	x	- Low	x
Visual and sense of place impacts of the solar facility	x	- Low	x
Visual and sense of place impacts of the grid connection corridor alternatives	x	- Low	x
Direct and Indirect employment opportunities and skills development	x	+Medium	x
Development of non-polluting, renewable energy infrastructure	x	+Medium	x
Potential loss of agricultural land	x	- Low	x
Contribution to Local Economic Development (LED) and social upliftment	x		x
Impact on tourism	x	+- Low	x

7. Mitigation Summary

Field	Main Impacts	Mitigation measure
Terrestrial Biodiversity	Habitat destruction, fragmentation, soil erosion, pollution, spread of alien invasive species, fauna mortalities	Avoid peripheral impacts, sensitive habitats must be avoided, activities restricted to specific areas, environmental training of employees, animal safety to be promoted, poisons and control of animals to be avoided, limit pesticide use, monitoring of activities, rehabilitation of disturbed areas, use of existing infrastructure, minimise land disturbance, protect sloping areas, repair erosion damage, stormwater control and management, store hazardous chemicals on impervious surfaces, implement speed limit, control alien invasive species, no staff accommodation on site, avoid travelling at night.
Avifauna	Loss of species, disturbance, degradation & modification of receiving environment, collisions with PV panels and power lines, electrocution on infrastructure	Minimise construction footprint, preserve indigenous vegetation, control pollution, use designated roads, rehabilitate with indigenous vegetation, roosting areas and nests (where present) must not be disturbed, power lines to be fitted with bird flight diverters.
Visual	Visual impact of construction activities, visual impact on sensitive receptors, lighting impacts, sense of place impacts,	Retain natural vegetation, plan placement of the laydown area, reduce and control dust, limit construction between 07:00 and 18:00, rehabilitate disturbed areas, maintain general appearance, plan lighting impacts and design to minimise lighting impact.
Soils and Agricultural	Loss of land capability	Vegetate/cover all soil stockpiles, spill kits must be available, no cleaning or servicing of vehicles to be undertaken, implement action plans for spills, leaks and impacts to aquatic systems.
Heritage	Loss or damage to heritage sites, features or objects	Should any heritage artefacts be exposed during excavation, work on the area where the artefacts were discovered, shall cease immediately, all discoveries shall be reported immediately to a heritage practitioner, artefacts must not be removed, destroyed or interfered with.
Palaeontology	Destroy or permanently seal-in fossils	If fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the Chance Find Protocol must be implemented.
Social	Employment and skills development, economic multiplier effect, loss of farm land, in-migration of people, safety and security impacts, impacts on daily movement patterns, nuisance impacts, impact on tourism	Adopt a local employment policy, source labour locally, promote gender equality, site to be fenced off, engage local community representatives, provide transportation for workers, implement a grievance mechanism, appoint a security company, access in an out of the site must be strictly controlled, all vehicles must be road worthy, implement penalties for reckless driving, avoid movement of heavy vehicles over the weekends and public holidays, implement dust suppression, implement a firebreak.
Wetland	Compaction, erosion, watercourse disturbance, pollution	Compaction to be limited, reseed with indigenous grasses, implement erosion control mechanisms, disturbance to wetlands in power line route to be minimised, minimise impact on natural flow regime, perform scheduled maintenance, use existing roads, contain dirty water, provide appropriate sanitary facilities, rehabilitate disturbed areas.