RED SANDS PV3

Northern Cape Province

Basic Assessment Report

April 2022

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PROJECT DETAILS

Title	:	Basic Assessment Report for the Red Sands PV3, Northern Cape Province.
Authors	:	Savannah Environmental (Pty) Ltd Jana de Jager Jo-Anne Thomas
Client	:	AGV Project (Pty) Ltd
Report Revision	:	Report for 30-day public review period
Date	:	April 2022

When used as a reference this report should be cited as: Savannah Environmental (2022) Basic Assessment Report for the Red Sands PV3, Northern Cape Province

PURPOSE OF THE BASIC ASSESSMENT REPORT AND INVITATION TO COMMENT

AGV Projects (Pty) Ltd is proposing the development of a solar PV facility and associated infrastructure on a site located approximately 22km northeast of Groblershoop, within the !Kheis Local Municipality and the ZF Mgcawu District Municipality in the Northern Cape Province. The project is to be known as Red Sands PV3 and will have a contracted capacity of up to 75MW.

As the project has the potential to impact on the environment, an Environmental Impact Assessment process is required to be completed in support of an application for Environmental Authorisation prior to the commencement of construction of the project. As the project falls within the Renewable Energy Development Zone (REDZ) 7 (the Upington REDZ), a Basic Assessment (BA) process is applicable as per GNR114 of February 2018.

This BA Report describes and assesses this proposed project and consists of the following chapters:

- **Chapter 1** provides background to Red Sands PV3 and the BA process.
- **Chapter 2** provides a description of Scope of the Red Sands PV3, including identified project alternatives.
- **Chapter 3** outlines strategic regulatory and legal context for energy planning in South Africa and specifically for Red Sands PV3.
- **Chapter 4** provides a motivation for the need and desirability of the proposed project.
- **Chapter 5** outlines the approach to undertaking the BA process.
- **Chapter 6** describes the existing biophysical and social environment within and surrounding the broader study and development area.
- **Chapter 7** provides an assessment of the potential issues and impacts associated with the solar PV facility and presents recommendations for the mitigation of significant impacts.
- **Chapter 8** provides an assessment of the potential cumulative impacts.
- **Chapter 9** presents the conclusions and recommendations based on the findings of the BA Report.
- **Chapter 10** provides references used in the compilation of the BA Report.

This BA Report is available for review between **Friday 8 April 2022** to **Thursday 12 May 2022** at the following locations:
(https://savannahsa.com/public-documents/energy-generation/red-sands-pv-cluster/).

Please submit your comments by **Thursday,12 May 2022** to:

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EXECUTIVE SUMMARY

AGV Projects (Pty) Ltd proposes the development of Red Sands PV3, a 75MW$_{AC}$ photovoltaic (PV) solar energy facility, and associated infrastructure on a site located ~22km north-east of the town of Groblershoop in the Northern Cape Province. The project site, Portion 19 of the Farm Rooi Sand 387, is located within the Kheis Local Municipality and the greater ZF Mgcawu District Municipality.

Red Sands PV3 will have a contracted capacity of up to 75MW$_{AC}$ and will include specific infrastructure, namely:

- Solar PV array comprising PV modules and mounting structures.
- Inverters and transformers.
- Low voltage cabling between the PV modules to the inverters
- A fence around the project development area
- Camera surveillance
- Internet connection
- 33kV cabling between the project components and the facility substation
- 33/132kV onsite facility substation[1].
- Battery Energy Storage System (BESS).
- Site offices and maintenance buildings, including workshop areas for maintenance and storage.
- Laydown areas.
- Access roads (up to 6m) and internal distribution roads (up to 4m).

A development area of 184ha has been identified within the project site by the proponent for the development of the Red Sands PV3 facility and associated infrastructure (**Figure 2**). The identification of this development area considered technical and environmental constraints in the larger property in line with a typical mitigation hierarchy. The development area has been fully considered within this BA process and assessed in terms of its suitability from an environmental and social perspective.

The Ecological Importance of the development area is regarded as High, specifically from an avian biodiversity and habitat perspective. However, the location of the development area has achieved an acceptable extent of avoidance within the project site, which will not result in unacceptable residual impacts. No environmental fatal flaws were identified in the detailed specialist studies conducted, and no impacts of unacceptable significance are expected to occur with the implementation of the recommended mitigation measures. These measures include, amongst others, the avoidance of sensitive features and the undertaking of monitoring, as specified by the specialists.

From the specialist studies undertaken it was determined that soils and agricultural aspects did not require any further assessment. The Red Sands PV3 development area is not associated with any arable soils, due to the type of soil as well as the climate, which limits crop production significantly. The land capabilities

[1] A 132kV power line will be assessed through a separate Basic Assessment Process

associated with the development area are only suitable for grazing, which corresponds with the current land use. It is the specialist's opinion that the proposed developments will have no impacts on the agricultural production ability of the land. Therefore, the proposed development may be favourably considered for a soils and agricultural perspective.

The potential environmental impacts associated with Red Sands PV3 identified and assessed through the BA process include:

» Impacts on ecology, flora and fauna.
» Impacts on avifauna.
» Impacts on heritage resources, including archaeology and palaeontology.
» Visual impacts on the landscape as a result of the facility.
» Positive and negative social impacts.

Impact on Ecology

The development area is located within an area classified as "Other natural areas" and has not been classified as a Critical Biodiversity Area (CBA) or an Ecological Support Area (ESA). The habitat present within the development area is not diverse and considered to be homogenous. However, based on the ecological condition and the diversity of mesocarnivores, the area possesses biodiversity value. Sensitivity in terms of terrestrial flora and fauna is considered to be low to moderate. The site ecological importance (SEI) was determined to be 'High' based on the potential for occurrence of a globally VU species, the extent of the area considered and its connectivity to natural areas within the landscape (**Appendix D**). However, the project development is considered as acceptable given the extent of avoidance achieved in relation to the remaining High and Very High areas within the project site, and the medium residual impacts remaining after mitigation.

Impact on Avifauna

A total of eighty-five (85) bird species have been recorded within the broader project site and surrounds (**Appendix E**). Two of the species recorded were species of conservation concern, on a national or international scale namely the Cape Vulture and Verreaux's Eagle. A number of species recorded are protected under the NC Conservation Act of 2009 (schedule 2), however three species are being highlighted here, the Pygmy Falcon (due to the nest found) as well as the Northern Black Korhaan and the Red Crested Korhaan (due to their small territories). A Pygmy Falcon nest were found at the water trough, just to the east of the project footprint.

The main expected impact of the proposed Red Sands PV3 will be the loss of habitat, loss of nesting sites and emigration of avifauna. Based on the outcomes of the site ecological importance (SEI) determination, the project possesses a 'High' SEI. However, the location of the development area has achieved an acceptable extent of avoidance within the project site, which will not result in unacceptable residual impacts. The development is therefore considered to be acceptable. It is recommended that should any future developments be proposed for the remaining extent of the 'High' and 'Very High' areas within the project site, that compensation strategies be required for these authorisations.

Impact on Heritage (including archaeology and palaeontology)

No significant heritage resources were identified within the development area for Red Sands PV3 (**Appendix G**). All of the archaeological resources (Middle and Late Stone Age) identified within the areas proposed for the development of the Red Sands PV3 have been determined to be not conservation worthy. As such, these resources have been sufficiently recorded and there is no objection to the development of the proposed PV facility in these locations from an archaeological perspective.

One archaeological site of significance was identified, Red Sands-045 and Red Sands-046 (both sites form part of one continuous scatter of artefacts), outside the development area. Although no impact is anticipated, it is recommended that this site is demarcated on relevant development maps and that a no-go buffer of 100m is implemented around this site.

Based on the nature of the heritage resources identified and the lack of any fossils recorded or expected in the area, the significance of the impacts on heritage and palaeontological resources will be low, with the implementation of the recommended mitigation measures. As such, the development of Red Sands PV3 is not associated with any fatal flaws from a heritage, archaeological and palaeontological perspective, and it is for this reason that the project is considered to be acceptable.

Visual Impact

The proposed Red Sands PV3 will generally result in a relatively limited level of visual impact within an area that is already impacted by major electrical and railway infrastructure as well as other solar facilities. In general terms visual impacts will be largely limited by the relatively low height of the majority of the project and by landform.

Potential visual impacts identified within the Visual Impact Assessment (**Appendix H**) include construction activities in close proximity to the PV plant, visual impacts to observers travelling along the roads and residents at homesteads within close proximity of the proposed PV facility, impact of lighting at night on sensitive visual receptors in close proximity to the proposed facility, and impact of solar glint and glare as a visual distraction and possible air travel hazard, impact of the ancillary infrastructure during the operation phase on observers in close proximity to the structures and potential impact on the sense of place of the region.

The duration of the impacts is expected to be long-term for majority of the visual impacts and with a magnitude ranging from moderate to low. The significance of the impacts will be medium and low with the implementation of mitigation, depending on the impact being considered. No impacts of a high significance are expected to occur. The development of Red Sands PV3 is therefore considered to be acceptable from a visual perspective.

Social Impact

The Social Impact Assessment (**Appendix I**) identified that most social impacts associated with the development of Red Sands PV3 will have a short-term duration associated with the construction phase and long-term duration during the operation phase of the project. The magnitude of the impacts ranges from high to small depending on the impact being considered and the status thereof. Impacts on the social environment are expected during both the construction and operation phases. The construction phase of a PV solar development is associated with the majority of social impacts. Many of the social impacts are unavoidable and will take place to some extent but can be managed through the careful planning and implementation of appropriate mitigation measures.

During the construction phase, negative impacts include: nuisance impacts (including noise and dust); an influx of construction workers and job seekers to the area and a change in population; safety and security impacts; impacts on daily living and movement patterns; and visual and a sense of place impacts. The significance of the negative construction phase impacts will be low with the implementation of the recommended mitigation measures. The positive social impacts associated with the construction phase of Red Sands PV3 include, an economic multiplier effect, and direct and indirect employment and skills development opportunities. The significance of the positive impacts will be medium with the implementation of the recommended enhancement measures.

Impacts associated with the operation of Red Sands PV3 will be both positive and negative. The negative impacts are related to the change in the sense of place. The significance of the negative impacts will be low with the implementation of the recommended mitigation measures. The positive impacts associated with the operation of the facility relate to the development of non-polluting renewable energy infrastructure, a contribution to Local Economic Development (LED) and social upliftment, and the creation of employment and skill development opportunities for the local economy and the country. The local infrastructure (roads and grid) will be reinforced which can be seen as a positive impact. The significance of the positive impacts will be low and medium with the implementation of the recommended enhancement measures.

Red Sands PV3 is unlikely to result in permanent damaging social impacts and will result in a number of positive impacts. From a social perspective it is concluded that the project is acceptable subject to the implementation of the recommended mitigation and enhancement measures and management actions identified for the project. Considering the findings of the report and potential for mitigation it is the reasoned opinion of the specialist that Red Sands PV3 can be authorised from a social perspective.

Environmental Sensitivity

As part of the specialist investigations undertaken within the development area of Red Sands PV3, specific environmental features were identified which will be impacted by the placement of the development footprint (i.e. project infrastructure) associated with the facility. The current condition of the features identified (i.e. intact or disturbed) informed the sensitivity of the environmental features and the capacity for disturbance and change associated with the proposed development.

The environmental features identified within and directly adjacent to the development area and development footprint are illustrated in **Figure 2**. The features identified specifically relate to ecological and avifauna habitats. The following points provide a description of the features present within the development area, as well as the surrounding area:

- The development area is recognised as an Other Natural Area (ONA) as per the Northern Cape CBAs. Ecological Support Areas within the project site have been avoided.
- Two National Forest Act (Act No. 84 of 1998) of 1998 (NFA) protected tree species occur at the site; i.e. *Vachellia haematoxylon* and *Boscia albitrunca.*
- The habitat condition within the development area can be regarded as degraded due to the dense stands of *Rhigozum trichotomum* and *Senegalia mellifera* subsp. *detinens* in certain areas. Terrestrial flora and fauna sensitivity is low to moderate. The Site Ecological Importance (SEI), based on the Species Protocols (2020), was determined to 'High' based on the high likelihood of occurrence for a

globally VU species, the extent of the area considered and its connectivity to natural areas within the landscape.

- Although largely outside of the development area the following avifauna features have been identified:
  - Breeding pair of Verreaux's Eagle (VU) recorded in the project site and have a nest nearby. A 3 km Buffer was placed around the nest;
  - Thirteen Cape Vultures (EN) were found in the project site, an additional 30 vultures were recorded nearby;
  - Two korhaan species (Red-Crested and Northern Black, NC Conservation Act of 2009 (schedule 2)) having territories in the project site and to some extent within the development area; and
  - A Pygmy Falcon Nest was found on the edge of the project site (NC Conservation Act of 2009 (schedule 2)), a 500m buffer was placed around the nest.

Considering the features identified within the project site and development area, the specialists have provided an indication of the acceptability of the proposed development. Given the degree of avoidance of the development area of High and Very High areas of ecological importance within the project site as well as avoidance of the avifauna buffers referred to above, the development may be considered acceptable as the residual impacts are expected to be of medium significance.

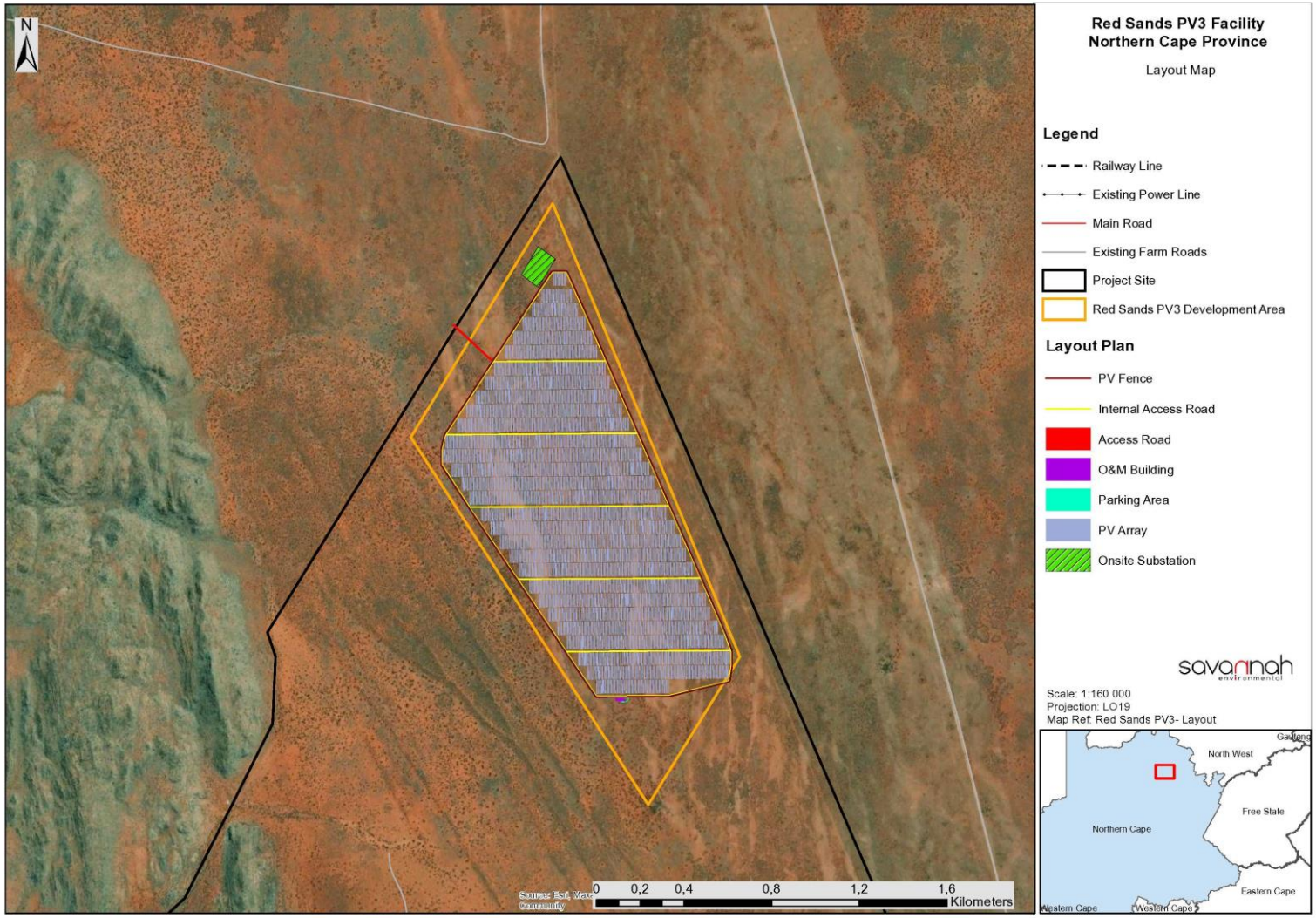

Figure 1: Layout map of the proposed Red Sands PV3

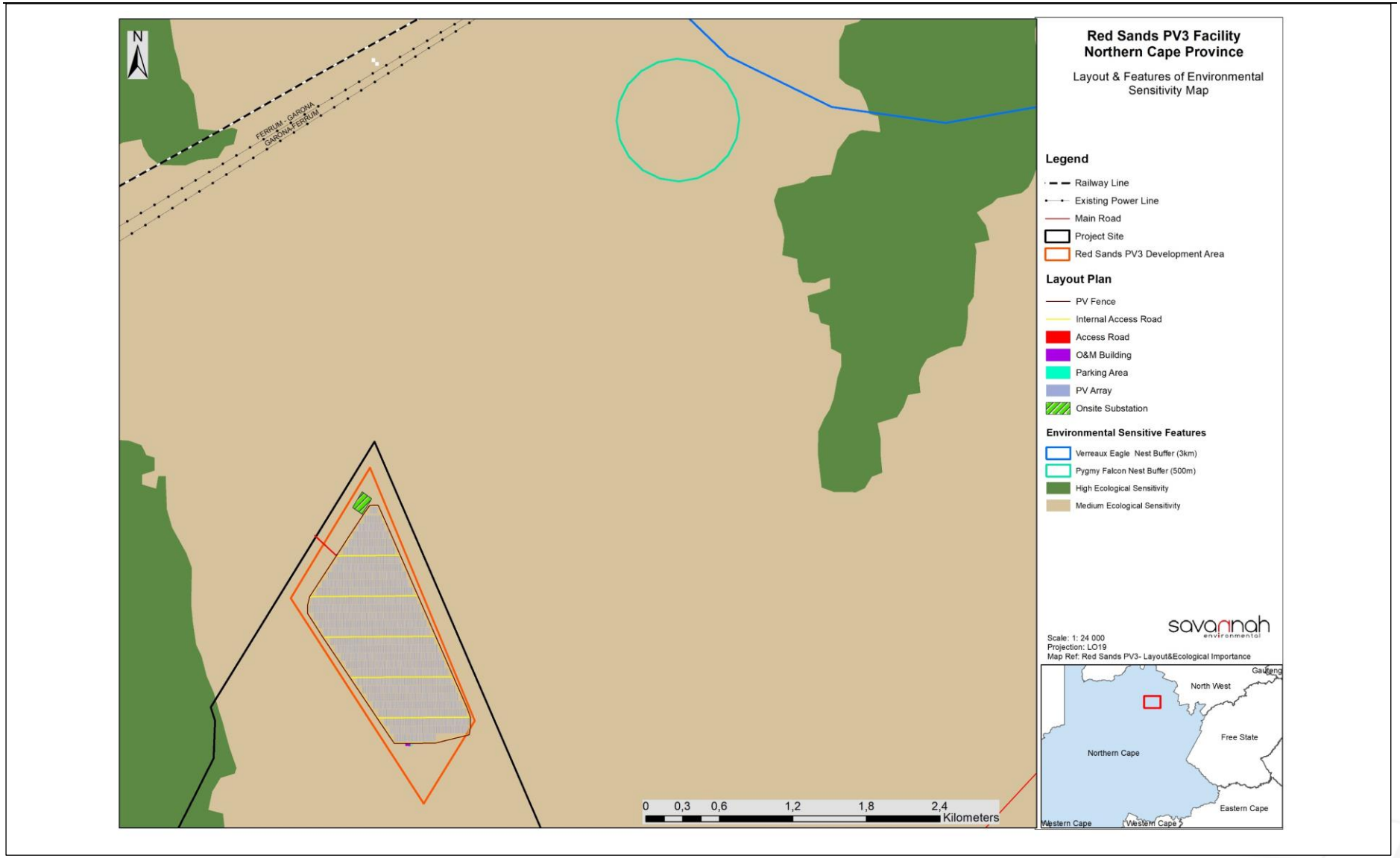

Figure 2: Environmental Importance and layout map of Red Sands PV3 development footprint (**Refer also to Appendix M**)

DEFINITIONS AND TERMINOLOGY

Alternatives: Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives or the 'do nothing' alternative.

Archaeological material: Remains resulting from human activities which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures.

Commence: The start of any physical activity, including site preparation and any other activity on site furtherance of a listed activity or specified activity, but does not include any activity required for the purposes of an investigation or feasibility study as long as such investigation or feasibility study does not constitute a listed activity or specified activity.

Construction: Construction means the building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity. Construction begins with any activity which requires Environmental Authorisation.

Cumulative impacts: Impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities (e.g. discharges of nutrients and heated water to a river that combine to cause algal bloom and subsequent loss of dissolved oxygen that is greater than the additive impacts of each pollutant). Cumulative impacts can occur from the collective impacts of individual minor actions over a period and can include both direct and indirect impacts.

Decommissioning: To take out of active service permanently or dismantle partly or wholly, or closure of a facility to the extent that it cannot be readily re-commissioned. This usually occurs at the end of the life of a facility.

Direct impacts: Impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity (e.g. noise generated by blasting operations on the site of the activity). These impacts are usually associated with the construction, operation, or maintenance of an activity and are generally obvious and quantifiable.

Disturbing noise: A noise level that exceeds the ambient sound level measured continuously at the same measuring point by 7 dB or more.

'Do nothing' alternative: The 'do nothing' alternative is the option of not undertaking the proposed activity or any of its alternatives. The 'do nothing' alternative also provides the baseline against which the impacts of other alternatives should be compared.

Endangered species: Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included here are taxa whose numbers of individuals have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction.

Emergency: An undesired/ unplanned event that results in a significant environmental impact and requires the notification of the relevant statutory body, such as a local authority.

Endemic: An "endemic" is a species that grows in a particular area (is endemic to that region) and has a restricted distribution. It is only found in a particular place. Whether something is endemic or not depends on the geographical boundaries of the area in question and the area can be defined at different scales.

Environment: the surroundings within which humans exist and that are made up of:

i. The land, water and atmosphere of the earth;
ii. Micro-organisms, plant and animal life;
iii. Any part or combination of (i) and (ii) and the interrelationships among and between them; and
iv. The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Environmental impact: An action or series of actions that have an effect on the environment.

Environmental impact assessment: Environmental Impact Assessment, as defined in the NEMA EIA Regulations and in relation to an application to which scoping must be applied, means the process of collecting, organising, analysing, interpreting and communicating information that is relevant to the consideration of that application.

Environmental management: Ensuring that environmental concerns are included in all stages of development, so that development is sustainable and does not exceed the carrying capacity of the environment.

Environmental management programme: An operational plan that organises and co-ordinates mitigation, rehabilitation and monitoring measures in order to guide the implementation of a proposal and its ongoing maintenance after implementation.

Heritage: That which is inherited and forms part of the National Estate (Historical places, objects, fossils as defined by the National Heritage Resources Act of 2000).

Indigenous: All biological organisms that occurred naturally within the study area prior to 1800.

Indirect impacts: Indirect or induced changes that may occur because of the activity (e.g. the reduction of water in a stream that supply water to a reservoir that supply water to the activity). These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place because of the activity.

Interested and affected party: Individuals or groups concerned with or affected by an activity and its consequences. These include the authorities, local communities, investors, work force, consumers, environmental interest groups, and the public.

Method statement: A written submission to the ECO and the site manager (or engineer) by the EPC Contractor in collaboration with his/her EO.

Mitigation hierarchy: The mitigation hierarchy is a framework for managing risks and potential impacts related to biodiversity and ecosystem services. The mitigation hierarchy is used when planning and implementing development projects, to provide a logical and effective approach to protecting and conserving biodiversity and maintaining important ecosystem services. It is a tool to aid in the sustainable management of living, natural resources, which provides a mechanism for making explicit decisions that balance conservation needs with development priorities.

No-go areas: Areas of environmental sensitivity that should not be impacted on or utilised during the development of a project as identified in any environmental reports.

Perennial and non-perennial: Perennial systems contain flow or standing water for all or a large proportion of any given year, while non-perennial systems are episodic or ephemeral and thus contains flows for short periods, such as a few hours or days in the case of drainage lines.

Pollution: A change in the environment caused by substances (radio-active or other waves, noise, odours, dust or heat emitted from any activity, including the storage or treatment or waste or substances.

Pre-construction: The period prior to the commencement of construction, this may include activities which do not require Environmental Authorisation (e.g. geotechnical surveys).

Rare species: Taxa with small world populations that are not at present Endangered or Vulnerable, but are at risk as some unexpected threat could easily cause a critical decline. These taxa are usually localised within restricted geographical areas or habitats or are thinly scattered over a more extensive range. This category was termed Critically Rare by Hall and Veldhuis (1985) to distinguish it from the more generally used word "rare."

Red data species: Species listed in terms of the International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Species, and/or in terms of the South African Red Data list. In terms of the South African Red Data list, species are classified as being extinct, endangered, vulnerable, rare, indeterminate, insufficiently known or not threatened (see other definitions within this glossary).

Riparian: the area of land adjacent to a stream or river that is influenced by stream-induced or related processes. Riparian areas which are saturated or flooded for prolonged periods would be considered wetlands and could be described as riparian wetlands. However, some riparian areas are not wetlands (e.g. an area where alluvium is periodically deposited by a stream during floods but which is well drained).

Site Ecological Importance (SEI): is a function of the Biodiversity Importance (BI) of the receptor (e.g., SCC, the vegetation/fauna community or habitat type present on the site) and Receptor Resilience (RR) (its resilience to impacts). An understanding of residual risk to SEI is important in determining acceptability of impact

Significant impact: An impact that by its magnitude, duration, intensity, or probability of occurrence may have a notable effect on one or more aspects of the environment.

Waste: means—

a) any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 to this Act; or
b) any other substance, material or object that is not included in Schedule 3 that may be defined as a waste by the Minister

Watercourse: as per the National Water Act means -

(a) a river or spring;
(b) a natural channel in which water flows regularly or intermittently;
(c) a wetland, lake or dam into which, or from which, water flows; and
(d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks

Wetlands: land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which under normal circumstances supports or would support vegetation typically adapted to life in saturated soil (Water Act 36 of 1998); land where an excess of water is the dominant factor determining the nature of the soil development and the types of plants and animals living at the soil surface (Cowardin et al., 1979).

ACRONYMS

BGIS	Biodiversity Geographic Information System
CBA	Critical Biodiversity Area
DEFF	Department of Environment, Forestry and Fisheries (National)
DWS	Department of Water and Sanitation
CBA	Critical Biodiversity Area
CR	Critically Endangered
CSIR	Council for Scientific and Industrial Research
DM	District Municipality
DMRE	Department of Mineral Resources Energy
EAP	Environmental Assessment Practitioner
EGIS	Environmental Geographic Information System
EIA	Environmental Impact Assessment
EMF	Environmental Management Framework
EMP	Environmental Management Plan
EMPr	Environmental Management Programme
EN	Endangered
EP	Equator Principles
ESA	Ecological Support Area
GA	General Authorisation
GHG	Greenhouse Gas
IBA	Important Bird Area
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
IEP	Integrated Energy Plan
IFC	International Finance Corporation
IPP	Independent Power Producer
IRP	Integrated Resource Plan
IUCN	International Union for Conservation of Nature
I&AP	Interested and Affected Party
km	Kilometre
kWh	Kilowatt hour
LC	Least Concern
LM	Local Municipality
LNG	Liquid Natural Gas
m	Metre
m^2	Square meters
m^3	Cubic meters
m amsl	Metres Above Mean Sea Level
MW	Megawatts
NDP	National Development Plan
NEMA	National Environmental Management Act (No. 107 of 1998)
NEM:AQA	National Environmental Management: Air Quality Act (No. 39 of 2004)
NEM:BA	National Environmental Management: Biodiversity Act (No. 10 of 2004)

NEM:WA	National Environmental Management: Waste Act (No. 59 of 2008)
NFA	National Forests Act (No. 84 of 1998)
NFEPA	National Freshwater Ecosystem Priority Area
NHRA	National Heritage Resources Act (No. 25 of 1999)
NT	Near Threatened
NWA	National Water Act (No. 36 of 1998)
ONA	Other Natural Area
PA	Protected Area
RMIPPP	Risk Mitigation Independent Power Producer Procurement
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SAIAB	South African Institute for Aquatic Biodiversity
SANBI	South African National Biodiversity Institute
SDF	Spatial Development Framework
TOPS	Threatened or Protected Species
VU	Vulnerable

TABLE OF CONTENTS

APPENDICES LIST

CHAPTER 1: INTRODUCTION

AGV Projects (Pty) Ltd is proposing the development of a solar PV facility and associated infrastructure on a site located approximately 22km northeast of Groblershoop, within the !Kheis Local Municipality and the ZF Mgcawu District Municipality in the Northern Cape Province. The project is to be known as Red Sands PV3 and will have a contracted capacity of up to 75MW.

As the project has the potential to impact on the environment, an Environmental Impact Assessment process is required to be completed in support of an application for Environmental Authorisation prior to the commencement of construction of the project. As the project falls within the Renewable Energy Development Zone (REDZ)[2] 7 (the Upington REDZ), a Basic Assessment (BA) process is applicable as per GNR114 of February 2018.

A preferred project site with an extent of ~3380ha and a development area of ~184ha within the project site has been identified by AGV Projects (Pty) Ltd as a technically suitable area for the development of the Red Sands PV3 facility. The development area for the PV facility is located on Portion 19 of the Farm Rooi Sand 387. The project site is accessible via an existing gravel farm road from an existing main gravel road off the N8 which is located southeast of the project site.

Site-specific studies and assessments will delineate areas of potential sensitivity within the identified development area. Once constraining factors have been confirmed, the layout of the solar PV facility can be planned to minimise social and environmental impacts. Two (2) additional 75MWac PV facilities (Red Sands PV2 and Red Sands PV1) are concurrently being considered adjacent to the project area (within Portion 2 of the Farm Tities Poort 386) and will be assessed through separate Basic Assessment (BA) processes. The relative location of the three development areas is indicated in **Figure 1.2**.

[2] The REDZ are zones identified by the Department of Forestry, Fisheries, and the Environment (DFFE) as geographical areas of strategic importance for the development of large-scale solar PV and wind energy development activities and which have been earmarked for the development of renewable energy facilities within South Africa as per GNR114 of February 2018

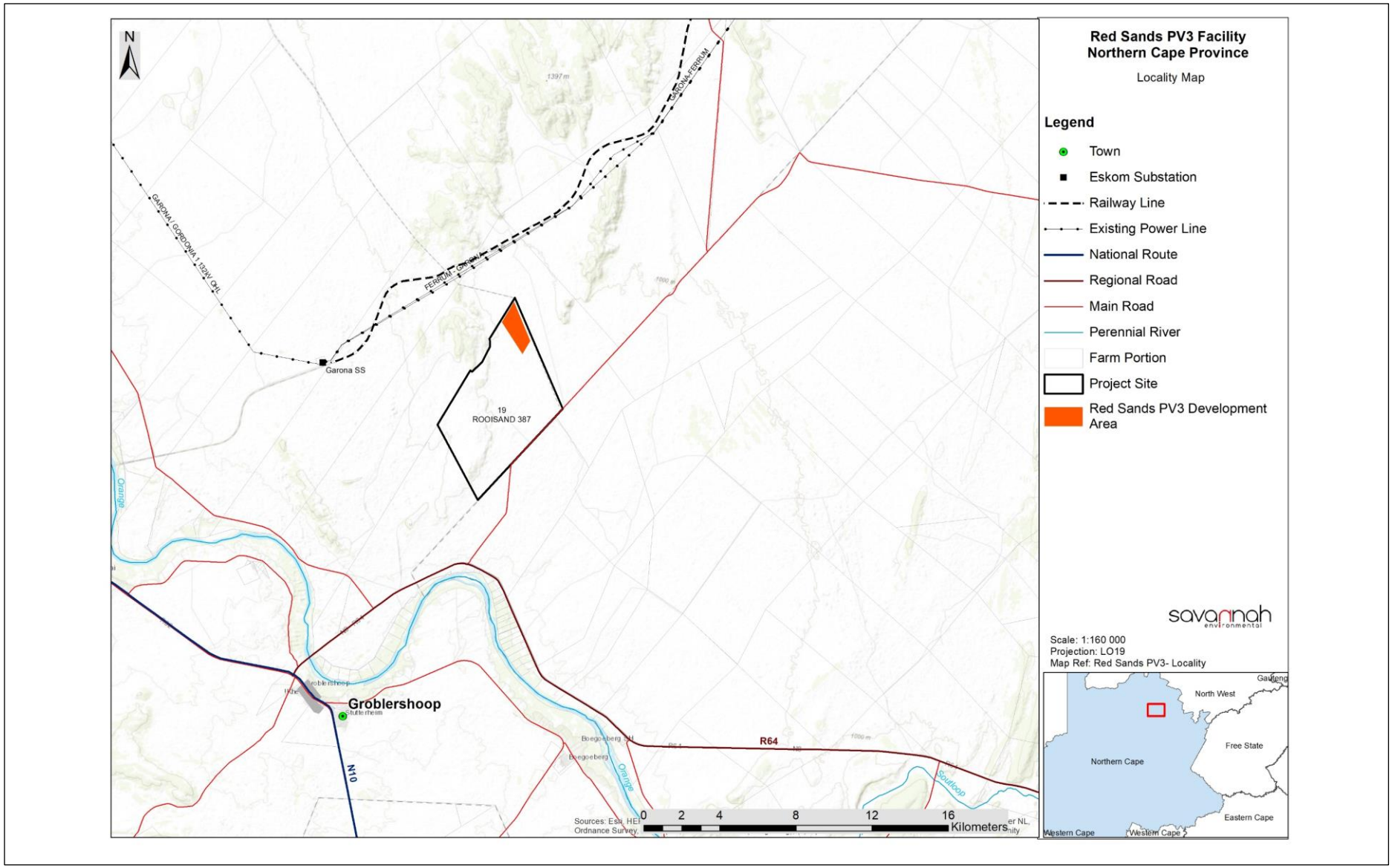

Figure 1.1: Locality map illustrating the Red Sands PV3 development area within the broader study area

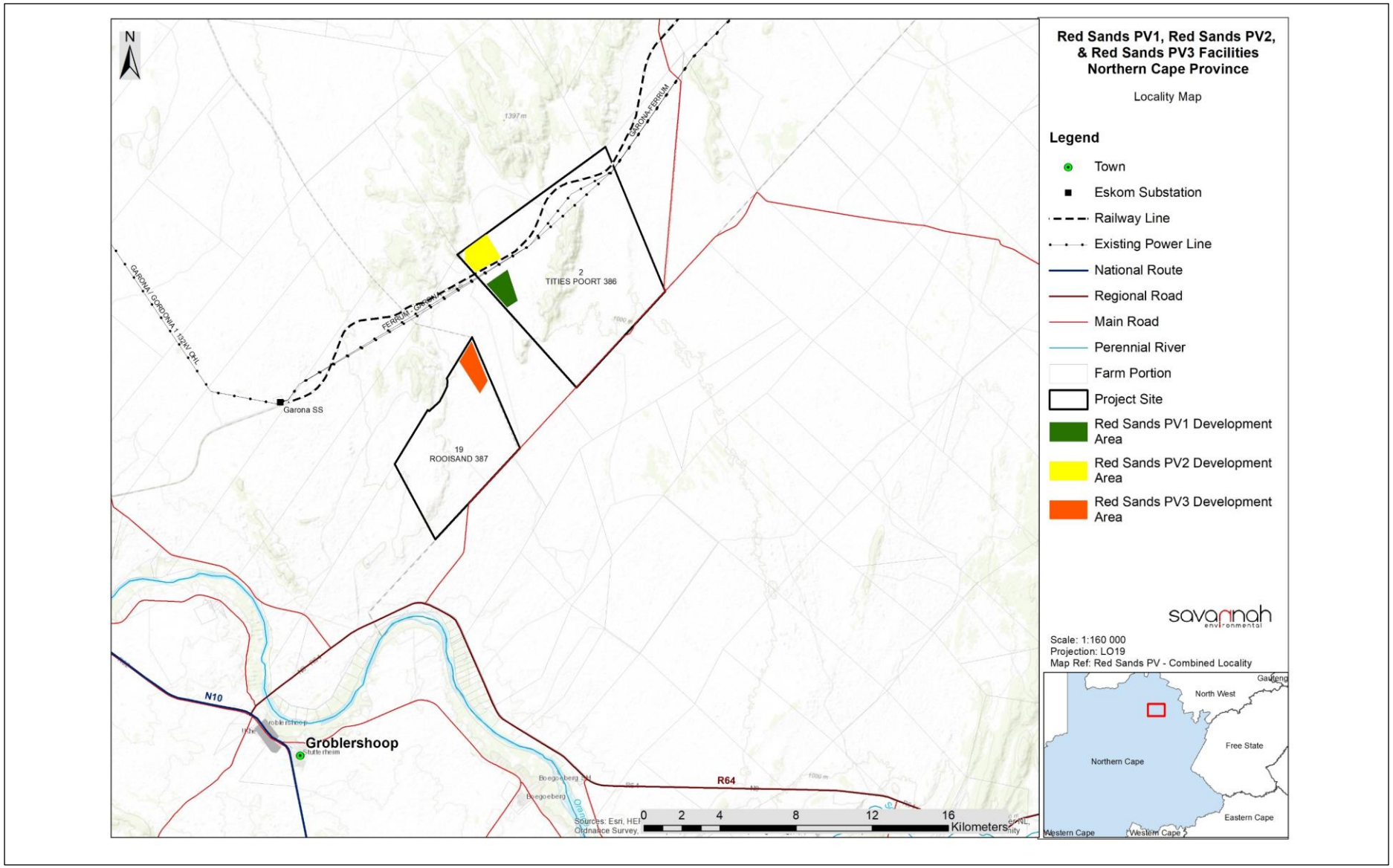

Figure 2.2: Locality map illustrating the Red Sands PV3 development area in relation to the proposed Red Sands PV2 and Red Sands PV3 development areas

1.1. Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This BA Report has been prepared in accordance with the requirements of the EIA Regulations published on 08 December 2014 (as amended) promulgated in terms of Chapter 5 of the National Environmental Management Act (No. 107 of 1998). This Chapter of the BA Report includes the following information required in terms of Appendix 1: Content of Basic Assessment Reports:

Requirement	Relevant Section
1(a) the details of the EAP who prepared the report and (ii) the expertise of the EAP, including a curriculum vitae.	The details and expertise of the EAP who prepared the report is included in section 1.4 and CVs of the project team are included in Appendix A.
(b) the location of the activity including (i) the 21 digit Surveyor General code of each cadastral land parcel, (ii) where available the physical address and farm name and (iii) where the required information in items (i) and (ii) is not available, the co-ordinates of the boundary of the property or properties.	A description of the location of Red Sands PV3 is included in **Table 1.1** and **Figure 1.1** and **Figure 1.2**. The information provided includes the 21-digit Surveyor General Code of the affected property and the farm name. Information on the relevant province, local and district municipalities, ward and current land zoning is also provided.

This BA Report describes and assesses this proposed project and consists of the following chapters:

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- **Chapter 10** provides references used in the compilation of the BA Report.

1.2. Project Overview

The Integrated Resource Plan (IRP) 2019 developed by the Department of Energy indicates that South Africa continues to pursue a diversified energy mix that reduces reliance on a single or a few primary energy sources. Renewable energy, including Solar PV, wind and CSP with storage present an opportunity to diversify the energy mix, and to produce grid connected or distributed off-grid electricity. In order to achieve this diversified mix and harness the benefits of renewable energy, the IRP 2019 includes an allocation of 6000MW of new capacity to large scale PV..

From a regional perspective, the greater Groblershoop area is considered favourable for the development of commercial solar energy facilities by virtue of the prevailing climatic conditions (as the economic

viability of a solar energy facility is directly dependent on the annual solar irradiation values for a particular area), relief and aspect, the availability of a direct grid connection (i.e. a point of connection to the national grid) and the availability of land on which the development can take place. The broader study area is designated as a Solar Corridor in terms of the Provincial Spatial Development Framework (PSDF) and is also located within the Upington REDZ and the Northern Grid Corridor.

It is in this context that the Red Sands PV3 project is being proposed. Ultimately, the project is intended to be a part of the renewable energy projects portfolio for South Africa, as contemplated in the Integrated Resource Plan, and Integrated Energy Plan.

The Red Sands PV3 project is proposed to accommodate the following infrastructure, which will enable the PV facility to supply a contracted capacity of up to 75MW$_{AC}$:

- Solar PV array comprising PV modules and mounting structures
- Inverters and transformers
- Low voltage cabling between the PV modules to the inverters
- Fence around the project development area
- Camera surveillance
- Internet connection
- 33kV cabling between the project components and the facility substation
- 33/132kV onsite facility substation[1].
- Battery Energy Storage System (BESS).
- Site offices and maintenance buildings, including workshop areas for maintenance and storage.
- Laydown areas.
- Access roads (up to 6m) and internal distribution roads (up to 4m).

The table below provides an overview of the Red Sands PV3 facility. The key infrastructure components associated with the development of Red Sands PV3 are described in greater detail within Chapter 3 of this BA Report.

Table 1.1: Overview of the Red Sands PV3 development area

Province	**Northern Cape Province**
District Municipality	ZF Mgcawu District Municipality
Local Municipality	!Kheis Local Municpality
Ward number(s)	Ward 6
Nearest town(s)	Groblershoop (22km)
Affected property of the PV development area: Farm name(s), number(s) and portion numbers	Portion 19 of the Farm Rooi Sand 387
SG 21 Digit Code (s)	C02800000000038700019
Current zoning of the study area	Agricultural (grazing)
Site Co-ordinates (corner co-ordinates of PV3)	Corner 1: 28°42'40.34"S 22° 5'56.43"E Corner 2: 28°43'50.72"S 22° 6'27.98"E Corner 3: 28°44'11.78"S 22° 6'8.74"E Corner 4: 28°43'19.59"S 22° 5'29.66"E

1.3. Details and Expertise of the Environmental Assessment Practitioner (EAP)

In accordance with Regulation 12 of the 2014 EIA Regulations (GN R326), AGV Projects (Pty) Ltd has appointed Savannah Environmental (Pty) Ltd (Savannah Environmental) as the independent environmental consultant to undertake the Basic Assessment and prepare the BA Report for Red Sands PV3 and its associated infrastructure. Neither Savannah Environmental nor any of its specialists are subsidiaries of/or are affiliated to AGV Projects (Pty) Ltd. Furthermore, Savannah Environmental does not have any interests in secondary developments that may arise out of the authorisation of the proposed solar PV facility.

Savannah Environmental is a leading provider of integrated environmental and social consulting, advisory and management services with considerable experience in the fields of environmental assessment and management. The company is wholly woman-owned (51% black woman-owned) and is rated as a Level 2 Broad-Based Black Economic Empowerment (B-BBEE) Contributor. The company was established in 2006 with a clear objective to provide services to the infrastructure development sector. Savannah Environmental benefits from the pooled resources, diverse skills and experience in the environmental field held by its team that has been actively involved in undertaking environmental studies for a wide variety of projects throughout South Africa and neighbouring countries. Strong competencies have been developed in project management of environmental processes, as well as strategic environmental assessment and compliance advice, and the assessment of environmental impacts, the identification of environmental management solutions and mitigation/risk minimising measures.

The Savannah Environmental team has considerable experience in environmental impact assessments and environmental management and has been actively involved in undertaking environmental studies for a wide variety of projects throughout South Africa, including those associated with electricity generation and transmission.

The Savannah Environmental team comprises:

» **Jana de Jager** is the principal author of this report. She holds an Honours degree in Geography and Environmental Science and a Masters Degree in Ecological Water Requirements. She has 4.5 years of experience in the environmental management field. Her key focus is on undertaking environmental impact assessments, GIS mapping, public participation, environmental management plans and programmes. She is registered as a Candidate Natural Scientist with the South African Council for Natural Scientific Professions (SACNASP).

» **Jo-Anne Thomas** is the Environmental Assessment Practitioner for this project. She holds a Master of Science Degree in Botany (M.S.c Botany) from the University of the Witwatersrand and is registered as a Professional Natural Scientist (400024/2000) with the South African Council for Natural Scientific Professions (SACNASP) and a registered Environmental Assessment Practitioner (EAP) with the Environmental Assessment Practitioners Association of South Africa (EAPASA) (2019/726). She has over 20 years of experience in the field of environmental assessment and management, and the management of large environmental assessment and management projects. During this time, she has managed and coordinated a multitude of large-scale infrastructure EIAs and is also well versed in the management and leadership of teams of specialist consultants, and dynamic stakeholders. She has been responsible for providing technical input for projects in the environmental management field, specialising in Strategic Environmental Advice, EIA studies, environmental permitting, public

participation, EMPs and EMPrs, environmental policy, strategy and guideline formulation, and integrated environmental management (IEM). Her responsibilities for environmental studies include project management, review and integration of specialist studies, identification and assessment of potential negative environmental impacts and benefits, and the identification of mitigation measures, and compilation of reports in accordance with applicable environmental legislation.

»

» **Lehlogonolo Mashego .** is a a Gauteng Branch Committee Member for IAIAsa facilitating the students and young professionals division. She holds a Masters in Environmental Science and has over 4 years professional experience in the public participation field; specializing in overall public facilitation, stakeholder engagement, public awareness, stakeholder liaison and project administration. She is responsible for project management of public involvement participation processes for a wide range of projects across South Africa in industries which include but not limited to mining, renewable energy, infrastructure and recreation.

» **Nicolene Venter.** She is a Board Member of IAPSA (International Association for Public Participation South Africa). She holds a Higher Secretarial Diploma and has over 21 years of experience in public participation, stakeholder engagement, awareness creation processes and facilitation of various meetings (focus group, public meetings, workshops, etc.). She is responsible for project management of public participation processes for a wide range of environmental projects across South Africa and neighbouring countries.

Curricula Vitae (CVs) detailing Savannah Environmental team's expertise and relevant experience are provided in **Appendix A**.

CHAPTER 2: PROJECT DESCRIPTION AND ALTERNATIVES

This Chapter provides a description of Red Sands PV3, comprising a solar PV energy facility and associated infrastructure proposed for development. It must be noted that the project description presented in this Chapter is subject to change to some extent based on the outcomes and recommendations of detailed engineering and other technical studies, the findings and recommendations of the BA and supporting specialist studies, and any licencing, permitting, and legislative requirements.

2.1 Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This chapter of the Basic Assessment Report includes the following information required in terms of Appendix 1: Content of Basic Assessment Reports:

Requirement	Relevant Section
(c) a plan which locates the proposed activity or activities applied for as well as associated structures and infrastructure at an appropriate scale.	A plan which locates the proposed activity or activities applied for as well as associated structures and infrastructure at an appropriate scale is included in **Figure 2.1.**
(g) a motivation for the preferred site, activity and technology alternative;	A motivation for the preferred development area, activity and technology alternative is included in **section 2.2**, and **2.2.2.1**.
(h)(i) details of all the alternatives considered;	The details of all alternatives considered are included in **section 2.2**.
(h)(ix) the outcome of the site selection matrix;	The outcome of the site selection process undertaken for the identification of the broader study and development area is included in **section 2.2**.
(h)(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such.	A motivation for not considering any alternative development locations is included in **section 2.2.2.1**.
(h) (xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity	A concluding statement indicating the preferred alternatives, including the preferred location of the activity is included in **section 2.2.2.1** and **2.2.2.**

2.2 Project Site Description

A broader project site has been identified for the development of Red Sands PV3 namely, Portion 19 of the Farm Rooi Sand 387, which is located approximately 22km north-east of the town of Groblershoop. The total extent of the affected property is ~3380ha, within which a development area of ~184ha has been considered (refer to Section 2.4 below). The project site can be accessed via an existing gravel farm road from an existing main gravel road off the N8 which is located southeast of the project site.

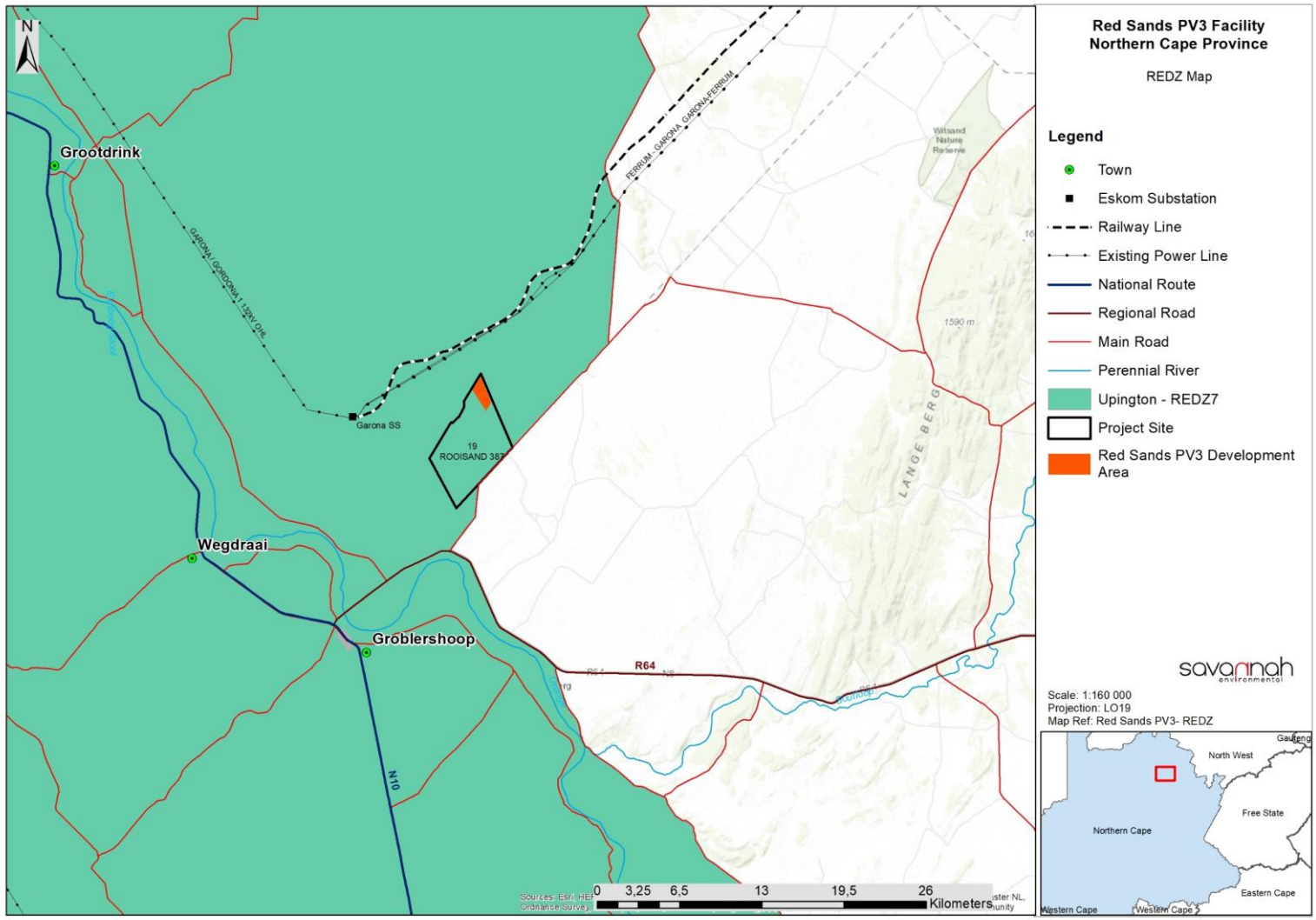

Figure 2.1. Red Sands PV3 within Renewable Energy Development Zone (Upington REDZ)

2.3 Receptiveness of the Site for development of a PV Project

From a regional perspective, the greater Groblershoop area is considered desirable for the development of commercial solar energy facilities from a technical perspective by virtue of the prevailing climatic conditions (as the economic viability of a solar energy facility is directly dependent on the annual solar irradiation values for a particular area), relief and aspect, the availability of a direct grid connection (i.e. a point of connection to the national grid) and the availability of land on which the development can take place. The detail regarding site-specific characteristics and the motivation for the selection of the broader study and development area for the development of Red Sands PV3 is provided in the sections which follow.

National and Provincial Planning Considerations: The broader study area is designated as a Solar Corridor in terms of the Provincial Spatial Development Framework (PSDF) (as detailed in Chapter 3) and is also located within the Upington REDZ and the Northern Grid Corridor. The project site is situated in an area which includes several authorised and operational solar (CSP and PV) facilities, such as the Bokpoort CSP.

Prevailing climatic conditions: The area surrounding Groblershoop in the Northern Cape has been earmarked as a hub for the development of solar energy projects due to the viability of the solar resource for the area. The economic viability of a solar PV facility is directly dependent on the annual direct solar irradiation values of the area within which it will operate. The Global Horizontal Irradiation (GHI) for the study area approximately 2278kWh/m^2/annum. The Northern Cape Province is considered to have the highest solar irradiation values of the country and therefore enables the development of solar energy projects and the successful operation thereof (refer to **Figure 2.2**).

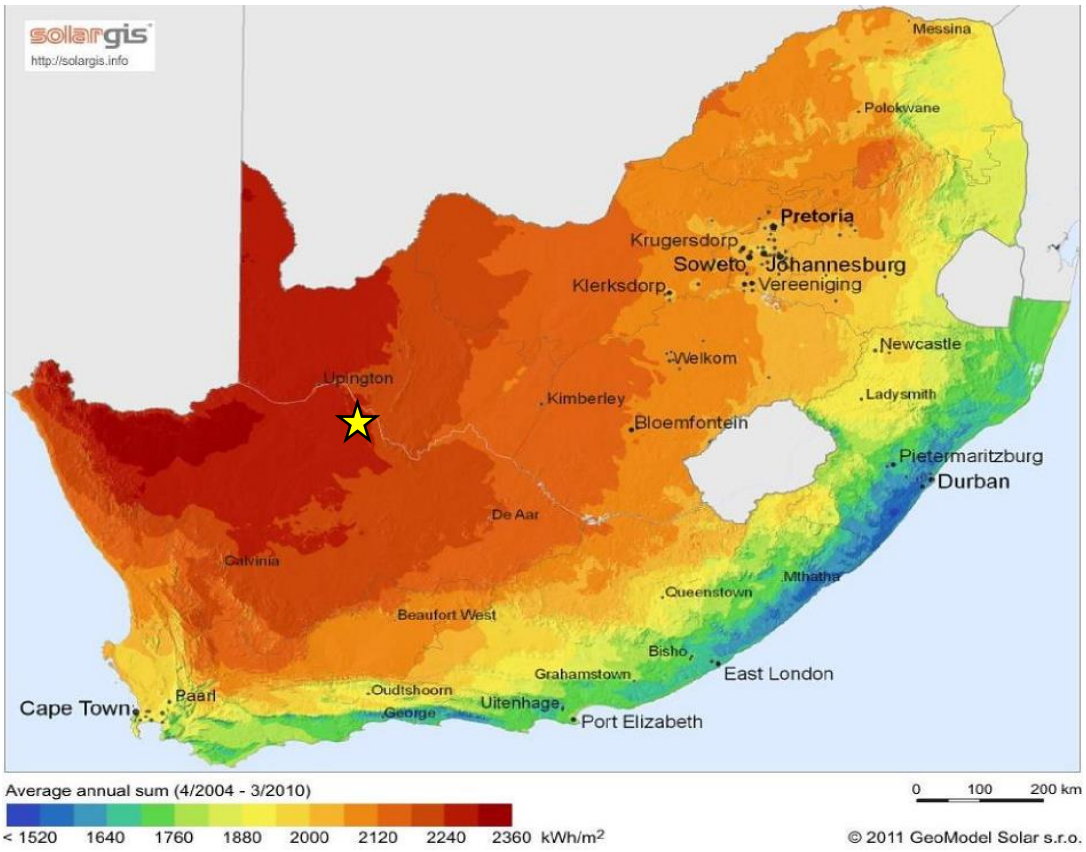

Figure 2.2: Solar irradiation map for South Africa; the proposed Red Sands PV3 Project position is shown by the yellow star on the map. (Source: adapted from GeoModel Solar, 2011).

Site extent: The affected property (i.e. Portion 19 of the Farm Rooi Sand 387), known as the project site, is approximately 3 380 ha in extent, which is sufficient for the installation of a facility with a contracted capacity of up to 75MW and allowing for avoidance of environmental site sensitivities (refer to Section 2.4).

Geographic location: The study area and development area are located within the Upington REDZ (REDZ 7) which is a node identified by National Government for the development of renewable energy projects (large scale solar developments). Development of renewable energy projects within the area has been on-going with the operational Bokpoort CSP near the development area. The developer also considered the fact that the project site has little infrastructure related to residential or tourism uses, which may be affected by the development of a solar facility.

Topography: The development area consists of uniform, relatively gentle topography with gentle slopes being present with an average slope of between 0% and 5%, with some smaller patches within the project area characterised by a slope percentage up to 11%. The development area of the project is situated between elevations 995m and 1016m above sea level.

Site access: Access to the project site is considered as an important criteria as appropriate access is required for the transportation of project related infrastructure and heavy machinery during construction. The proximity of the project site to viable access routes decreases the traffic impact on secondary roads during the construction and operation phases of the project. The project site can be readily accessed via

an existing gravel farm road from an existing main gravel road off the N8 which is located southeast of the project site.

Considering the readily available site access to the development area, the location of Red Sands PV3 and associated infrastructure is considered to be suitable and appropriate from a technical perspective.

Grid access: A key factor in the siting of any solar PV project is that the project must have a viable grid connection. The Garona Substation is located approximately 11km west of the development area and is proposed as the preferred grid connection point for the facility. AGV Projects have put in an application for a CEL with the Eskom GAU, however, there has been a delay in the process due to REIPPPP round 5 and AGV is therefore still awaiting confirmation. .

Existing grid infrastructure (i.e. power lines and substations) within close proximity to Red Sands PV3 provide an opportunity for the project to connect to the national grid with minimal new linear infrastructure (i.e. of less than 15km) required to be developed.

Landowner support: The selection of a site where the landowner is supportive of the development of a renewable energy facility is essential for ensuring the success of the project. The affected property, Portion 2 of the Farm Titiies Poort 386, is privately owned. The landowner is in favour of the development and does not view the establishment of the solar PV facility as a conflict with the current land use practices (i.e. grazing).

Based on the above site-specific attributes, the proponent considers the project site as highly preferred for the development of a solar PV facility from a technical perspective and expects that Red Sands PV3 will be able to draw on synergies with existing projects within the vicinity of the study area. As a result, no location/property alternatives are proposed as part of this BA process.

2.4 Summary of Development Area Selection Process

As part of the feasibility assessment for the project, an environmental screening of the site was undertaken by the developer to evaluate the main constraints and opportunities and determine whether or not there were any potential fatal flaws or significant no-go areas within the site. The screening process took place prior to the commencement of the BA process and included specialist investigations of the broader project site. This included preliminary field investigations by the specialist appointed to undertake the BA studies, as well as desktop consideration of environmental constraints. The purpose of the screening study was to identify areas constrained for development (i.e., no-go areas). The sensitivity spatial data compiled for the larger site was provided to the applicant prior to lodging the application for environmental authorisation. This is a common approach in the development of renewable energy projects in order to inform the placement of infrastructure for further investigation in the BA process.

Based on the suitable areas for development, a preliminary geotechnical investigation was also undertaken by the developer of 3 potential PV development areas. During the geotechnical site visit the extent of the dune fields was apparent within the identified areas, subsequently two additional sites which appeared to be more suitable were reviewed (refer to Figure 2.3). The first additional site (KA1) is located immediately south of the main farmhouse and adjacent to the main gravel access road. KA1 is considered a more favourable site from a geotechnical perspective than either Kheis 1 – 3, however it was concluded that the close proximity to the existing farm werf (KA1) will result in a challenging plant layout.

The second additional site (KA2) is located immediately north of Kheis 2 across the Transnet railway line. It was concluded that it is likely that KA2 will also be underlain by thick aeolian sand and have a similar density of vegetation as Kheis 2. KA2 is not located in a dune field and is thus a more preferential site than Kheis 1 and Kheis 3. It should be noted that Kheis 1 was moved to KA2 (Now Kheis 2). All sites were later shifted out of the sand dunes.

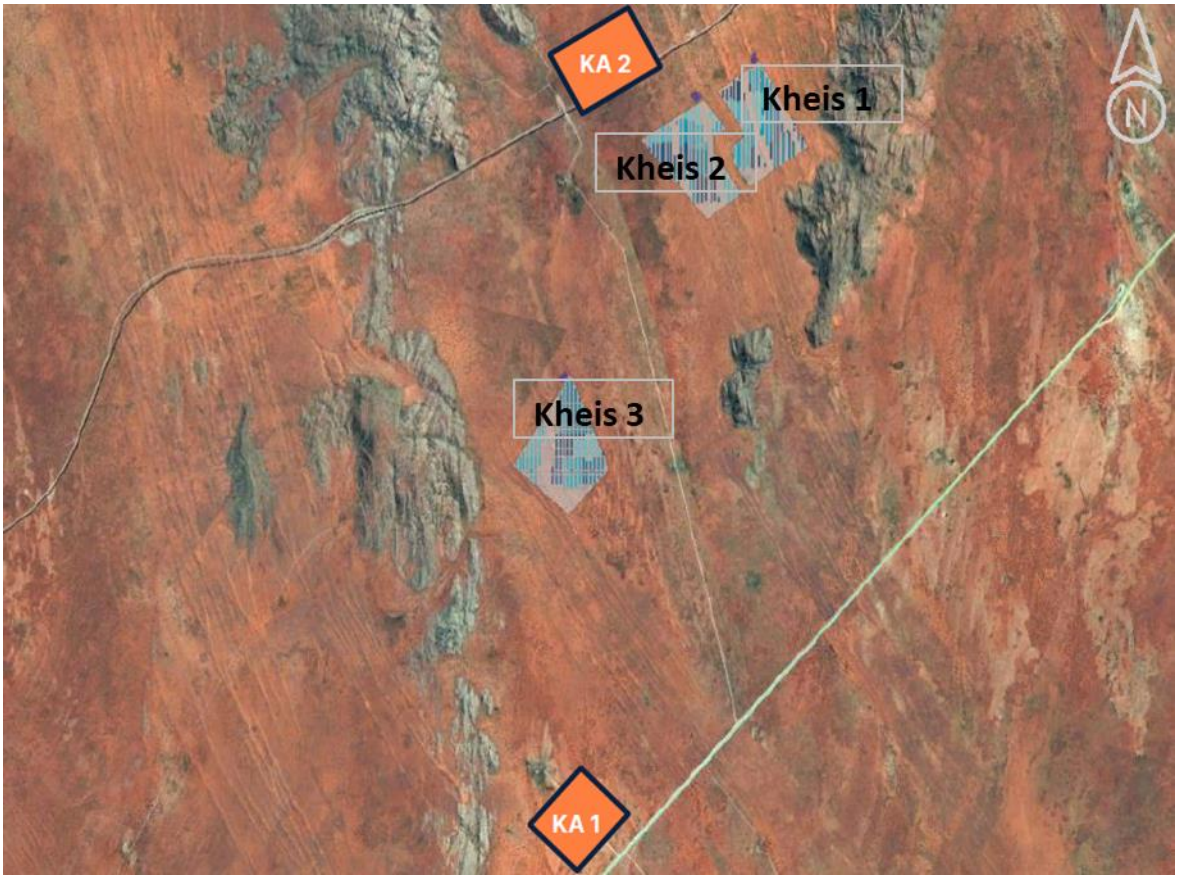

Figure 2.3: Original development areas and additional areas considered during geotechnical investigation.

Other potential sites were also located within dune fields and were considered to be too far from the other development sites to provide feasible options (refer to Figure 2.4).

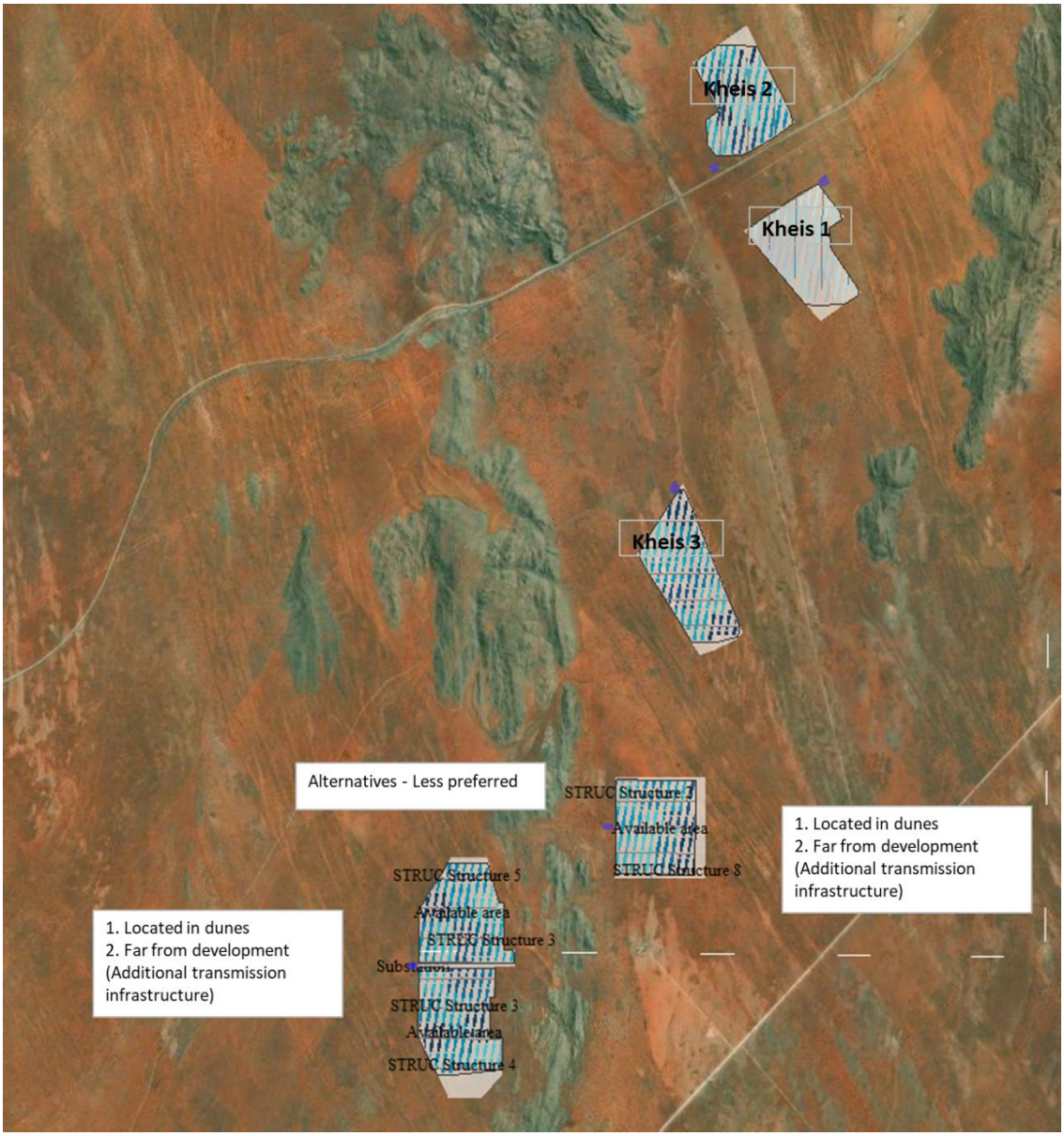

Figure 2.4: Preliminary development areas identified in relation to alternatives which were not feasible.

Based on the environmental screening study and the preliminary geotechnical study, Red Sands PV3 development area (previously known as Kheis 3 in Figure 2.4 above) was identified by the developer as being the most technically feasible and viable project area within the broader project site. No feasible alternative development area was identified for the assessment as part of the BA process. The site selection and layout optimisation process applied by the developer (which includes the process followed above) demonstrates due consideration of the suitability of the project site for the Red Sands PV3 in line with a typical mitigation hierarchy:

1. First Mitigation: avoidance of adverse impacts as far as possible by use of preventative measures (in this instance an environmental screening and integration process assisted in the avoidance of identified sensitive areas).
2. Second Mitigation: minimisation or reduction of adverse impacts to 'as low as practicable' through implementation of mitigation and management measures (in this instance the development of technical mitigation solutions as well as recommendations from the various environmental specialists).

3. Third Mitigation: remedy or compensation for adverse residual impacts, which are unavoidable and cannot be reduced further.

As part of the development area selection process and environmental screening, as described above, the first tier of avoidance has already been applied prior to the BA process. No feasible alternative layouts have been identified for investigation. A development area of ~184ha has been identified within the project site within which the solar PV facility and associated infrastructure will be sited. The development footprint of the facility, i.e., facility infrastructure, would occupy an area of ~131ha, which is equivalent to approximately 71% of the extent of the development area. Therefore, as part of the BA process the development area has been fully assessed and the impact of the solar facility ground-truthed by independent specialists. The significance of the impacts associated with the proposed development footprint and the appropriateness of the layout has been assessed and is included in Chapter 7 and Appendices D – I. Where any further conflicts in terms of the development footprint and environmental and social sensitivities or features occur, the mitigation strategy will be further implemented in order to meet the objectives of the mitigation hierarchy (i.e. avoid, minimise, mitigate).

2.5 Description of the Project Technology

Red Sands PV3 will have a contracted capacity of up to 75MWac and will make use of PV technology. Solar energy facilities, such as those which utilise PV technology, use the energy from the sun to generate electricity through a process known as the Photovoltaic Effect. Generating electricity using the Photovoltaic Effect is achieved through the use of the following components:

PV Cells

A PV cell is made of silicone (Si) that is doped (i.e. another element is introduced to the Si-structure to enhance its electrical properties) to produce the Photovoltaic Effect. PV cells are arranged in multiples / arrays and placed behind a protective glass sheet to form a PV panel (refer to **Figure 2.5**). Each PV cell is positively charged on one side and negatively charged on the opposite side, with electrical conductors attached to either side to form a circuit. This circuit captures the released electrons in the form of an electric current (i.e. DC).

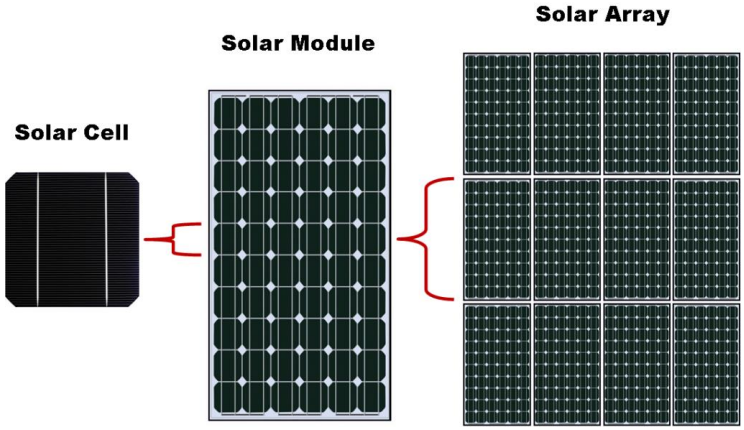

Figure 2.5: Overview of a PV cell, module and array / panel (Source: pveducation.com).

Inverters

Inverters are used to convert electricity produced by the PV cells from DC into AC, to enable the facility to be connected to the national electricity grid. In order to connect a large solar facility such as the one being proposed to the national electricity grid, numerous inverters will be arranged in several arrays to collect, and convert power produced by the facility.

Transformers

Transformers are required to transform (i.e. step-up) the power generation by the PV facility from a low voltage to a higher voltage to allow for it to be integrated into the national electricity grid.

Support Structures

PV panels will be fixed to a support structure. PV panels can either utilise fixed / static support structures, or single or double axis tracking support structures (refer to **Figure 2.6**). PV panels which utilise fixed / static support structures are set at an angle (fixed-tilt PV system) so as to optimise the amount of solar irradiation. With fixed / static support structures the angle of the PV panel is dependent on the latitude of the proposed development, and may be adjusted to optimise for summer and winter solar radiation characteristics. PV panels which utilise tracking support structures track the movement of the sun throughout the day so as to receive the maximum amount of solar irradiation.

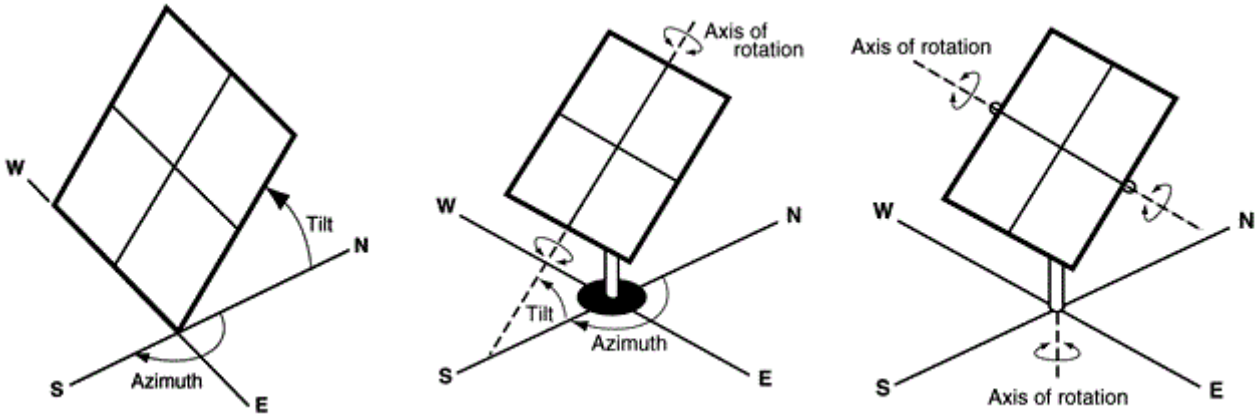

Figure 2.6: Overview of different PV tracking systems (from left to right: fixed-tilt, single-axis tracking, and double-axis tracking (Source: pveducation.com)).

PV panels are designed to operate continuously for more than 20 years, mostly unattended and with low maintenance.

2.6 Description of the Project Components

The project will comprise the following key infrastructure and components:

- Solar PV array comprising PV modules and mounting structures.
- Inverters and transformers.
- Low voltage cabling between the PV modules to the inverters
- Fence around the project development area
- Camera surveillance
- Internet connection

- 33kV cabling between the project components and the facility substation
- 33/132kV onsite facility substation[3].
- Battery Energy Storage System (BESS).
- Site offices and maintenance buildings, including workshop areas for maintenance and storage.
- Laydown areas.
- Access roads (up to 6m) and internal distribution roads (up to 4m).

Table 2.2 provides the details of Red Sands PV3, including the main infrastructure components and services that will be required during the project life cycle.

Table 2.2: Overview of the project and associated infrastructure for Red Sands PV3

Total extent of the Development area (including associated infrastructure)	**~184ha**
Contracted capacity of the facility	75MW AC
Technology	» Static or Tracking Photovoltaic Systems » Bifacial or monofacial
PV panels	» Height: ~2.2m from ground level (installed). » Up to 197 100 panels required. » Fixed tilt, single axis or double axis tracking systems.
Grid connection	On-site inverter (step up facility) to convert power from Direct Current (DC) to an Alternative (AC) and step up the electricity current from 11kV to 132kV that will connect to the on-site substation via underground cables. As part of a separate BA process, the electricity will be evacuated via a switching station and 132kV power line to the existing Garona substation.
Site access	Direct access to the broader study area and the development area is provided by the existing gravel roads running from the N8. Access roads will be up to 6m and internal distribution roads up to 4m.
Other infrastructure	» Fence around the project development area » Camera surveillance » Internet connection » Battery Energy Storage System (BESS) located within substation footprint. » Site offices and maintenance buildings, including workshop areas for maintenance and storage. » Laydown areas.
Services required	» Refuse material disposal - all refuse material generated from the proposed development will be collected by a contractor and will be disposed of at a licensed waste disposal site off site. This service will be arranged with the municipality and suitable contractors when required. » Sanitation – all sewage waste will be collected by a contractor and will be disposed of at a licensed waste disposal site during the construction

[3] A 132kV powerline will be assessed through a separate Basic Assessment Process

	phase. This service will be arranged with the municipality when required during the operational phase.

A layout for the PV facility has been proposed by the proponent for consideration and assessment within this BA Report (refer to **Figure 2.7**.

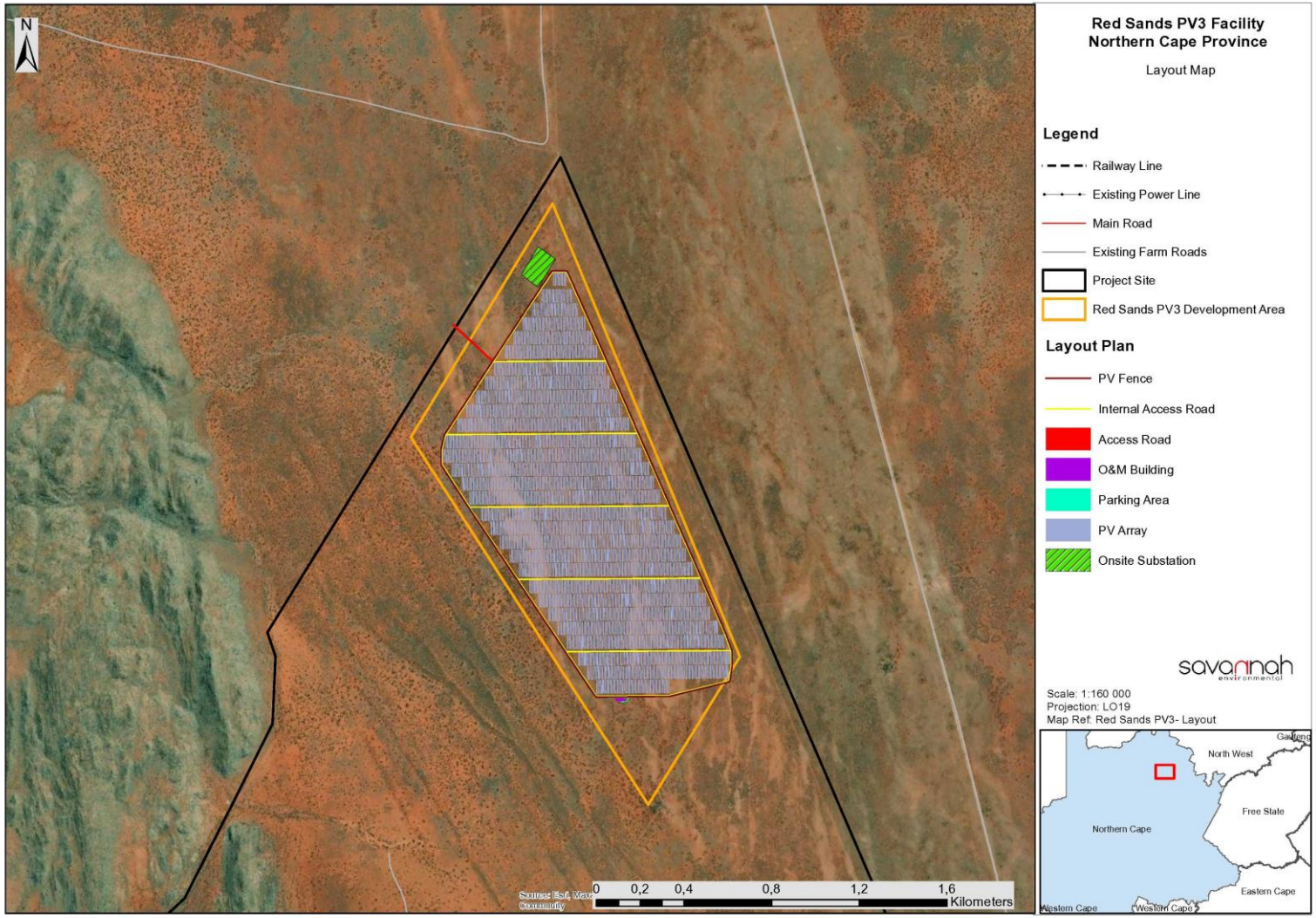

Figure 2.7: Layout map of the proposed Red Sands PV3

2.7 Description of Project Alternatives

In accordance with the requirements of Appendix 3 of the 2014 EIA Regulations (GNR 326), an EIA process must contain a consideration of alternatives, which can include site (i.e. development footprint), activity, technology and site access alternatives, as well as the "do-nothing" alternative. Alternatives are required to be assessed in terms of social, biophysical, economic and technical factors.

The DFFE Guideline for determining alternatives states that the key criteria for consideration when identifying alternatives are that they should be "practicable", "feasible", "relevant", "reasonable" and "viable". Essentially there are two types of alternatives:

» Fundamentally (totally) different alternatives to the project.
» Incrementally different (modifications) alternatives to the project.

2.7.1 Consideration of Fundamentally Different Alternatives

Fundamentally different alternatives are usually assessed at a strategic level, and as a result project-specific EIAs are therefore limited in scope and ability to address fundamentally different alternatives. At a strategic level, electricity generating alternatives have been addressed as part of the DMRE's current Integrated Resource Plan for Electricity 2010 – 2030 (IRP), 2019[4], and will continue to be addressed as part of future revisions thereto. In this regard, the need for renewable energy power generation (including solar and wind) has been identified as part of the technology mix for power generation in the country in the next 20 years. Of particular relevance to the proposed project is the allocation of 6000MW of new capacity to large scale PV included in the IRP 2019. The site is considered most suitable for the development of a PV solar energy facility as a result of local irradiation. Therefore, fundamentally different alternatives to the proposed project are not considered within this BA process.

2.7.2 Consideration of Incrementally Different Alternatives

Incrementally different alternatives relate specifically to the project under investigation. "Alternatives", in relation to a proposed activity, means different ways of meeting the general purposes and requirements of the activity, which may include alternatives to:

» The property on which, or location where the activity is proposed to be undertaken.
» The type of activity to be undertaken.
» The design or layout of the activity.
» The technology to be used in the activity.
» The operational aspects of the activity.

[4] The Integrated Resource Plan (IRP) is legislated policy which regulates power generation planning.

In addition, the option of not implementing the activity (i.e. the "do-nothing" alternative) must also be considered.

The applicable alternatives are discussed under the respective sub-headings below and where no alternatives are applicable, a motivation has been included.

i) Property or Location Alternatives

As discussed in Section 2.3 and 2.4 above), the consideration of the suitability of the site for the proposed project is in line with a typical mitigation hierarchy:

1. First Mitigation: avoidance of adverse impacts as far as possible by use of preventative measures (in this instance a sensitivity analysis assisted in the avoidance of identified ecological, avifaunal and bat sensitive areas).
2. Second Mitigation: minimisation or reduction of adverse impacts to 'as low as practicable' (in this instance minimisation of impact on identified ecological, avifaunal and bat sensitive areas through implementing mitigation).
3. Third Mitigation: remedy or compensation for adverse residual impacts, which are unavoidable and cannot be reduced further.

Therefore, based on above site-specific attributes discussed in Section 2.4, the proponent considers the development area located within the project site as highly preferred in terms of the development of a solar PV facility and expects that Red Sands PV3 will be able to draw on synergies with the projects proposed and/or currently authorised within the vicinity of the study area. As a result, no property/location alternatives are proposed as part of this BA process.

ii) Design and Layout Alternatives

Red Sands PV3 will have a development footprint of approximately 131ha, to be located within the development area of approximately 184ha. Based on the above environmental screening study, preliminary geotechnical study, and landowner requirements, Red Sands PV3 development area was identified by the developer as being the most technically feasible and viable project area within the broader project site. Specialist field surveys and assessments were undertaken as part of the BA process in order to provide the proponent with site specific information regarding the study area and the development area considered for the development (refer to **Appendices D-I**).

As a result, the preferred development area (184ha) within the affected property (i.e. ~3380ha in extent) is considered as the most feasible and appropriate location for Red Sands PV3, based on considerations discussed in Section 2.4.

No feasible design or layout alternatives were identified for the proposed project.

iii) Technology Alternatives

1.1.1.1 PV Technology Alternatives

Considering the available natural energy resources within the area, as detailed in the previous sections, and the current significant restrictions placed on other natural resources such as water, it is considered that

PV is the preferred option for the development of a solar facility within the preferred project site. In addition, grid connection infrastructure to connect the solar facility to the national grid is present in the surrounding area which enables an easy and short connection.

Considering the suitability of the project site for the development of a solar facility, the current land-use activities being undertaken within the project site which relate to grazing and compatibility thereof with the proposed development, the size of the development footprint for the solar facility (i.e. ~120ha) and the minimal loss to grazing carrying capacity as a result of the development due to the low agricultural potential of the site, the activity (i.e. the development of a solar PV facility) is considered to be appropriate.

Few technology options are available for solar facilities, and the use of those that are considered are usually differentiated by weather and temperature conditions that prevail in the area, so that optimality is obtained by the final site selection. The Integrated Resource Plan (IRP) 2019, excludes the procurement of power from CSP facilities until 2030; whereas new additional capacity of approximately 6 000MW will be required from solar PV facilities. Therefore, PV technology was identified as being the preferred option for the study area. Solar PV consists of a lower visual profile and limited water requirements when compared to the CSP technology option.

Preliminary design specifies single-axis trackers with monofacial panels, however, with appropriate albedo measurements, bifacial panels can be chosen at detail design phase.

Considering the above, no other technology alternatives are being assessed for development on the proposed site.

1.1.1.2 Battery Energy Storage System Alternatives

The general purpose and utilisation of a Battery Energy Storage System (BESS) is to save and store excess electrical output as it is generated, allowing for a timed release when the capacity is required. BESS systems therefore provide flexibility in the efficient operation of the electric grid through decoupling of the energy supply and demand. **Figures 2.8, 2.9, 2.10**, and **2.11** below illustrate a typical utility scale BESS system (a Lithium-Ion BESS) as applied in the context of a Renewable Energy Facility.

Figure 2.8: Li-Ion BESS implementation for a Renewable Energy facility (Source: Enel Green Power).

Figure 2.9: Li-Ion BESS containerised modules located within the BESS enclosure footprint (Source: Enel Green Power).

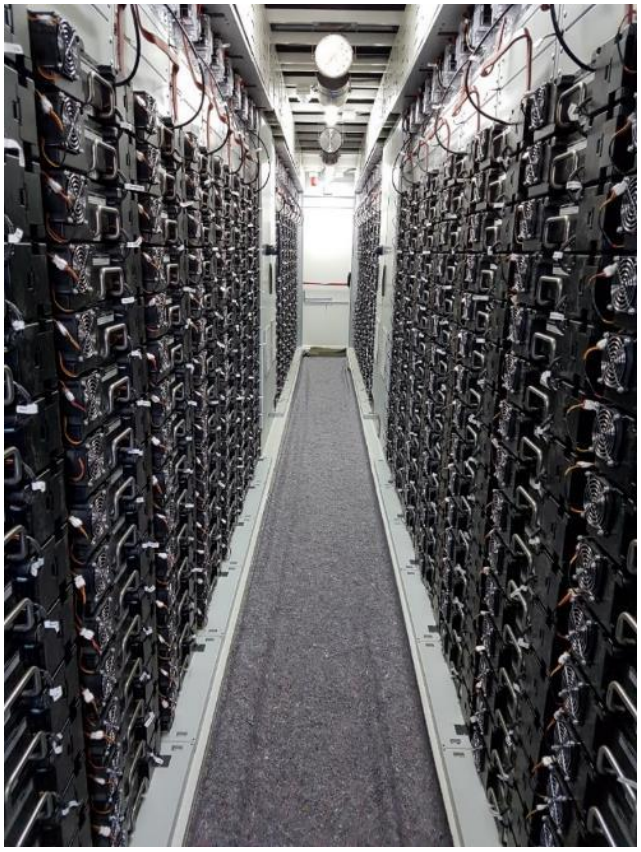

Figure 2.10: Li-Ion BESS internal design and implementation of a container used within a BESS. The image shows a series of sealed battery cell packs within a containerised module (Source: Enel Green Power).

Figure 2.11: Illustration of battery storage units installed by Tesla (Source: fastcompany.com).

As technological advances within battery energy storage systems (BESS) are frequent, no specific technology can be determined for use by the proponent at this stage. Two BESS technology alternatives are available:

- Solid state battery electrolytes typically consist of Lead Acid (Pb), Nickel Cadium (NiCad), Lithium-Ion (Liion), Sodium Sulphur (NaS) or Sodium Nickle Chloride (Zebra) (NaNiCl) and use solid electrodes and electrolytes. As a result of the declining costs, Li-ion technology now accounts for more than 90% of battery storage additions globally (IRENA, 2019); and
- Redox-flow technology (e.g. vanadium flow battery, or similar technology and chemistries). Flow batteries use solid electrodes and liquid electrolytes. The most used flow battery is the Vanadium Redox Flow Battery (VRFB), which is a type of rechargeable flow battery that employs vanadium ions in different oxidative states to store chemical potential energy.

However, only solid-state technology types are envisaged for the proposed project. The technology includes batteries housed within containers which are fully enclosed and self-contained. It is important to note, no specific solid-state technology is proposed as the preferred for authorisation, as all are expected to have similar impacts due to their design and functions being closely related. Therefore, the assessment proposes all solid state technologies for authorisation to allow the proponent to determine the precise technology when the project is implemented, on the understanding that further investigation into the specific technologies available at the time of being awarded preferred bidder status will allow for one of two to be selected and ultimately developed.

The BESS will be compliant with all local laws and regulations and health and safety requirements governing
battery facilities. Over and above that they will comply with international standards such as UN 38.3 (Transportation Testing for Lithium Batteries), UL 1642 (Standard for Safety – Lithium-ion Batteries) and IEC 62619 (Secondary cells and batteries containing alkaline or other non-acid electrolytes Safety requirements
for secondary lithium cells and batteries, for use in industrial applications). Furthermore, the battery facility will also comply with standards such as UL 1973 (Batteries for Use in Stationary Applications) and IEC 62619-2017 including thermal runaway non-propagation and safety zone region operation limits and a failure mode analysis. The design will be compliant with UL 9540 (Energy Storage Systems and Equipment): this standard defines the safety requirements for battery installation in industrial and grid connected applications.

The design of the BESS in compliance with all the local and international standards ensures that fire risk is minimal. Furthermore, each container has a built-in fire detection and suppression system. This system continually monitors the batteries and in an unlikely event of a fire it supresses the fire using inert gas. Each container is also spaced about 3m apart ensuring the chance of a fire spreading between containers (which
are made of metal and therefore not easily flammable) is also minimal. **Figure 2.12** below provides a typical configuration of fire detection and suppression system.

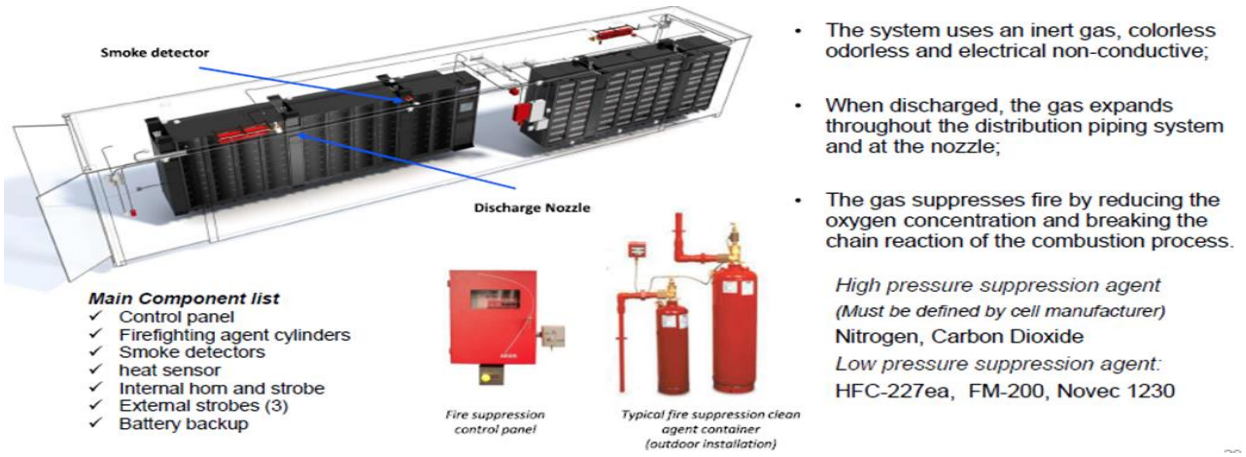

Figure 2.12: Typical configuration of fire detection and suppression system

iv) The 'Do-Nothing' Alternative

The 'Do-Nothing' alternative is the option of not constructing Red Sands PV3. Should this alternative be selected, there would be no environmental impacts or benefits as a result of the construction and operation activities associated with a solar PV facility. The 'Do-Nothing' alternative has been assessed as part of the BA process (refer to **Chapter 7** and **Chapter 8** of this BA Report).

2.8 Activities during the Project Development Stages

Table 2.2: Details of the project development phases (i.e. construction, operation and decommissioning)

Pre-construction	
Requirements	» Planning and Design of facility
Activities to be undertaken	
Site preparation	» Confirming the integrity of site access to accommodate the required equipment. » Preparation of the site (e.g. laydown areas). » Mobilisation of construction equipment.
Conduct surveys prior to construction	» Including, but not limited to: a detailed site survey and confirmation of the infrastructure micro-siting footprint, survey of the on-site substation site and O&M building area to determine and confirm the locations of all associated infrastructure.
Construction Phase	
Requirements	» Project requires Environmental Authorisation from DFFE, a generation license issued by NERSA. » Duration expected to be up to 12 months for the Red Sands PV3. » Create direct construction employment opportunities: Up to 350 jobs (at peak of construction) created and maintained for approximately two and a half years. » Security staff will also be present during the night-time of the construction phase. » Waste removal and sanitation will be undertaken by a sub-contractor or the municipality, where possible. Waste containers, including containers for hazardous waste, will be located at easily accessible locations on site when construction activities are undertaken. » Electricity required for construction activities will be generated by a generator or will be sourced from available 11kV or 22kV Eskom distribution networks in the area. » Water will be required for the construction phase, which will be approximately 8 290m^3 total for the construction activities. Water will be sourced from either existing boreholes, new boreholes or a pipeline from the Orange River. Hydrocensus will determine best option (In process)..
Activities to be undertaken	
Establishment of access roads to the Site	» Access/haul roads and internal access roads within the site will be established at the commencement of construction. » Existing access roads will be utilised where possible to minimise impact and upgraded where required. » Access roads to the site will have a width of up to 6m. » Access roads to be established between the project components for construction and/or maintenance activities within the development footprint. » Internal service road alignment will be approximately 4m wide.
Undertake site preparation	i) Including the clearance of vegetation at the footprint of each support structure, establishment of the laydown areas, the establishment of internal access roads and excavations for foundations.

	ii) Stripping of topsoil to be stockpiled, backfilled, removed from site and/or spread on site. iii) To be undertaken in a systematic manner to reduce the risk of exposed ground being subjected to erosion. iv) Include search and rescue of floral Species of Conservation Concern (where required) and the identification and excavation of any sites of cultural/heritage value (where required).
Establishment of laydown areas and batching plant on site	» A laydown area for the storage of project components, including the PV panels and civil engineering construction equipment. » The laydown area will also accommodate building materials and equipment associated with the construction of buildings. » Infilling or depositing materials will be sourced from licenced borrow pits within the surrounding areas, which have been authorised independently to the Red Sands PV3 BA process.
Transport of components and equipment to and within the site	» Transportation will take place via appropriate National and Provincial roads, and the dedicated access/haul road to the site. » Some of the components (i.e. substation transformer) may be defined as abnormal loads in terms of the Road Traffic Act (Act No. 29 of 1989) by virtue of the dimensional limitations. » Typical civil engineering construction equipment will need to be brought to the site (e.g. excavators, trucks, graders, compaction equipment, cement trucks, etc.) as well as components required for the mounting of the PV support structures, construction of the substation and site preparation.
Erect PV Panels and Construct Substation, Inverters	» Installation of the solar PV panels and the structural and electrical infrastructure to make the plant operational. » For array installation, typically vertical support posts/piles are driven into the ground. Depending on the results of the geotechnical investigation a different foundation method may be required. Different options include a screw pile, helical pile, micro-pile or drilled post/pile which may or may not need to be cast in concrete underground at an appropriate depth as determined by the Geotechnical investigation. The posts will hold the support structures (tables) on which PV arrays would be mounted. Brackets attach the PV modules to the tables.   » Trenches are dug for the underground AC and DC cabling and the foundations of the inverter enclosures and transformers are prepared. » Wire harnesses connect the PV modules to the electrical collection systems.
Construction of the substation and BESS	» One on-site substation to be constructed within the development footprint. » Substation will be constructed with a high-voltage yard footprint.

	» The BESS will be constructed as part onsite substation and will require a survey of the footprint, site clearing and levelling. For solid state batteries, the battery cell packs (containing an electrolyte solution) will be brought to site as sealed units which will be installed and connected on site.
Establishment of ancillary infrastructure	» Operation and Maintenance buildings including a gate house, security building, control centre, offices, warehouses, a workshop and visitors centre. » Temporary staff accommodation is required for the duration of construction. » Establishment will require the clearing of vegetation, levelling and the excavation of foundations prior to construction.
Connection of PV facility to the onsite substation	» Underground cables and overhead circuits connect the string inverters to the on-site AC electrical infrastructure (central inverter) and ultimately the project's on-site substation. » Excavation of trenches are required for the installation of the cables. Trenches will be approximately 1.2m deep. » Underground cables are planned to follow the internal access roads, as far as possible.
Connect substation to the power grid	1. A 132/33kV on-site collector substation to be connected to the Garona Substation via a new 132kV overhead power line (subject to separate authorisation process).
Undertake site rehabilitation	1. Commence with rehabilitation efforts once construction is completed in an area, and all construction equipment is removed. 2. On commissioning, access points to the site that will not be required for the operation phase will be closed and prepared for rehabilitation.
<u>Operation Phase</u>	
Requirements	» Duration will be 20-25 years, or longer depending on need for the project. » Requirements for security and maintenance of the facility. » Employment opportunities relating mainly to operation activities and maintenance. Up to 20 full-time and 60 temporary direct employment opportunities will be available. » Water will be required for the operation phase. Approximately 1000m^3 of water per annum will be required for the cleaning of the PV modules. Water will be sourced from existing boreholes in the area or municipal supply. » Current land-use activities being undertaken within the project site can continue during the operation of the PV facility.
Activities to be undertaken	
Operation and Maintenance	» Full time security, maintenance and control room staff. » PV facility will be operational except under circumstances of mechanical breakdown, inclement weather conditions, or maintenance activities. » PV facility to be subject to periodic maintenance and inspection. » Disposal of waste products (e.g. oil) in accordance with relevant waste management legislation. » Areas which were disturbed during the construction phase to be utilised should a laydown area be required during operation. » PV panels will be washed during operation utilising clean water or non-hazardous biodegradable cleaning products. Wastewater generated by washing can be allowed to run-off under the panels.
<u>Decommissioning Phase</u>	
Requirements	» Decommissioning of the Sun Garden PV Facility infrastructure at the end of its economic life.

	» Potential for repowering of the facility, depending on the condition of the facility at the time. » Expected lifespan of approximately 20 - 25 years (with maintenance) before decommissioning is required. » Decommissioning activities to comply with the legislation relevant at the time.
Activities to be undertaken	
Site preparation	» Confirming the integrity of site access to accommodate the required equipment. » Preparation of the site (e.g. laydown areas and construction platform). » Mobilisation of equipment required for decommissioning.
Disconnect, Disassemble and remove solar facility components	» Disconnect the facility from the grid. » Dismantle all panels, mounting structures and foundations in line with all relevant legislation. » Recycle, repurpose and re-use as much of the decommissioned project components as possible in accordance with regulatory requirements. » Concrete foundations will be removed to a depth as defined by an agricultural specialist. » Backfill the mounting structure holes and rehabilitate the area appropriately. » Visible cables will be removed. » Access roads will either be left for use by landowners/future landowners, or covered with topsoil or reduced in width. » A final site walkthrough will be conducted to remove debris and/or waste generated within the site during the decommissioning process. » Rehabilitation may include top soiling, raking, and/or re-seeding (whichever is appropriate).

It is expected that the areas of the project site affected by the solar facility infrastructure (development footprint) will revert back to their original land-use (i.e. primarily grazing) once the Red Sands PV3 has reached the end of its economic life and all infrastructure has been decommissioned.

CHAPTER 3: POLICY AND LEGISLATIVE CONTEXT

This Chapter provides an overview of the policy and legislative context within which the development of a solar PV facility such as Red Sands PV3 and the associated infrastructure is proposed. It identifies environmental legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process which may be applicable to or have bearing on the proposed project. It also provides information which supports the need and justification for the project, which is further discussed in Chapter 4.

3.1. Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This chapter of the BA Report includes the following information required in terms of Appendix 1: Content of Basic Assessment Reports:

Requirement	Relevant Section
(e) a description of the policy and legislative context within which the development is proposed including- (i) an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report. (ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments.	A description of the policy and legislative context within which Red Sands PV3 is proposed is included in section **3.3**, **3.4** and **3.5.**

3.2. Strategic Electricity Planning in South Africa

The need to expand electricity generation capacity in South Africa is based on national policy and informed by on-going strategic planning undertaken by the Department of Mineral Resources and Energy. The hierarchy of policy and planning documentation that supports the development of renewable energy projects, such as solar energy facilities, is illustrated in **Figure 3.1**. These policies are discussed in more detail in the following sections, along with the provincial and local policies and plans that have relevance to the development of Red Sands PV3.

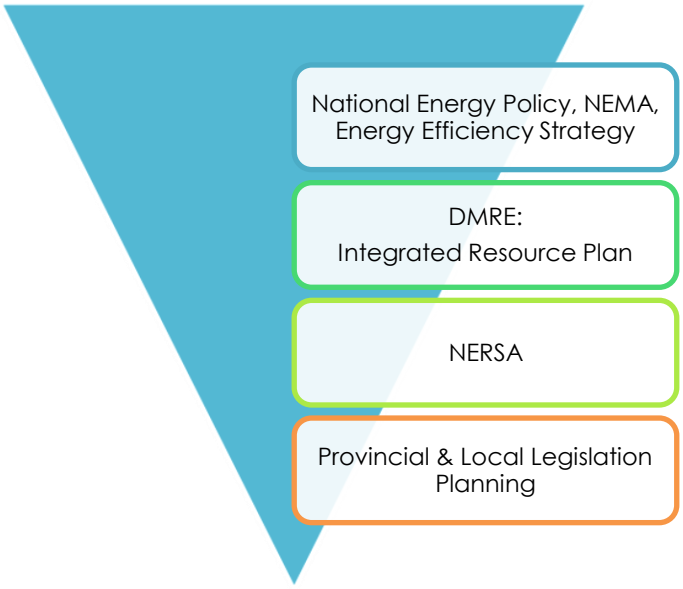

Figure 3.1: Hierarchy of electricity and planning documents

The South African energy industry is evolving rapidly, with regular changes to legislation and industry role-players. The regulatory hierarchy for an energy generation project of this nature consists of three tiers of authority who exercise control through both statutory and non-statutory instruments – that is National, Provincial and Local levels. As solar energy developments are multi-sectoral (encompassing economic, spatial, biophysical, and cultural dimensions) various statutory bodies are likely to be involved in the approval process of a solar energy project and the related statutory environmental assessment process.

At **National Level**, the main regulatory agencies are:

- **Department of Mineral Resources and Energy (DMRE):** This Department is responsible for policy relating to all energy forms and for compiling and approving the Integrated Resource Plan (IRP) for electricity and, since merging with the Department of Mineral Resources (DMR), is also responsible for granting approvals for the use of land which is contrary to the objects of the Mineral and Petroleum Resource Development Act (No. 28 of 2002) (MPRDA) in terms of Section 53 of the MPRDA. Therefore, in terms of the Act, approval from the Minister is required to ensure that the proposed activities do not sterilise mineral resource that may occur within the broader study area and development area.
- **National Energy Regulator of South Africa (NERSA):** NERSA is responsible for regulating all aspects of the electricity sector and will ultimately issue licenses for IPP projects to generate electricity.
- **Department of Forestry, Fisheries, and the Environment (DFFE):** This Department is responsible for environmental policy and is the controlling authority in terms of NEMA and the 2014 EIA Regulations (GN R326) as amended. DEFF is the competent authority for this project (as per GNR 779 of 01 July 2016), and is charged with granting the EA for the project under consideration. Furthermore, the Department is also responsible for issuing permits for the disturbance or destruction of protected tree species listed under Section 15 (1) of the National Forest Act (No. 84 of 1998) (NFA).
- **The South African Heritage Resources Agency (SAHRA):** SAHRA is a statutory organisation established under the National Heritage Resources Act (No. 25 of 1999) (NHRA), as the national administrative body responsible for the protection of South Africa's cultural heritage.
- **South African National Roads Agency Limited (SANRAL):** This Agency is responsible for the regulation and maintenance of all national road routes.

- **Department of Water and Sanitation (DWS):** This Department is responsible for effective and efficient water resources management to ensure sustainable economic and social development. This Department is also responsible for evaluating and issuing licenses pertaining to water use (i.e. Water Use Licenses (WUL) and General Authorisation).
- **The Department of Agriculture, Rural Development and Land Reform (DARDLD):** This Department is the custodian of South Africa's agricultural resources and is responsible for the formulation and implementation of policies governing the agriculture sector and the initiation, facilitation, coordination and implementation of integrated rural development programmes.
-

At **Provincial Level**, the main regulatory agencies are:

- **Northern Cape Department Agricultural, Environmental Affairs, Rural Development, and Land Reform (DAEARD&LR)**: This Department is the commenting authority for the BA process for the project and is responsible for issuing of other biodiversity and conservation-related permits.
- **Northern Cape Department of Transport, Safety and Liaison:** This Department provides effective co-ordination of crime prevention initiatives, provincial police oversight, traffic management and road safety towards a more secure environment.
- **Ngwao-Boswa Ya Kapa Bokone (NBKB):** This Department identifies, conserves and manage heritage resources throughout the Northern Cape Province.

At the **Local Level,** the local and district municipal authorities are the principal regulatory authorities responsible for planning, land use and the environment. In the Northern Cape Province, both the local and district municipalities play a role. The local municipality includes the **Tsantsabane Local Municipality** which form part of the **ZF Mgcawu District Municipality**. In terms of the Municipal Systems Act (No. 32 of 2000), it is compulsory for all municipalities to go through an Integrated Development Planning (IDP) process to prepare a five-year strategic development plan for the area under their control.

3.3 International Policy and Planning Context

A brief review of the most relevant international policies relevant to the establishment of Red Sands PV3 are provided below in **Table 3.1**. Red Sands PV3 is considered to align with the aims of these policies, even if contributions to achieving the goals therein are only minor.

Table 3.1: International policies relevant to Red Sands PV3

Relevant policy	Relevance to the proposed project
United Nations Framework Convention on Climate Change (UNFCCC) and Conference of the Party (COP)	The Conference of the Parties (COP), established by Article 7 of the UNFCCC, is the supreme body and highest decision-making organ of the Convention. It reviews the implementation of the Convention and any related legal instruments and takes decisions to promote the effective implementation of the Convention. The Conference of the Parties (COP) 21 was held in Paris from 30 November to 12 December 2015. From this conference, an agreement to tackle global warming was reached between 195 countries. This Agreement is open for signature and subject to ratification, acceptance or approval by States and regional economic integration organisations that are Parties to the Convention from 22 April 2016 to 21 April 2017. Thereafter, this Agreement shall be open for accession from the day following the date on which it is closed for signature.

Relevant policy	Relevance to the proposed project
	The agreement can only be sanctioned once it has been ratified by 55 countries, representing at least 55% of emissions. South Africa signed the Agreement in April 2016 and ratified the agreement on 01 November 2016. The Agreement was assented to by the National Council of Provinces on 27 October 2016, and the National Assembly on 1 November 2016. The Agreement was promulgated on 04 November 2016, thirty days after the date on which at least 55 Parties to the Convention, which account for at least 55% of the total global greenhouse gas emissions have deposited their instruments of ratification, acceptance, approval or accession with the Depositary. South Africa's National Climate Change Response Policy (NCCRP) establishes South Africa's approach to addressing climate change, including adaptation and mitigation responses. The NCCRP formalises Government's vision for a transition to a low carbon economy, through the adoption of the 'Peak, Plateau and Decline' (PPD) GHG emissions trajectory whereby South Africa's emissions should peak between 2020 and 2025, plateau for approximately a decade, and then decline in absolute terms thereafter, and based on this the country has pledged to reduce emissions by 34% and 42% below Business As Usual (BAU) emissions in 2020 and 2025, respectively. The policy provides support for Red Sands PV3 which will contribute to managing climate change impacts, supporting the emergency response capacity, as well as assist in reducing GHG emissions in a sustainable manner.
The Equator Principles 4 (October 2020)	The Equator Principles (EPs) 4 constitute a financial industry benchmark used for determining, assessing, and managing project's environmental and social risks. The EPs are primarily intended to provide a minimum standard for due diligence to support responsible risk decision-making. The EPs are applicable to large infrastructure projects (such as Red Sands PV3) and apply globally to all industry sectors. Such an assessment should propose measures to minimise, mitigate, and offset adverse impacts in a manner relevant and appropriate to the nature and scale of Red Sands PV3. In terms of the EPs, South Africa is a non-designated country, and as such the assessment process for projects located in South Africa evaluates compliance with the applicable IFC Performance Standards on Environmental and Social Sustainability, and Environmental Health and Safety (EHS) Guidelines. Red Sands PV3 is currently being assessed in accordance with the requirements of the 2014 EIA Regulations, as amended (GN R326), published in terms of Section 24(5) of the National Environmental Management Act (No. 107 of 1998) (NEMA), which is South Africa's national legislation providing for the authorisation of certain controlled activities. Through this assessment, all potential social and environmental risks are identified and assessed, and appropriate mitigation measures proposed.
International Finance Corporation (IFC) Performance Standards and Environmental and Social	The International Finance Corporation's (IFC) Performance Standards (PSs) on Environmental and Social Sustainability were developed by the IFC and were last updated on 1 January 2013.

Relevant policy	Relevance to the proposed project
Sustainability (January 2012)	Performance Standard 1 requires that a process of environmental and social assessment be conducted, and an ESMS appropriate to the nature and scale of the project, and commensurate with the level of its environmental and social risks and impacts, be established and maintained. The above-mentioned standard is the overarching standard to which all the other standards relate. Performance Standard 2 through to 8 establish specific requirements to avoid, reduce, mitigate or compensate for impacts on people and the environment, and to improve conditions where appropriate. While all relevant social and environmental risks and potential impacts should be considered as part of the assessment, the standards 2 and 8 describe potential social and environmental impacts that require particular attention specifically within emerging markets. Where social or environmental impacts are anticipated, the developer is required to manage them through its ESMS consistent with Performance Standard 1. Given the nature of Red Sands PV3, it is anticipated (at this stage of the process) that Performance Standards 1, 2, 3, 4, 6, and 8 may be applicable to the project.

3.4 National Policy

3.4.1 The National Energy Act (No. 34 of 2008)

The purpose of the National Energy Act (No. 34 of 2008) is to ensure that diverse energy resources are available, in sustainable quantities and at affordable prices, to the South African economy in support of economic growth and poverty alleviation, while taking into account environmental management requirements and interactions amongst economic sectors, as well as matters relating to renewable energy. The National Energy Act also provides for energy planning, increased generation and consumption of renewable energies, contingency energy supply, holding of strategic energy feedstocks and carriers, adequate investment in, appropriate upkeep and access to energy infrastructure. The Act provides measures for the furnishing of certain data and information regarding energy demand, supply and generation, and for establishing an institution to be responsible for promotion of efficient generation and consumption of energy and energy research.

The Act provides the legal framework which supports the development of power generation facilities, such as Red Sands PV3.

3.4.2 White Paper on the Energy Policy of South Africa, 1998

The South African Energy Policy, published by the then Department of Minerals and Energy (DME) in December 1998 identifies five key objectives, namely:

- Increasing access to affordable energy services.
- Improving energy sector governance.
- Stimulating economic development.
- Managing energy-related environmental impacts.
- Securing supply through diversity.

In order to meet these objectives and the developmental and socio-economic objectives of South Africa, the country needs to optimally use available energy resources. The South African Government is required to address what can be done to meet these electricity needs both in the short and long-term. The White Paper identifies key objectives for energy supply, such as increasing access to affordable energy services, managing energy-related environmental impacts and securing energy supply through diversifying South Africa's electricity mix.

This policy recognises that renewable energy applications have specific characteristics which need to be considered. The Energy Policy is "*based on the understanding that renewables are energy sources in their own right, and are not limited to small-scale and remote applications, and have significant medium- and long-term commercial potential*." In addition, the National Energy Policy states that "*Renewable resources generally operate from an unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future*".

The support for the Renewable Energy Policy is guided by a rationale that South Africa has a very attractive range of renewable resources, particularly solar and wind, and that renewable applications are, in fact, the least cost energy service in many cases from a fuel resource perspective (i.e. the cost of fuel in generating electricity from such technology), more so when social and environmental costs are taken into account. In spite of this range of resources, the National Energy Policy acknowledges that the development and implementation of renewable energy applications has been neglected in South Africa.

Government policy on renewable energy is therefore concerned with addressing the following challenges:

- Ensuring that economically feasible technologies and applications are implemented.
- Ensuring that an equitable level of national resources is invested in renewable technologies, given their potential and compared to investments in other energy supply options.
- Addressing constraints on the development of the renewable industry.

3.4.3 White Paper on the Renewable Energy Policy, 2003

The White Paper on Renewable Energy Policy supplements the Government's overarching policy on energy as set out in its White Paper on the Energy Policy of the Republic of South Africa (DME, 1998). The White Paper on Renewable Energy Policy recognises the significance of the medium and long-term potential of renewable energy. The main aim of the policy is to create the conditions for the development and commercial implementation of renewable technologies. The position of the White Paper on Renewable Energy is based on the integrated resource planning criterion of:

"Ensuring that an equitable level of national resources is invested in renewable technologies, given their potential and compared to investments in other energy supply options."

The White Paper on Renewable Energy sets out the Government's vision, policy principles, strategic goals and objectives for promoting and implementing renewable energy in South Africa. It also informs the public and the international community of the Government's vision, and how the Government intends to achieve these objectives; and informs Government agencies and organs of their roles in achieving the objectives.

South Africa relies heavily on coal to meet its energy needs because it is well-endowed with coal resources in particular. However, South Africa is endowed with renewable energy resources that can be sustainable alternatives to fossil fuels, but which have so far remained largely untapped. This White Paper fosters the uptake of renewable energy in the economy and has a number of objectives that include:

» Ensuring that equitable resources are invested in renewable technologies.
» Directing public resources for implementation of renewable energy technologies.
» Introducing suitable fiscal incentives for renewable energy.
» Creating an investment climate for the development of renewable energy sector.

The objectives of the White Paper are considered in six focal areas, namely:

i) Financial instruments.
ii) Legal instruments.
iii) Technology development.
iv) Awareness raising.
v) Capacity building and education.
vi) Market based instruments and regulatory instruments.

The policy supports the investment in renewable energy facilities as they contribute towards ensuring energy security through the diversification of energy supply, reducing Greenhouse Gas (GHG) emissions and the promotion of renewable energy sources.

3.4.4 The Electricity Regulation Act (No. 04 of 2006) (ERA)

The Electricity Regulation Act (No. 04 of 2006) as amended by the Electricity Regulation Act (No. 28 of 2007), replaced the Electricity Act (No. 41 of 1987), as amended, with the exception of Section 5B, which provides funds for the energy regulator for the purpose of regulating the electricity industry.

The ERA establishes a national regulatory framework for the electricity supply industry and made NERSA custodian and enforcer of the National Electricity Regulatory Framework. The ERA also provides for licences and registration as the manner in which the generation, transmission, distribution, reticulation, trading, and import and export of electricity is regulated.

3.4.5 The National Development Plan (NDP) 2030

The National Development Plan (NDP) 2030 offers a long-term plan for the country. It defines desired destinations where inequality and unemployment are reduced and poverty is eliminated so that all South Africans can attain a decent standard of living. Electricity is one of the core elements of a decent standard of living.

While the achievement of the objectives of the NDP requires progress on a broad front, three priorities stand out, namely:

» Raising employment through faster economic growth
» Improving the quality of education, skills development and innovation
» Building the capability of the state to play a developmental, transformative role

In terms of the Energy Sector's role in empowering South Africa, the NDP envisages that, by 2030, South Africa will have an energy sector that promotes:

» Economic growth and development through adequate investment in energy infrastructure. The sector should provide reliable and efficient energy service at competitive rates, while supporting economic growth through job creation.
» Social equity through expanded access to energy at affordable tariffs and through targeted, sustainable subsidies for needy households.
» Environmental sustainability through efforts to reduce pollution and mitigate the effects of climate change.

In formulating its vision for the energy sector, the NDP took the IRP 2010 as its point of departure. Therefore, although electricity generation from coal is still seen as part of the energy mix within the NDP, the plan sets out steps that aim to ensure that, by 2030, South Africa's energy system looks very different to the current situation: coal will contribute proportionately less to primary-energy needs, while gas and renewable energy resources – especially wind, solar, and imported hydroelectricity – will play a much larger role.

3.4.6 Integrated Energy Plan (IEP), November 2016

The purpose and objectives of the Integrated Energy Plan (IEP) are derived from the National Energy Act (No. 34 of 2008). The IEP takes into consideration the crucial role that energy plays in the entire economy of the country and is informed by the output of analyses founded on a solid fact base. It is a multi-faceted, long-term energy framework which has multiple aims, some of which include:

» To guide the development of energy policies and, where relevant, set the framework for regulations in the energy sector.
» To guide the selection of appropriate technologies to meet energy demand (i.e. the types and sizes of new power plants and refineries to be built and the prices that should be charged for fuels).
» To guide investment in and the development of energy infrastructure in South Africa.
» To propose alternative energy strategies which are informed by testing the potential impacts of various factors such as proposed policies, introduction of new technologies, and effects of exogenous macro-economic factors.

A draft version of the IEP was released for comment on 25 November 2016. The purpose of the IEP is to provide a roadmap of the future energy landscape for South Africa which guides future energy

infrastructure investments and policy development. The development of the IEP is an ongoing continuous process. It is reviewed periodically to take into account changes in the macroeconomic environment, developments in new technologies and changes in national priorities and imperatives, amongst others.

The 8 key objectives of the integrated energy planning process are as follows:

» Objective 1: Ensure security of supply.
» Objective 2: Minimise the cost of energy.
» Objective 3: Promote the creation of jobs and localisation.
» Objective 4: Minimise negative environmental impacts from the energy sector.
» Objective 5: Promote the conservation of water.
» Objective 6: Diversify supply sources and primary sources of energy.
» Objective 7: Promote energy efficiency in the economy.
» Objective 8: Increase access to modern energy.

3.4.7 Integrated Resource Plan (IRP) for Electricity 2010 - 2030

The Integrated Resource Plan (IRP) for Electricity is a subset of the IEP and constitutes South Africa's National electricity plan. The IRP is an electricity infrastructure development plan based on least-cost electricity supply and demand balance, taking into account security of supply and the environment. The primary objective of the IRP is to determine the long term electricity demand and detail how this demand should be met in terms of generating capacity, type, timing and cost. The IRP also serves as input to other planning functions, including amongst others, economic development and funding, and environmental and social policy formulation.

The promulgated IRP 2010–2030 identified the preferred generation technology required to meet expected demand growth up to 2030. It incorporated government objectives such as affordable electricity, reduced greenhouse gas (GHG) emissions, reduced water consumption, diversified electricity generation sources, localisation and regional development.

Following the promulgation of the IRP 2010–2030, implementation followed in line with Ministerial Determinations issued under Section 34 of the Electricity Regulation (Act No. 4) of 2006. The Ministerial Determinations give effect to planned infrastructure by facilitating the procurement of the required electricity capacity.

Since the promulgated IRP 2010–2030, the following capacity developments have taken place:

» A total 6 422 MW under the Renewable Energy Independent Power Producers Programme (REIPPP) has been procured, with 3 876 MW operational and made available to the grid as of 31 March 2021.
» 2 000MW of generating capacity (comprising various technologies) has been awarded to 8 Independent Power Producers under the RMIPPPP in March 2021.
» 2 583MW of electricity in bid window 5 of the REIPPPP, announced on 28 October 2021 (DMRE, 2021).
» IPPs have commissioned 1 005 MW from two Open Cycle Gas Turbine (OCGT) peaking plants.
» Under the Eskom build programme, the following capacity has been commissioned:
  * 1 332 MW of Ingula pumped storage, 1 588 MW of Medupi, 800 MW of Kusile and
  * 100 MW of Sere Wind Farm.
» 18 000MW of new generation capacity has been committed to.

Besides capacity additions, a number of assumptions have changed since the promulgation of IRP 2010–2030. Key assumptions that changed include the electricity demand projection, Eskom's existing plant performance, as well as new technology costs. In addition, environmental considerations such as South Africa's contribution to Greenhouse gases which contribute to climate change, local air quality and water availability have come to the fore.

These considerations necessitated the review and update of the IRP and ultimately the promulgation of a revised plan in October 2019. In terms of the IRP 2019, South Africa continues to pursue a diversified energy mix that reduces reliance on a single or a few primary energy sources. In the period prior to 2030, the system requirements are largely for incremental capacity addition (modular) and flexible technology, to complement the existing installed inflexible capacity. South Africa is a signatory to the Paris Agreement on Climate Change and has ratified the agreement. In line with INDCs (submitted to the UNFCCC in November 2016), South Africa's emissions are expected to peak, plateau and from year 2025 decline.

Following consideration of all these factors, the following Plan was promulgated.

	Coal	Coal (Decommis-sioning)	Nuclear	Hydro	Storage	PV	Wind	CSP	Gas & Diesel	Other (Distributed Generation, CoGen, Biomass, Landfill)
Current Base	37,149		1 860	2,100	2 912	1 474	1 980	300	3 830	499
2019	2,155	-2,373					244	300		Allocation to the extent of the short term capacity and energy gap.
2020	1,433	-557				114	300			
2021	1,433	-1403				300	818			
2022	711	-844			513	400 1,000	1,600			
2023	750	-555				1000	1,600			500
2024			1,860				1,600		1000	500
2025						1000	1,600			500
2026		-1,219					1,600			500
2027	750	-847					1,600		2000	500
2028		-475				1000	1,600			500
2029		-1,694			1575	1000	1,600			500
2030		-1,050		2,500		1000	1,600			500
TOTAL INSTALLED CAPACITY by 2030 (MW)	33,364		1,860	4,600	5,000	8,288	17,742	600	6,380	
% Total Installed Capacity (% of MW)	43		2.36	5.84	6.35	10.52	22.53	0.76	8.1	
% Annual Energy Contribution (% of MWh)	58.8		4.5	8.4	1.2*	6.3	17.8	0.6	1.3	

Installed Capacity
Committed/Already Contracted Capacity
Capacity Decommissioned
New Additional Capacity
Extension of Koeberg Plant Design Life
Includes Distributed Generation Capacity for own use

- 2030 Coal Installed Capacity is less capacity decommissioned between years 2020 and 2030.
- Koeberg power station rated/installed capacity will revert to 1,926MW (original design capacity) following design life extension work.
- Other/ Distributed generation includes all generation facilities in circumstances in which the facility is operated solely to supply electricity to an end-use customer within the same property with the facility.
- Short term capacity gap is estimated at 2,000MW.

Figure 3.2: IRP 2019 as promulgated in October 2019

This plan provides for the development of 6000MW of new capacity from large scale PV. The Red Sands PV3 project would contribute towards this goal.

3.4.8 New Growth Path (NGP) Framework, 23 November 2010

The purpose of the New Growth Path (NGP) Framework is to provide effective strategies towards accelerated job-creation through the development of an equitable economy and sustained growth. The target of the NGP is to create 5 million jobs by 2020. With economic growth and employment creation as the key indicators identified in the NGP. The framework seeks to identify key structural changes in the economy that can improve performance in term of labour absorption and the composition and rate of growth.

To achieve this, government will seek to, amongst other things, identify key areas for large-scale employment creation, as a result of changes in conditions in South Africa and globally, and to develop a policy package to facilitate employment creation in these areas.

3.4.9 National Climate Change Bill, 2018

On 08 June 2018 the Minister of Environmental Affairs published the National Climate Change Bill ("the Bill") for public comment. The purpose of the Bill is to build an effective climate change response and ensure the long-term, just transition to a climate resilient and lower carbon economy and society. This will be done within the context of sustainable development for South Africa, and will provide for all matters related to climate change.

The National Climate Change Bills addresses issues related institutional and coordination arrangement across the three spheres of government namely national, provincial and local. It further highlights the need the spheres of government and entities, sectors as well business to respond to challenges of climate change. The bill further address the matters relating to, the national adaptation to impacts of climate change, greenhouse gas emissions and removals, and policy alignment and institutional arrangements. The Bill provides a procedural outline that will be developed through the creation of frameworks and plans. The following objectives are set within the Bill:

a) Provide for the coordinated and integrated response to climate change and its impacts by all spheres of government in accordance with the principles of cooperative governance;
b) Provide for the effective management of inevitable climate change impacts through enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, with a view to building social, economic, and environmental resilience and an adequate national adaptation response in the context of the global climate change response;
c) Make a fair contribution to the global effort to stabilise greenhouse gas concentrations in the atmosphere at a level that avoids dangerous anthropogenic interference with the climate system within a timeframe and in a manner that enables economic, employment, social and environmental development to proceed in a sustainable manner.

Red Sands PV3 comprises a renewable energy generation facility and would not result in the generation or release of emissions during its operation.

3.4.10 National Climate Change Response Policy, 2011

South Africa's National Climate Change Response Policy (NCCRP) establishes South Africa's approach to addressing climate change, including adaptation and mitigation responses. The NCCRP formalises Government's vision for a transition to a low carbon economy, through the adoption of the 'Peak, Plateau and Decline' (PPD) GHG emissions trajectory whereby South Africa's emissions should peak between 2020 and 2025, plateau for approximately a decade, and then decline in absolute terms thereafter, and based on this the country has pledged to reduce emissions by 34% and 42% below Business As Usual (BAU) emissions in 2020 and 2025, respectively.

As an integral part of the policy, a set of near-term priority flagship programmes will be implemented to address the challenges of climate change, one of which includes the Renewable Energy Flagship Programme. This flagship programme includes a scaled-up renewable energy programme, based on the current programme specified in the IRP 2010, and using the evolving South African Renewables Initiative led by the Department of Public Enterprise and Department of Trade and Industry (DTI), as a driver for the deployment of renewable energy technologies. The programme will be informed by enhanced domestic manufacturing potential and the implementation of energy efficiency and renewable energy plans by local government.

The development of Red Sands PV3 is aligned with the Renewable Energy Flagship Programme identified under South Africa's NCCRP and could therefore be argued to be aligned with the country's approach to addressing climate change.

3.4.11 Climate Change Bill, 2018

On 08 June 2018, the Minister of Environmental Affairs published the Climate Change Bill ("the Bill") for public comment. The Bill provides a framework for climate change regulation in South Africa aimed at governing South Africa's sustainable transition to a climate resilient, low carbon economy and society. The Bill provides a procedural outline that will be developed through the creation of frameworks and plans.

Red Sands PV3 comprises a renewable energy generation facility and would not result in the generation or release of emissions during its operation.

3.4.12 Strategic Integrated Projects (SIPs)

The Presidential Infrastructure Coordinating Committee (PICC) is integrating and phasing investment plans across 18 Strategic Infrastructure Projects (SIPs) which have five core functions: to unlock opportunity, transform the economic landscape, create new jobs, strengthen the delivery of basic services and support the integration of African economies. A balanced approach is being fostered through greening of the economy, boosting energy security, promoting integrated municipal infrastructure investment, facilitating integrated urban development, accelerating skills development, investing in rural development and enabling regional integration. SIP 8 and 9 of the energy SIPs supports the development of the solar energy facility:

- SIP 8: Green energy in support of the South African economy: Support sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the Integrated Resource Plan (IRP 2010 – 2030) and supports bio-fuel production facilities.
- SIP 9: Electricity generation to support socio-economic development: The proposed Red Sands PV3 is a potential SIP 9 Project as electricity will be generated and social and economic upliftment,

development and growth will take place within the surrounding communities. It would become a SIP 9 project if selected as a Preferred Bidder project by the Department of Energy. SIP 9 supports the acceleration of the construction of new electricity generation capacity in accordance with the IRP 2010 to meet the needs of the economy and address historical imbalances.

Red Sands PV3 could be registered as a SIP project once it is under development. The project would then contribute to the above-mentioned SIPs.

3.4.13 Renewable Energy Development Zones

The Strategic Environmental Assessment (SEA) for Wind and Solar Photovoltaic Energy in South Africa, 2015, has identified 8 Renewable Energy Development Zones (REDZs) that are of strategic importance for large-scale wind and solar photovoltaic energy development, including the roll-out of its supporting transmission and distribution infrastructure, in terms of Strategic Integrated Project (SIP) 8: Green Energy in support of the South African Economy. **Figure 3.3** below illustrates the location of Red Sands PV3 facility within the Upington REDZ.

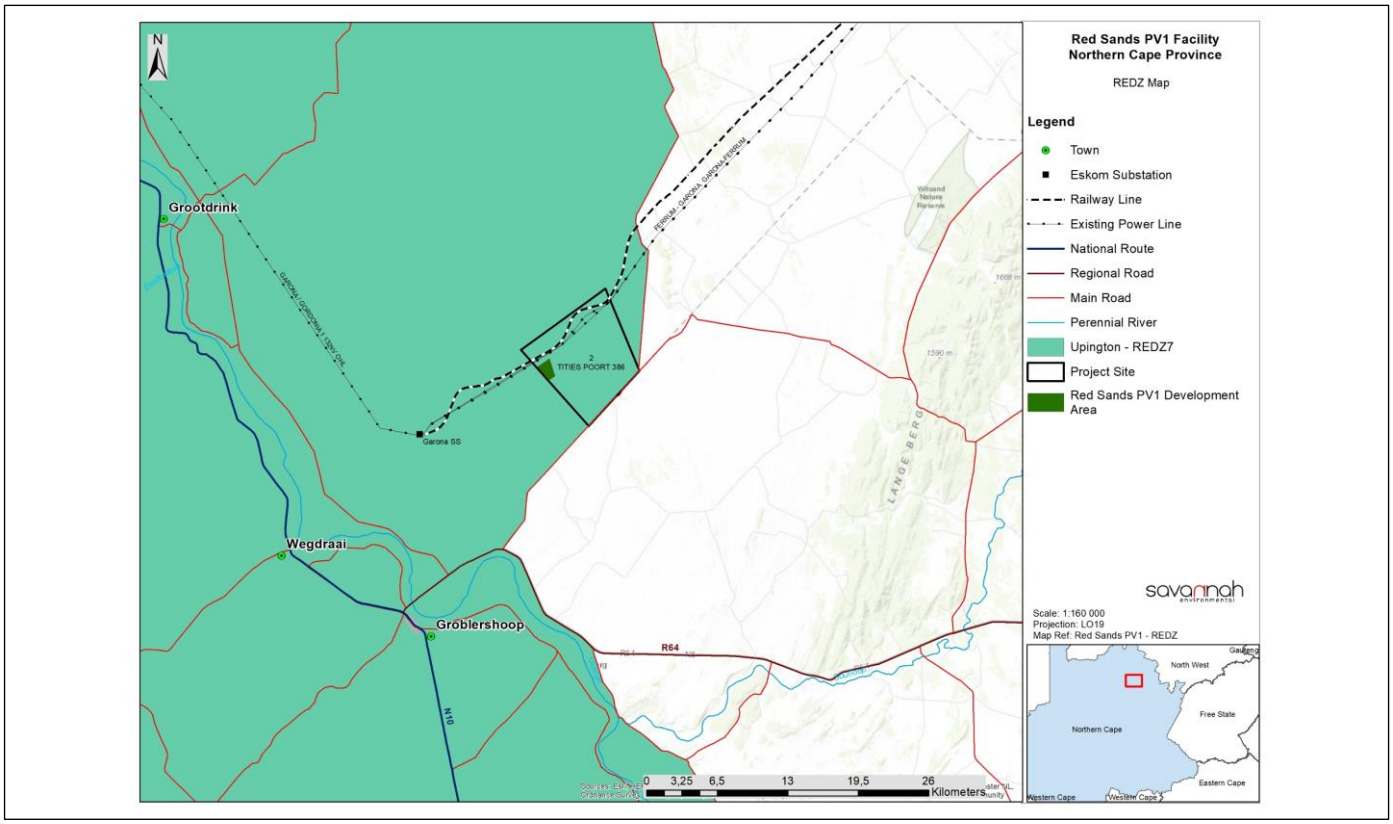

Figure 3.3: Red Sands PV3 is located within the south-western corner of the Upington REDZ area (Zone 7), known as the Upington REDZ

3.4.14 National Biodiversity Economy Strategy (NBES) (March 2016)

The biodiversity economy of South Africa encompasses the businesses and economic activities that either directly depend on biodiversity for their core business or that contribute to conservation of biodiversity through their activities. The commercial wildlife and the bioprospecting industries of South Africa provide cornerstones for the biodiversity economy and are the focus of this strategy.

Both the wildlife and bioprospecting sub-sectors of the biodiversity economy have already demonstrated the potential for significant future development and growth. In the study commissioned on the situational analysis of the biodiversity economy, the contribution of the biodiversity economy to the national economy can be measured in terms of Gross Domestic Product (GDP), with the wildlife and bioprospecting industries contributing approximately R3 billion to GDP in 2013. Growth in the wildlife and bioprospecting industries can make a significant impact on the national economy, while contributing to national imperatives such as job creation, rural development and conservation of our natural resources.

The Wildlife Industry value chain is centred on game and wildlife farming/ranching activities that relate to the stocking, trading, breeding, and hunting of game, and all the services and goods required to support this value chain. The key drivers of this value chain include domestic hunters, international hunters and a growing retail market demand for wildlife products such as game meat and taxidermy products. This sector is therefore characterised by an interesting combination of agriculture, eco-tourism and conservation characteristics.

Over the period 2008-2013, the total Wildlife Industry market grew by more than 14% per year. This growth comprised an average annual growth exceeding 6% in domestic hunting, a decrease in international hunting, and an exponential growth in live auction sales. It is considered likely that the consolidated Wildlife Industry has the potential to experience a weighted average annual growth rate of between 4 %-14 % per year up to 2030.

In order for the wildlife and bioprospecting sub-sectors of the biodiversity economy to achieve its full potential, a strategic partnership between the state, private sector and communities is required. To this end, a National Biodiversity Economy Strategy (NBES) is required to guide the sustainable growth of the wildlife and bioprospecting industries and to provide a basis for addressing constraints to growth, ensuring sustainability, identifying clear stakeholder's responsibilities and monitoring progress of the Enabling Actions.

The Vision of NBES is to optimise the total economic benefits of the wildlife and bioprospecting industries through its sustainable use, in line with the Vision of the Department of Environmental Affairs. The purpose of NBES is to provide a 14-year national coordination, leadership and guidance to the development and growth of the biodiversity economy.

NBES has set an industry growth goal stating that by 2030, the South African biodiversity economy will achieve an average annualised GDP growth rate of 10% per annum. This envisioned growth curve extends into the year 2030 and is aligned to the efforts of the country's National Development Plan, Vision 2030. The NBES seeks to contribute to the transformation of the biodiversity economy in South Africa through inclusive economic opportunities, reflected by a sector which is equitable - equitable access to resources, equitable and fair processes and procedures and equitable in distribution of resources (i.e. business, human, financial, indigenous species, land, water) in the market.

To address these transformation NBES imperatives, NBES has the principles of:

» Conservation of biodiversity and ecological infrastructure
» Sustainable use of indigenous resources
» Fair and equitable beneficiation

» Socio-economic sustainability
» Incentive driven compliance to regulation
» Ethical practices
» Improving quality and standards of products.

The NBES provides the opportunity to redistribute South Africa's indigenous biological/ genetic resources in an equitable manner, across various income categories and settlement areas of the country. The NBES has prioritised nodes in the country for biodiversity economy transformation, referred to as BET nodes. NBES prioritises 18 BET nodes, 13 rural and 5 urban districts across the nine provinces of the country (refer to **Figure 3.4**), with communities having been prioritised for development of small and medium size enterprises and community-based initiatives which sustainably use of indigenous biological and/or genetic resources. The ZF Mgcawu District Municipality within which Red Sands PV3 is proposed is not included as one of these nodes.

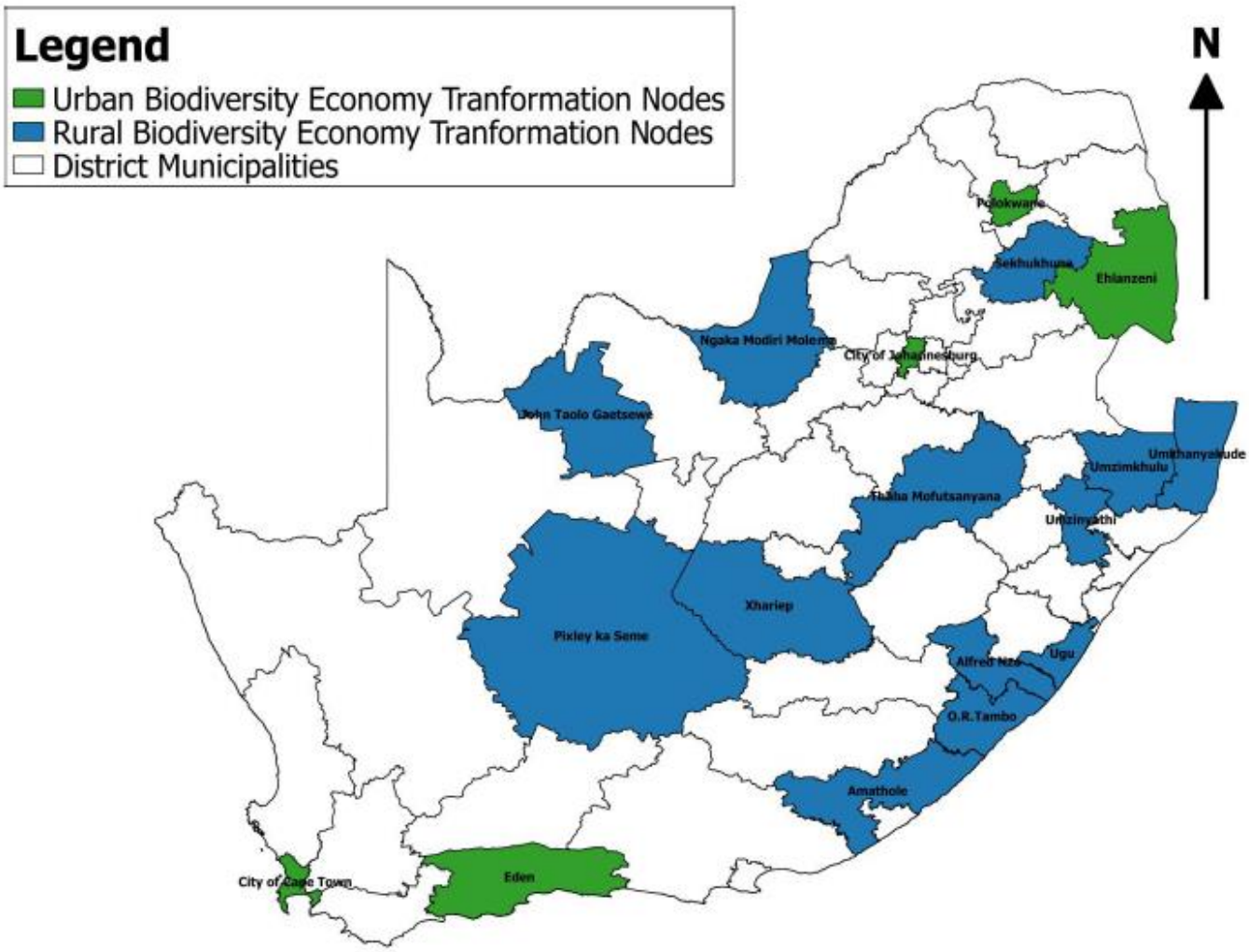

Figure 3.4: Map of the Biodiversity Economy Transformation (BET) nodes which are the transformation priorities of the NBES

3.5 Provincial Planning and Context

3.5.1 Northern Cape Provincial Spatial Development Framework (PSDF) 2012

The Northern Cape Provincial Spatial Development Framework (PSDF) 2012 states that the overarching goal for the Province is to enable sustainability through sustainable development. The Province considers social and economic development as imperative in order to address the most significant challenge facing the Northern Cape, which is poverty.

The PSDF considers the release of greenhouse gas (GHG) emissions created by human activity as the key cause of global warming, which in turn could result in major negative effects and disasters in the short- and medium-term. This effect would increasingly undermine human development gains. Innovative strategies would have to be implemented to reduce the impact of global deterioration.

The PSDF identifies key sectoral strategies and plans which are considered to be the key components of the PSDF. Sectoral Strategy 19 refers to a provincial renewable energy strategy. Within the PSDF a policy has been included which states that renewable energy sources (including the utilisation of solar energy) are to comprise 25% of the Province's energy generation capacity by 2020.

The overall energy objective for the Province also includes promoting the development of renewable energy supply schemes which are considered to be strategically important for increasing the diversity of domestic energy supply and avoiding energy imports, while also minimising the detrimental environmental impacts. The implementation of sustainable renewable energy is also to be promoted within the Province through appropriate financial and fiscal instruments.

3.5.2 The Northern Cape Climate Change Response Strategy

The key aspects of the Northern Cape Climate Change Response Strategy (NCCCRS) Report are summarised in the MEC's (NCPG: Environment and Nature Conservation) 2011 budget speech: "*The Provincial Climate Change Response Strategy will be underpinned by specific critical sector climate change adaptation and mitigation strategies that include the Water, Agriculture and Human Health sectors as the 3 key Adaptation Sectors, the Industry and Transport alongside the Energy sector as the 3 key Mitigation Sectors with the Disaster Management, Natural Resources and Human Society, livelihoods and Services sectors as 3 remaining key. Sectors to ensure proactive long-term responses to the frequency and intensity of extreme weather events such as flooding and wildfire, with heightened requirements for effective disaster management*".

Key points from the MEC address include the NCPG's commitment to develop and implement policy in accordance with the National Green Paper for the National Climate Change Response Strategy (2010), and an acknowledgement of the NCP's extreme vulnerability to climate-change driven desertification. The development and promotion of a provincial green economy, including green jobs, and environmental learnership is regarded as an important provincial intervention in addressing climate change. The renewable energy sector, including solar and wind energy (but also biofuels and energy from waste), is explicitly indicated as an important element of the Provincial Climate Change Response Strategy.

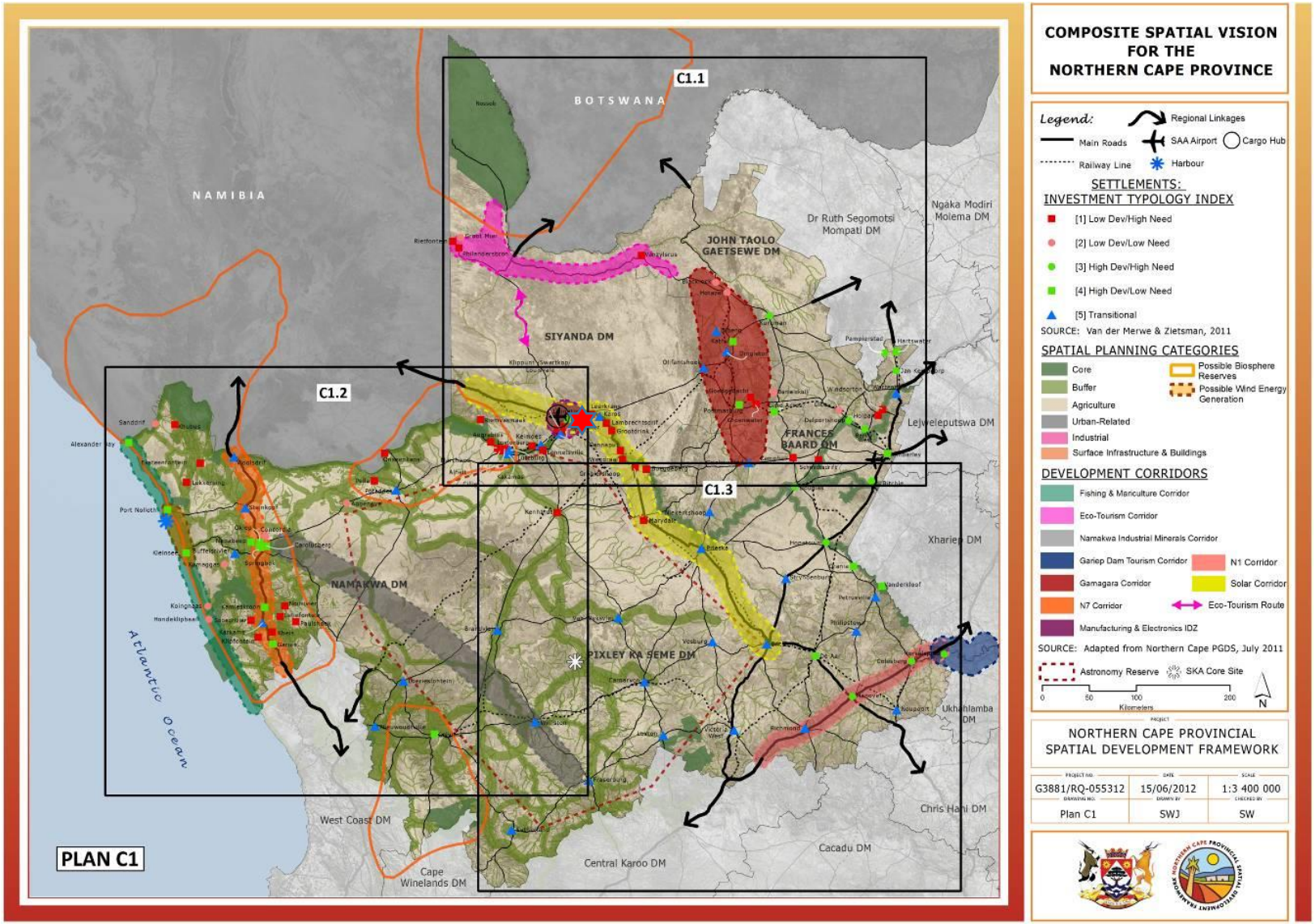

Figure 3.5: Development regions and corridors of the Northern Cape (Source: Northern Cape PSDF 2012). The position of the Red Sands PV3 site is indicated by the red star.

The MEC further indicated that the NCP was involved in the processing 7 wind energy facility and 11 solar energy facility EIA applications (March 2011)[5].

The development of Red Sands PV3 will assist in achieving (although only to a limited extent) the promotion of the provincial green economy of the Northern Cape.

3.6 Local Policy and Planning Context

The local tiers of government within which Red Sands PV3 is located in the Dawid Kruiper Local Municipality within the ZF Mgcawu District Municipality. The development instruments or policies at both the district and local level contain objectives which are in line with the development of Red Sands PV3. These include, economic growth, job creation, community upliftment and poverty alleviation.

Table 3.1: Relevant district and local legislation and policies for Red Sands PV3

Relevant policy	Relevance to Red Sands
ZF Mgcawu District Municipality Draft Integrated Development Plan (IDP), 2018/2019 (2017-2022)	The vision of the ZF Mgcawu DM is "Quality support to deliver quality services." The mission of the ZF Mgcawu DM is "Centre of excellence in providing quality basic services through support to local municipalities." The following strategic and development objectives have been identified for the ZF Mgcawu DM: » To monitor and determine the housing backlogs in the district as well as to eradicate sanitation & infrastructure backlogs » To assess and provide targeted support improving institutional capacity and service delivery capabilities of category B-municipalities » To promote environmental health and safety of communities in the ZF Mgcawu District through the proactive prevention, mitigation, identification and management of environmental health services, fire and disaster risks » To promote safety of communities in the ZF Mgcawu District through the proactive prevention, mitigation, identification and management of fire and disaster risks » To Facilitate the Development of Sustainable regional land use, economic, spatial and environmental planning frameworks that will support and guide the development of a diversified, resilient and sustainable district economy » To market, develop and co-ordinate tourism in the ZF Mgcawu District » To assess and monitor the status of infrastructure needs and requirements of B Municipalities » To ensure efficient business operations and to fulfils the assurance statutory requirements of the ZF Mgcawu District Municipality The spatial vision for the district is an mix of » Tourism, Cultural, wilderness, floristic, river tourism ranging from the Kgalagadi international trans frontier park to the culture of the Riemvasmak community to river

[5] (www.info.gov.za/speech/DynamicAction?pageid=461&sid=22143&tid=45200).

Relevant policy	Relevance to Red Sands
	tourism on the mighty Orange River ; » Mining and mining beneficiation; » Agriculture: river bank vineyards and expansive stock and game farming in the Kalahari; and » Renewable energy technology opportunities. The strategic objective of supporting and guiding the development of a diversified, resilient and sustainable district economy, and the development objectives of creating investment opportunities in sectoral development (i.e. investment activities, Entrepreneurial business support programme), and enabling an environment for business establishment and support initiatives (i.e. Increase the number of businesses, entrepreneurial support) through its local content and local economic development requirements as prescribed under the REIPPP Programme will be supported through the proposed development.
!Kheis Local Municipality Final Integrated Development Plan 2017-2022	The !Kheis Local Municipality aims to promote socio-economic development through the eradication of backlogs associated with housing, water and sanitation, and electricity, as well as improve basic services. According to the !Kheis Local Municipality IDP 2017-2022: "The Municipality is in the middle of the Presidential Infrastructure Coordinating Committee (PICC), Strategic Infrastructure Program (SIP) and is therefore part of the Special Economic Development Zone of the Solar Corridor. !Kheis Municipal area could benefit from a number of programs that are not available to other Municipalities, and must be incorporated in the approach in the IDP.

CHAPTER 4: PROJECT NEED AND DESIRABILITY

Appendix 1 of the EIA Regulations, 2014 (as amended) requires the inclusion of a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location. This Chapter provides an overview of the anticipated suitability of Red Sands PV3 being developed at the preferred location from an international, national, regional, and site-specific perspective. It also provides an overview of the need and desirability and perceived benefits of the project specifically.

4.1. Need and Desirability from an International Perspective

The need and desirability of Red Sands PV3, from an international perspective, can be described through the project's alignment with internationally recognised and adopted agreements, protocols, and conventions. South Africa is signatory to a number of international treaties and initiatives, including the United Nations Development Programme's (UNDP's) Sustainable Development Goals (SDGs). The SDGs address social and economic development issues such as poverty, hunger, health, education, climate change, gender equality, water, sanitation, energy, urbanization, environment and social justice. The SDGs comprise 17 global goals set by the United Nations. The 17 SDGs are characterised by 169 targets, and 304 indicators.

Goal 7 of the SGDs relates to "Affordable and Clean Energy", with the aim of the goal being to ensure access to affordable, reliable, sustainable and modern energy for all. The following targets and indicators have been set for Goal 7:

Targets		Indicators	
7.1	By 2030, ensure universal access to affordable, reliable and modern energy services.	7.1.1 7.1.2	Proportion of population with access to electricity. Proportion of population with primary reliance on clean fuels and technology.
7.2	By 2030, increase substantially the share of renewable energy in the global energy mix.	7.2.1	Renewable energy share in the total final energy consumption.
7.3	By 2030, double the global rate of improvement in energy efficiency.	7.3.1	Energy intensity measured in terms of primary energy and GDP.
7.A	By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology.	7.A.1	Mobilized amount of United States dollars per year starting in 2020 accountable towards the $100 billion commitment.
7.B	By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States, and land-locked developing countries, in accordance with their respective programmes of support.	7.B.1	Investments in energy efficiency as a percentage of GDP and the amount of foreign direct investment in financial transfer for infrastructure and technology to sustainable development services.

The development of Red Sands PV3 would contribute positively towards Goal 7 of the SGDs through the following means:

- By generating up to 100MW of affordable and clean energy.
  - A study published by the CSIR on 14 October 2016 ("Cost of new power generators in South Africa Comparative analysis based on recent IPP announcements", Dr Tobias Bischof-Niemz and Ruan Fourie) which took into consideration the results of the cost prices bid successfully under the DMRE's REIPPP and Coal Baseload IPP Procurement (CBIPPP) Programmes found that solar PV and wind were 40% cheaper than new baseload coal (i.e. R0.62/kWh for PV and wind vs R1.03 for coal).
  - PV technology is one of the cleanest electricity generation technologies, as it is not a consumptive technology and does not result in the release of emissions during its operation.
- By contributing towards South Africa's total generation capacity, specifically through the utilisation of renewable energy resources.

4.2. Need and Desirability from a National Perspective

4.2.1. Policy and Planning

Red Sands PV3 is proposed in specific response to the requirement for diversification of the country's energy mix to include renewable energy such as solar PV as detailed in the IRP 2019. As a result, the need and desirability of Red Sands PV3 from a national perspective, can largely be assimilated from the project's alignment with national government policies, plans, and programmes which have relevance to energy planning and production (as discussed in detail in **Chapter 2**). The following key plans have been developed by government to consider South Africa's current energy production, projected future demands, and provides the necessary framework within which energy generation projects can be developed:

- Integrated Energy Plan (IEP)
- Integrated Resource Plan (IRP)

The abovementioned energy plans have been extensively researched and are updated on an ongoing basis to take into consideration changing scenarios, new information, developments in new technologies, and to reflect updated demands and requirements for energy production within the South African context. These plans form the basis of South Africa's energy generation sector and dictate national priorities for energy production.

The IEP is intended to provide a roadmap of South Africa's future energy landscape and guide future energy infrastructure investments and policy development. The latest iteration of the IEP (25 November 2016) contained the following statement regarding solar power in South Africa:

"*South Africa experiences some of the highest levels of solar radiation in the world and this renewable resource holds great potential for the country. The daily solar radiation in South Africa varies between 4.5 and 6.5 kilowatt hours per square meter (kWh/m²) (16 and 23 megajoules per square meter [MJ/m²]) (Stassen, 1996), compared to about 3.6kWh/m² in parts of the United States and about 2.5kWh/m² in Europe and the United Kingdom. The total area of high radiation in South Africa amounts to approximately*
194 000km², including the Northern Cape, which is one of the best solar resource areas in the world. With

electricity production per square kilometre of mirror surface in a solar thermal power station being 30.2MW, and just 1% of the high radiation area in the country being made available for solar power generation, the generation potential is approximately 64GW. Solar energy has the potential to contribute quite substantially to South Africa's future energy needs. This would, however, require large investments in transmission lines from the areas of high radiation to the main electricity consumer centres."

In terms of electricity generation, the IEP states that South Africa should continue to pursue a diversified energy mix which reduces reliance on a single or a few primary energy sources, and includes the following statement regarding solar energy's contribution to the diversified energy mix:

- *Solar should play a much more significant role in the electricity generation mix than it has done historically, and constitutes the greatest share of primary energy (in terms of total installed capacity) by 2050. The contribution of solar in the energy mix comprises both CSP and solar PV. Solar PV includes large scale installations for power generation which supply to the grid and individual, off-grid solar home systems and rooftop panels.*
- *Several interventions which could enhance the future solar energy landscape are recommended as follows: – Large scale CSP projects with proven thermal storage technologies and hybridisation / industrial steam application projects should be incentivised in the short to medium term. In the long term the existing incentives could be extended to promote locally developed CSP technology storage solutions and large scale solar fuel projects.*
- *A thorough solar resource assessment for South Africa should continue to be undertaken in the Northern Cape Province and extended to other provinces deemed to have high solar radiation levels.*
- *Investments should be made to upgrade the grid in order to accommodate increasing solar and other renewable energy contributions.*

The IRP for Electricity 2010 – 2030 is a subset of the IEP and constitutes South Africa's current gazetted energy plan. The purpose of the plan is to ensure sustainable electricity development which takes into consideration technical, economic, and social constraints, and identifies investments in the electricity sector which are required to meet the country's forecasted electricity demands at minimum costs. The IRP 2010 included 9.6GW of nuclear, 6.25GW of coal, **17.8GW of renewables**, and approximately 8.9GW of other generation sources such as hydro and gas in addition to all existing and committed power plants.

Since the promulgated IRP 2010, the following capacity developments have taken place:

- A total of **6 422MW** under the REIPP Programme has been procured with **3 876MW** being operational and made available to the grid;
- **1 005MW** has been commissioned by IPPs from the two (2) Open Cycle Gas Turbine (OCGT) peaking plants; and
- Under the Eskom Build Programme, **1 332MW** has been commissioned from the Ingula Pump Storage Project in Kwa-Zulu Natal, **4 764MW** and **4 800MW** from the Medupi and Kusile power stations, and **100MW** has been commissioned from the Sere Wind Farm.

Besides capacity additions, a number of assumptions changed since the promulgation of IRP 2010–2030. Key assumptions that changed include the electricity demand projection, Eskom's existing plant performance, as well as new technology costs. In addition, environmental considerations such as South Africa's contribution to Greenhouse gases which contribute to climate change, local air quality and water availability have come to the fore.

These considerations necessitated the review and update of the IRP and ultimately the promulgation of a revised plan in October 2019. In terms of the IRP 2019, South Africa continues to pursue a diversified energy mix that reduces reliance on a single or a few primary energy sources. In the period prior to 2030, the system requirements are largely for incremental capacity addition (modular) and flexible technology, to complement the existing installed inflexible capacity. South Africa is a signatory to the Paris Agreement on Climate Change and has ratified the agreement. In line with NDCs (submitted to the UNFCCC in November 2016), South Africa's emissions are expected to peak, plateau and from year 2025 decline. As detailed in Chapter 2 of this report, the IRP 2019 provides for the development of 6000MW of new capacity from large scale PV.

In addition to the policy considerations detailed above, Government has prioritised post COVID-19 turnaround plans in terms of renewable energies within the Just Energy Transition (JET), coupled with key development objectives of the various spheres of government. These policies share the same ideals, such as:

» The utilisation, application and investment in renewable energy resources in South Africa is considered to be an essential means of reducing the carbon footprint of the country,
» Diversifying the national economy,
» Reducing poverty, and
» Providing critical additional energy to that of Eskom.

Government has compiled an Economic Reconstruction and Recovery Plan which was presented to Parliament in October 2020. According to this plan, the economic survey will rely on a massive investment in infrastructure, including energy, telecommunications, ports and rail. The core elements of the Economic Reconstruction and Recovery Plan are as follows:

1. Priority interventions for economic recovery: the plan sets out eight priority interventions that will ignite South Africa's recovery and reconstruction effort. These are the flagship initiatives that all of society will rally around to build a new economy (Figure 4.1).
2. Enabling conditions for growth: these are growth-enhancing reforms and other preconditions for an inclusive, competitive and growing economy.
3. Macroeconomic framework: economic reconstruction and recovery requires careful mobilisation of resources to ensure fiscal sustainability.
4. Institutional arrangements: the plan focuses on execution, and is supported by enhanced institutional arrangements to ensure implementation and accountability.

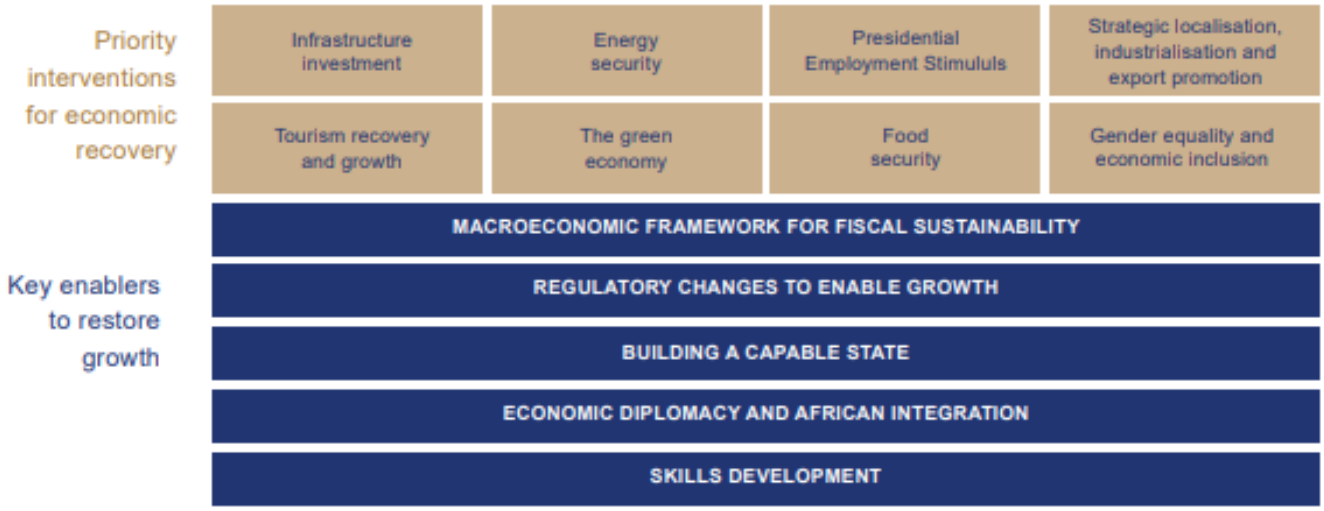

Figure 4.1: Core elements of the Economic Reconstruction and Recovery Plan (source: Building a new economy - Highlights of the Reconstruction and Recovery Plan, Presidency of the Republic of South Africa)

The plan recognises energy security as the most important prerequisite for the recovery agenda and states that renewed investment in a diversified energy mix can be achieved within a short time horizon, while alleviating a crippling energy crisis and facilitating a necessary transition to a less carbon-intensive economy. One of the key commitments of the plan is therefore to implement the IRP 2019 without delay to provide a substantial increase in the contribution of renewable energy sources by 2030, alongside other sources including battery storage, gas and clean coal. The transition to green energy is recognised as contributing towards the realisation of the low-carbon, climate-resilient and inclusive economy envisaged by the National Development Plan. The development of the Red Sands PV3 is identified as a mechanism for securing additional power generation capacity for private off-takers, reducing the reliance for electricity on Eskom.

The cluster of renewable energy facilities, which the Red Sands PV3 forms part of, will ensure the optimisation of a supply of steady state baseload type power, as well as play a significant role in the Just Energy Transition ("JET") by supplying low-cost energy to the national grid. At the same time, it will contribute to a JET fund to assist in transitioning jobs from the fossil fuel sector in Mpumalanga to renewable energy. The available solar resource, proximity to the transmission infrastructure and scale of the portfolio may also play a possible role in in contributing to the hydrogen economy in South Africa, with Europe as a possible export market.

Furthermore, the solar facility will contribute to the economic recovery and reconstruction as part of the Government's plan.

The South African government has identified the green economy as one of 12 job drivers that could help contribute to creating 5 million additional jobs by 2020. The New Growth Path, in which the sectoral job targets are disaggregated, envisages that as many as 300 000 new direct jobs could be created in the areas of natural resource management and renewable energy construction (Department of Energy, 2019). The developer will implement social and economic development strategies, including amongst others, job creation, local content, skills development, enterprise and supplier development, and socio-

economic development. In addition to electricity generation and supply the project will therefore also contribute positively towards socio-economic development of a region, over and above job creation.

Red Sands PV3 will make use of renewable energy technology and would contribute positively towards reducing South Africa's GHG emissions and ensure compliance with all applicable legislation and permitting requirements. In addition, by making use of PV technology, Red Sands PV3 would have reduced water requirements when compared with some other generation technologies in alignment with one of the Vision 2030 themes of the then Department of Water and Sanitation's (now the Department of Human Settlements, Water and Sanitation) National Water Resource Strategy 2 (2013) (i.e. transitioning to a low carbon economy through stimulating renewable energy and retrofitting buildings).

4.2.2. Benefits of Renewable Energy in the South African Environment

The generation of electricity from renewable energy resources offers a range of potential socio-economic and environmental benefits for South Africa. These benefits include:

Increased energy security: Given that renewables can often be deployed in a short timeframe and in a decentralised manner close to consumers, they offer the opportunity for improving grid strength and supply quality in the short-term, while reducing expensive distribution losses. As a result of the power constraints in the first half of 2015, power generators, meant to be the "barely-ever-used" safety net for the system (diesel-fired gas turbines), were running at > 30% average load factor in the first half of 2015. Load shedding occurred during 82 days in the first half of 2015 (out of 181 days). Results of a CSIR Energy Centre study for the period January to June 2015 (CSIR, August 2015), concluded that the already implemented renewable projects (wind and solar) within the country avoided 203 hours of so-called 'unserved energy'. During these hours the supply situation was so tight that some customers' energy supply would have had to be curtailed ('unserved') if it had not been for the renewables. The avoidance of unserved energy cumulated into the effect that during 15 days from January to June 2015, load shedding was avoided entirely, delayed, or a higher stage of load shedding was prevented due to the contribution of the wind and PV projects[6].

Resource saving: It is estimated that the achievement of the targets in the Renewable Energy White Paper will result in water savings of approximately 16.5 million kilolitres per annum. As an already water-stressed nation, it is critical that South Africa engages in a variety of water conservation measures, particularly due to the detrimental effects of climate change on water availability. Renewable energy also translates into revenue savings, as fuel for renewable energy facilities is free compared to the continual purchase of fuel for conventional power stations. Results of a CSIR Energy Centre study for January to June 2015 (CSIR, August 2015) have quantified the contribution from renewable energy to the national power system and the economy over the first 6 months of 2015 compared to the 12 months of 2014:

2014 (12 months)	2015 (6 months)

[6] (http://ntww1.csir.co.za/plsql/ptl0002/PTL0002_PGE157_MEDIA_REL?MEDIA_RELEASE_NO=7526896)

2014 (12 months)	2015 (6 months)
R3.64 billion saving in diesel and coal fuel costs	R3.60 billion saving in diesel and coal fuel costs
120 hours of unserved energy avoided, saving at least an additional R1.67 billion for the economy	200 hours of unserved energy avoided, saving at least an additional R1.20 billion–R4.60 billion for the economy
Generated R0.8 billion more financial benefits than cost	Generated R4.0 billion more financial benefits than cost

The overview of the Independent Power Producers Procurement Report (March 2019) has indicated that water savings of 42.8 million kilolitres has been realised by the programme from inception until the end of March 2019, of which 3.4 million kilolitres is reported on in this 2019 reporting quarter.

Exploitation of our significant renewable energy resource: At present, valuable renewable resources including biomass by-products, solar radiation and wind power remain largely unexploited. The use of these energy flows will strengthen energy security through the development of a diverse energy portfolio in South Africa.

By the end of March 2020, the REIPPPP had made the following significant impacts in terms of energy supply:

- 6 422 MW1 of electricity had been procured from 112 RE Independent Power Producers (IPPs) in seven bid rounds ;
- 4 201 MW of electricity generation capacity from 67 IPP projects has been connected to the national grid;
- 46 946 GWh of energy has been generated by renewable energy sources procured under the REIPPPP since the first project became operational. Renewable energy IPPs have proved to be very reliable. Of the 67 projects that have started operations, 64 projects have been operational for longer than a year. The electrical energy generated over the past 12 month period for the 64 projects is 11 176 GWh which is 94% of their annual energy contribution projections (P50) 3 of 11 882 GWh over a 12 month delivery period. Twenty seven (27) of the 64 projects (42%) have individually exceeded their P50 projections.

In addition to the above:

- **2 000MW** of generating capacity (comprising various technologies) has been awarded to 8 Independent Power Producers under the RMIPPPP in March 2021.
- **2 583MW** of electricity in bid window 5 of the REIPPPP, announced on 28 October 2021 (DMRE, 2021).

Economics: As a result of the excellent resource and competitive procurement processes, both wind power and solar PV power are now proven in South Africa as cheaper forms of energy generation than coal power. They offer excellent value for money to the economy and citizens of South Africa while benefitting society as a whole through the development of clean energy.

The following has been achieved by the IPP programme (March 2020) in terms of investment and economics:

- Investment (equity and debt) to the value of R209.7 billion, of which R41.8 billion (20%) is foreign investment, was attracted;

- Created 50 984 job years4 for South African citizens to date;
- Socio-economic development contributions of R1.2 billion to date, of which R88.3 million was spent in this reporting quarter; Enterprise development contributions of R365.6 million to date, of which R25.0 million was spent in this reporting quarter;

Pollution reduction: The release of by-products through the burning of fossil fuels for electricity generation has a particularly hazardous impact on human health and contributes to ecosystem degradation. The use of solar radiation or wind for power generation is a non-consumptive use of a natural resource which produces zero emissions during its operation.

The overview of the Independent Power Producers Procurement Report (March 2020) indicates that carbon emission reductions of 47.7 Mton CO2 has been realised by the programme from inception to date, of which 2.9 Mton in the March 2020 reporting quarter.

Climate friendly development: The uptake of renewable energy offers the opportunity to address energy needs in an environmentally responsible manner and thereby allows South Africa to contribute towards mitigating climate change through the reduction of greenhouse gas (GHG) emissions. South Africa is estimated to be currently responsible for approximately 1% of global GHG emissions (and circa half of those for which Africa is responsible) and is currently ranked 9th worldwide in terms of per capita carbon dioxide emissions. The renewable energy sector saved South Africa 1.4 million tons of carbon emissions over the first 6 months of 2015[7].

Support for international agreements: The effective deployment of renewable energy provides a tangible means for South Africa to demonstrate its commitment to its international agreements under the Kyoto Protocol and the Paris Agreement, and for cementing its status as a leading player within the international community.

Employment creation: The development, procurement, installation, maintenance and management of renewable energy facilities have significant potential for job creation and skills development in South Africa. The construction phase will create temporary employment opportunities and the operation phase will create limited full-time employment opportunities.

The overview of the Independent Power Producers Procurement Report (March 2020) indicates that all IPP projects to date have created 40 134 job years for South African citizens.

Acceptability to society: Renewable energy offers a number of tangible benefits to society including reduced pollution concerns, improved human and ecosystem health, the use of clean energy and climate friendly development.

[7] http://www.iol.co.za/capetimes/renewable-energy-saving-sa-billions-csir-1.1903409#.VkNjdJq6FeU

Support to a new industry sector: The development of renewable energy offers the opportunity to establish a new industry within the South African economy, which will create jobs and skill local communities and result in community upliftment for the affected areas.

Protecting the natural foundations of life for future generations: Actions to reduce the disproportionate carbon footprint can play an important part in ensuring the human role in preventing dangerous anthropogenic climate change, thereby securing the natural foundations of life for generations to come; this is the basis of sustainable development.

4.3. Need and Desirability of the project from a Regional Perspective

South Africa's electricity generation mix has historically been dominated by coal. This can be attributed to the fact that South Africa has abundant coal deposits, which are relatively shallow with thick seams, and are therefore easy and comparatively cost effective to mine. **Figure 4.2** provides an overview of the energy mix of South Africa in 2021 (Akinbami, et al, 2021).

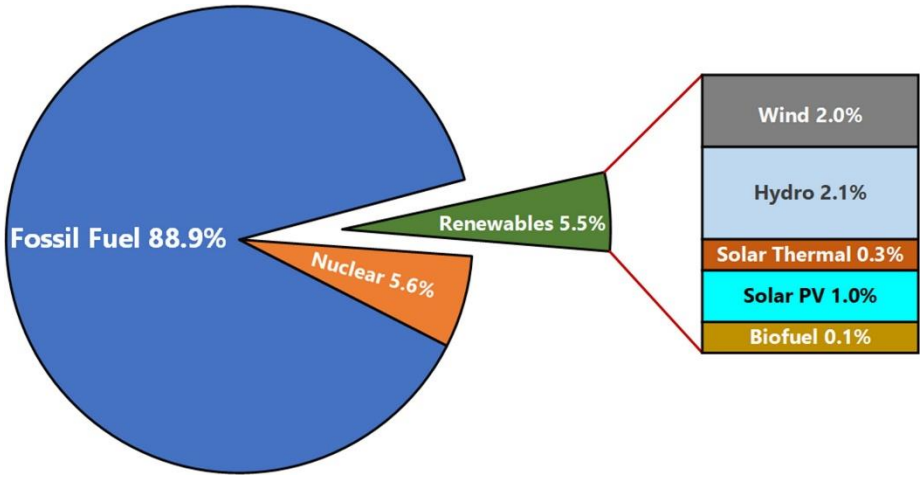

Figure 4.2: Overview of South Africa's energy mix.

Whereas the majority of South Africa's electricity generation infrastructure is currently located within Mpumalanga Province due to the location of coal resources within this province, the Northern Cape Province has been identified as an area where the development of solar energy facilities is a feasible and suitable option for electricity generation. the Northern Cape region ranked highest among all the provinces in terms of renewable energy (solar PV, CSP, wind and Biomass) deployment in South Africa (refer to **Figure 4.3**).

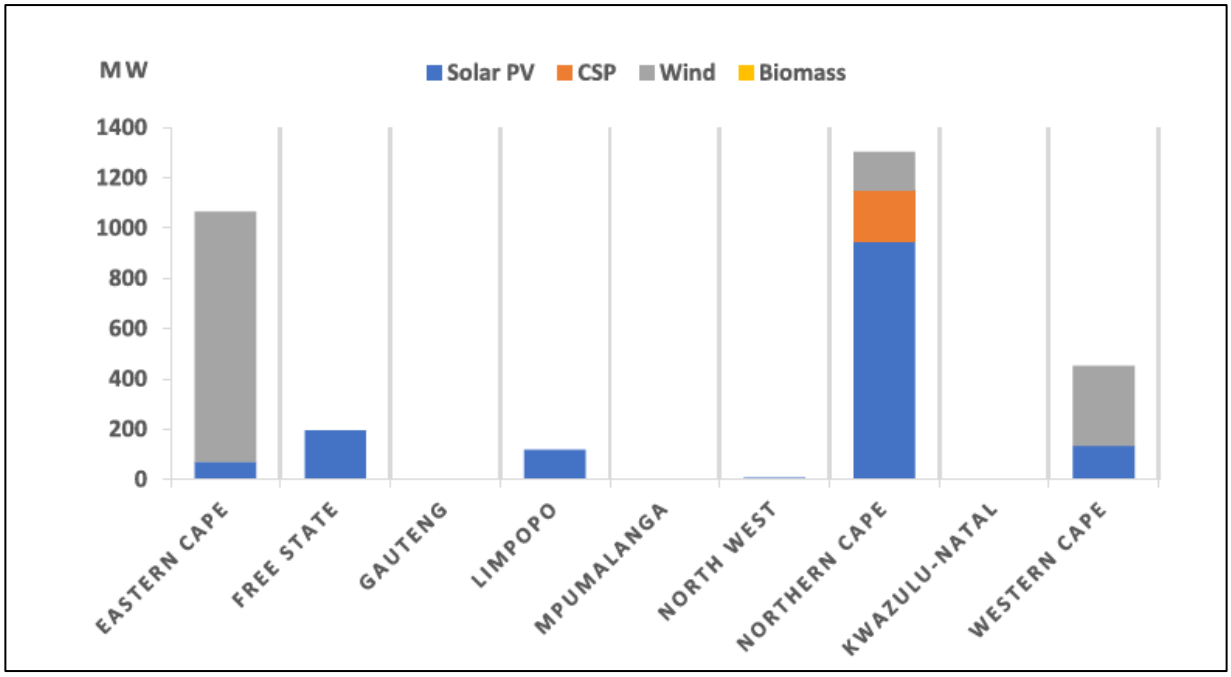

Figure 4.3: South Africa's electricity generation in MW by different technologies (source: Akinbami et al, 2021).

The Upington area has been ear-marked as a hub for the development of solar energy projects due to the viability of the solar resource for the area, and this area is included in the solar corridor which has been identified by the Northern Cape Spatial Development Framework (refer to Chapter 3 for more details), as well as within the Upington REDZ (an area identified for the development of commercial solar PV facilities). The overarching objective for the solar energy facility is to maximise electricity production through exposure to the solar resource, while minimising infrastructure, operational and maintenance costs, as well as social and environmental impacts. From a regional site selection perspective, this region is considered to be preferred for solar energy development by virtue of its annual solar irradiation values. The GHI for the area derived from the World Bank Group's Global Solar Atlas is approximately 2 264kWh/m^2/annum, equivalent to the highest GHI values in the country (refer to **Figure 4.4**). The project site is therefore suitably located for the proposed development.

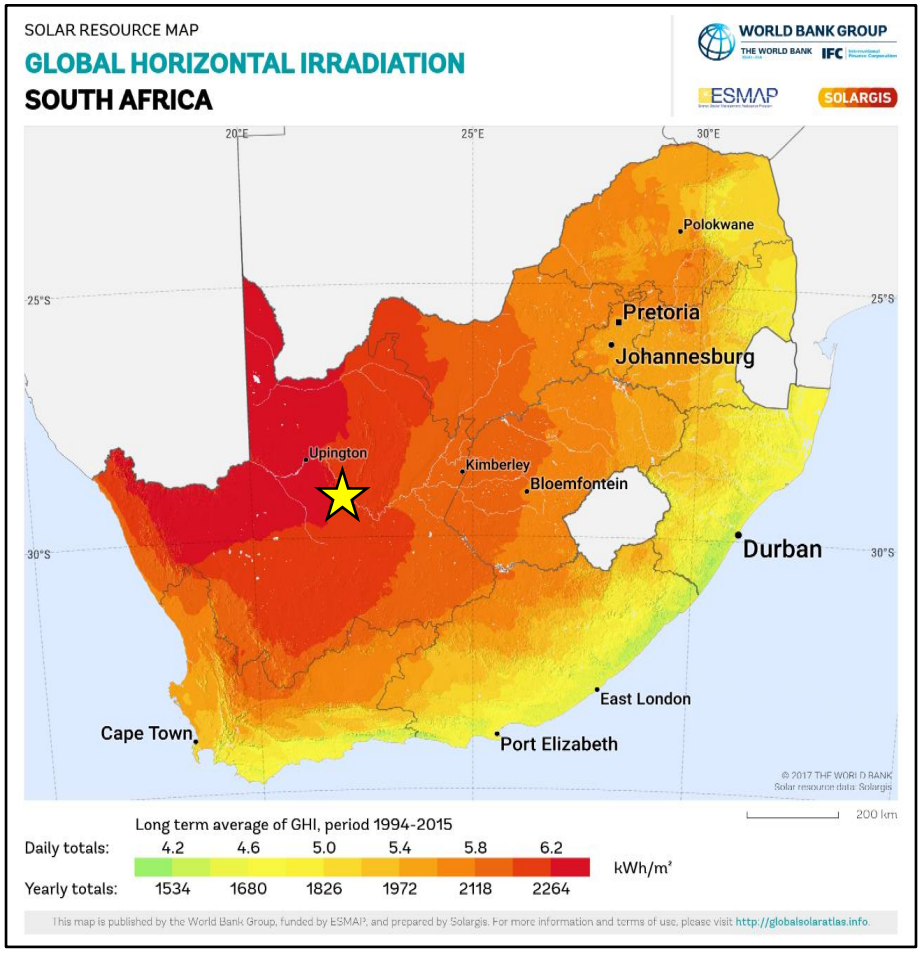

Figure 4.4: Solar irradiation map for South Africa, the proposed position of Red Sands PV3 is shown by the yellow star on the map. (Source: World Bank Groups Global Solar Atlas).

4.4. Need and Desirability of the project from a Local Perspective

The Red Sands PV3 project site itself has not been considered for an alternative land use such as urban development, nor is it currently used for agriculture as a result of limited potential due to scarcity of water resources. The proposed development of the site for renewable energy is therefore considered to be a suitable land use.

From a local perspective, the site has specifically been identified by the project proponent as being highly desirable for the development of a PV facility due to its suitable topography (i.e. in terms of slope and local topography), site access (i.e. to facilitate the movement of machinery during the construction phase and operations staff in the long-term), land availability (i.e. the land is secured for the intended use), the extent of the site (i.e. the land parcel is able to accommodate the 184 ha required for the facility) (refer to Section 2.2 for details), and enabling optimal placement of the infrastructure considering potential environmental sensitivities or technical constraints, as well as the consolidation of renewable projects within an already identified node, being within an identified Solar Corridor and REDZ.

The site is located within an area which has become a node for solar energy projects, with the operational Bokpoort CSP located directly within a 30km radius from the project development site. According to current records there are 22 other developments proposed within a 50km radius of the proposed

development site (refer to **Chapter 8** for more details of these developments and the expected cumulative impacts). The consolidation of similar developments within an area is considered desirable. This consolidation of projects will result in a consolidation of impacts within one area rather than a spread of the impacts across a larger area, enabling focussed management and mitigation within a single area.

4.5 Conclusion

From the above, it is clear that the need and desirability for the project is supported from a planning and policy perspective on a national, provincial, district, and local level, as well as from a technical perspective when considering solar resource. It is however important to also consider the potential impacts and benefits that the proposed solar facility may have for the affected site and surrounding area from both a biodiversity sustainability perspective and a socio-economic perspective. Therefore, it is imperative for the assessment being undertaken for the project to consider this project not only from a policy (national, provincial and local level) perspective, but also from a biodiversity and socio-economic perspective. The aim of the EIA process is to ensure a balance between these three spheres and to ensure that conclusions made regarding the proposed project draw on both the positive and negative consequences of the proposed development, as well as the potential for impacts to be compounded through the development of the solar facility and its associated infrastructure in proximity to other similar developments (i.e. cumulative impact). The potential impacts are identified and assessed in this Basic Assessment Report.

CHAPTER 5: APPROACH TO UNDERTAKING THE BASIC ASSESSMENT PROCESS

In terms of the EIA Regulations of December 2014 (amended in April 2017) published in terms of the NEMA (Act No. 107 of 1998) as amended, the construction and operation of Red Sands PV3 is a listed activity requiring environmental authorisation. In terms of GNR114 of February 2018, the application for environmental authorisation is required to be supported by a BA process based on the location of the Red Sands PV3 project site within the Upington REDZ.

The BA process aims at identifying and describing potential environmental issues associated with the development of the proposed solar PV facility and associated infrastructure[8]. In order to ensure that a comprehensive assessment is provided to the competent authority and I&APs regarding the impacts of the facility, detailed independent specialist studies were undertaken as part of the BA process.

During the undertaking of the BA process South Africa was subjected to the spread of COVID-19 throughout the country which lead to the implementation of various mechanisms limiting the movement of people to curb the spread of the virus. Considering the limitations experienced during this time a comprehensive consultation process was designed and implemented to cater for the undertaking of a full-scale, innovative public participation process which included I&APs, the competent authority, directly impacted landowners/occupiers, adjacent landowners/occupiers, relevant Organs of State departments, ward councillors and other key stakeholders. This chapter serves to outline the process that was followed during the BA process.

5.1 Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This chapter of the BA report includes the following information required in terms of Appendix 1: Content of the BA Report:

Requirement	Relevant Section
3(d)(i) a description of the scope of the proposed activity, including all listed and specified activities triggered and being applied for.	All listed activities triggered as a result of the development of Red Sands PV3 have been included in section 5.2, **Table 5.1**. The specific project activity relating to the relevant triggered listed activity has also been included in **Table 5.1**.
3(h)(ii) details of the public participation process undertaken in terms of Regulation 41 of the Regulations, including copies of the supporting documents and inputs.	The details of the public participation process undertaken for Red Sands PV3 has been included and described in section 5.3.2.
3(h)(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them.	All comments raised during the 30-day review and comment period of the BA Report and through on-going consultation with I&APs will be included as part of a C&R report (**Appendix C8**) to be submitted as part of the Final

[8] The grid connection solution for Red Sands PV3 will be assessed as part of this Basic Assessment process.

Requirement	Relevant Section
	BA Report to DFFE for decision-making.
3(h)(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives.	The methodology used to assess the significance of the impacts of Red Sands PV3 has been included in **section 5.4**.
(o) a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed.	The assumptions and limitations of the BA process being undertaken for Red Sands PV3 is included in **section 5.6**.

5.2 Relevant legislative permitting requirements

The legislative permitting requirements applicable to Red Sands PV3 as identified at this stage in the process are described in more detail under the respective sub-headings.

5.2.1 National Environmental Management Act (No. 107 of 1998) (NEMA)

NEMA is South Africa's key piece of national environmental legislation that provides for the authorisation of certain controlled activities known as "listed activities". In terms of Section 24(1) of NEMA, the potential impact on the environment associated with listed activities must be considered, investigated, assessed and reported on to the competent authority (the decision-maker) charged by NEMA with granting of the relevant EA. Due to the fact that Red Sands PV3 is a power generation project and therefore relates to the IRP 2010 – 2030, 2019[9], the National DFFE has been determined as the Competent Authority in terms of GNR 779 of 01 July 2016. The Provincial Northern Cape Department Agriculture, Environmental Affairs, Rural Development, and Land Reform (DAEARD&LR) is a Commenting Authority on the project.

The need to comply with the requirements of the EIA Regulations published under the NEMA ensures that proponents are provided the opportunity to consider the potential environmental impacts of their activities early in the project development process, and also allows for an assessment to be made as to whether environmental impacts can be avoided, minimised or mitigated to acceptable levels. Comprehensive, independent environmental studies are required to be undertaken in accordance with the EIA Regulations to provide the competent authority with sufficient information in order for an informed decision to be taken regarding the project and Application for Environmental Authorisation.

The BA process being conducted for Red Sands PV3 is being undertaken in accordance with Section 24 (5) of the NEMA. Section 24 (5) of NEMA pertains to Environmental Authorisations (EAs), and requires that the potential consequences for, or impacts of, listed or specified activities on the environment be considered, investigated, assessed, and reported on to the competent authority. Listed Activities are activities identified in terms of Section 24 of the NEMA which are likely to have a detrimental effect on the environment, and which may not commence without an EA from the competent authority subject to the

[9] The Integrated Resource Plan (IRP) is legislated policy which regulates power generation planning.

completion of an environmental assessment process (either a Basic Assessment (BA) or full Scoping and EIA).

As the proposed development is located within Zone 7 of the Renewable Energy Development Zones (REDZ) (also known as the Upington REDZ), one of the eleven (11) designated REDZ areas, the EIA process to be followed for Red Sands PV3 will be as per GN R114, as formally gazetted on 16 February 2018. Red Sands is now subject to a Basic Assessment process and not a full Scoping & EIA process, as well as a shortened timeframe of 57 days for the processing of an application for environmental authorisation.

Table 5.1 details the listed activities in terms of the EIA Regulations, 2014 (as amended) which apply to Red Sands PV3, and for which an Application for Environmental Authorisation has been submitted to DFFE. The table also includes a description of the specific project activities which relate to the applicable listed activities.

Table 5.1: Listed activities as per the EIA regulations which are triggered by Red Sands PV3

Indicate the number and date of the relevant notice:	**Activity No (s) (in terms of the relevant notice):**	**Describe each listed activity as per project description**
GN 327, 08 December 2014 (as amended on 07 April 2017)	11(i)	The development of facilities or infrastructure for the transmission and distribution of electricity - (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts. ***Red Sands PV3 will require the construction and operation of an on-site substation with a capacity of more than 33 but less than 275 kilovolts outside an urban area***
GN 327, 08 December 2014 (as amended on 07 April 2017)	14	The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic meters or more, but not exceeding 500 cubic meters. ***The development and operation of Red Sands PV3 will require the storage of up to 80 cubic metres of dangerous goods, which will include flammable and combustible liquids such as oils associated with the on-site facility substation transformers, lubricants and solvents***
GN 327, 08 December 2014 (as amended on 07 April 2017)	28(ii)	Residential, mixed, retail, commercial, industrial, or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare. ***Red Sands PV 1 (considered to be an industrial development) will be constructed and operated on land used for agricultural purposes. The development area of the project is located outside of an urban area and the development footprint will have an extent of ~184ha.***

Indicate the number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice):	Describe each listed activity as per project description
GN 325, 08 December 2014 (as amended on 07 April 2017)	1	The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more. ***Red Sands PV3 will make use of solar energy as a renewable energy resource and will have a contracted capacity of up to 75MW (AC).***
GN 325, 08 December 2014 (as amended on 07 April 2017)	15	The clearance of an area of 20 hectares or more of indigenous vegetation. ***The project will require the clearance of an area of up to 184ha (equivalent to the development footprint) of vegetation. The project is proposed on a property where the predominant land use is grazing and comprises of indigenous vegetation. The project would therefore result in the clearance of an area of indigenous vegetation greater than 20ha in extent.***

5.2.3 National Heritage Resources Act (No. 25 of 1999) (NHRA)

The National Heritage Resources Act (No. 25 of 1999) (NHRA) provides an integrated system which allows for the management of national heritage resources and to empower civil society to conserve heritage resources for future generations. Section 38 of NHRA provides a list of activities which potentially require the undertaking of a Heritage Impact Assessment.

Section 38: Heritage Resources Management

1). Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as –

- *a. the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;*
- *b. the construction of a bridge or similar structure exceeding 50m in length;*
- *c. any development or other activity which will change the character of a site –*
  - *i). exceeding 5 000m² in extent; or*
  - *ii). involving three or more existing erven or subdivisions thereof; or*
  - *iii). involving three or more erven or divisions thereof which have been consolidated within the past five years; or*
  - *iv). the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;*

Must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

In terms of Section 38(8), approval from the heritage authority is not required if an evaluation of the impact of such development on heritage resources is required in terms of any other legislation (such as NEMA), provided that the consenting authority ensures that the evaluation of impacts fulfils the requirements of the relevant heritage resources authority in terms of Section 38(3) and any comments and recommendations of the relevant resources authority with regard to such development have been taken into account prior

to the granting of the consent. However, should heritage resources of significance be affected by the proposed solar PV facility, a permit is required to be obtained prior to disturbing or destroying such resources as per the requirements of Section 48 of the NHRA, and the SAHRA Permit Regulations (GNR 668).

A Heritage Impact Assessment has been undertaken as part of the BA Process (refer to Appendix G).

5.3 Overview of the Basic Assessment Process for Red Sands PV3

Key tasks undertaken for the BA included:

- Consultation with relevant decision-making and regulating authorities (at National, Provincial and Local levels).
- Submission of the completed Application for Environmental Authorisation to the competent authority (i.e. DFFE) in terms of Regulations 5 and 6 of the EIA Regulations, 2014 (GNR 326), as amended.
- Undertaking a public participation process in accordance with Chapter 6 of GNR326, and the Department of Environmental Affairs (2017), Public Participation guidelines in terms of NEMA EIA Regulations, Department of Environmental Affairs, Pretoria, South Africa (hereinafter referred to as "the Guidelines") in order to identify issues and concerns associated with the proposed project.
- Considerations on the restrictions enforced in terms of Government Gazette 43096 which placed the country in a national state of disaster limiting the movement of people to curb the spread of the COVID-19 virus.
- Undertaking of independent specialist studies in accordance with Appendix 6 of the EIA Regulations, 2014 (GNR326), as amended.
- Preparation of a BA report and EMPr in accordance with the requirements of Appendix 1 and Appendix 4 of GNR326.
- 30-day public and authority review period of the BA report.
- Compilation of a C&R report detailing the comments raised by I&APs, addressing these comments in detail and finalisation of the BA report.
- Submission of a final BA report to the DFFE for review and decision-making.

The tasks are discussed in detail in the sub-sections below.

5.3.1. Authority Consultation and Application for Authorisation in terms of the 2014 EIA Regulations (as amended)

In terms of Government Notice 779 of 01 July 2016, the National Department of Forestry, Fisheries and the Environment (DFFE) is the competent authority for all projects related to the IRP. As the project is located within the Northern Cape Province, the Northern Cape Department of Agriculture, Environmental Affairs, Rural Development, and Land Reform is the commenting authority. Consultation with the regulating authorities (i.e. DFFE and DAEARD&LR) as well as with all other relevant Organs of State will continue throughout the BA process. To date, this consultation has included the following:

- Submission of a Public Participation Plan for approval prior to the commencement of the process.
- Submission of the project notification letters and application for Environmental Authorisation to the DFFE.
- Submission of the BA Report for review and comment by:
  - The competent and commenting authorities.

- State departments that administer laws relating to a matter affecting the environment relevant to an application for Environmental Authorisation.
- Organs of State which have jurisdiction in respect of the activity to which the application relates.

A record of all authority correspondence undertaken during the BA process is included in **Appendix B** and **Appendix C.**

5.3.2. Public Participation Process

Public participation is an essential and regulatory requirement for an environmental authorisation process and is guided by Regulations 41 to 44 of the EIA Regulations 2014 (GN R326) (as amended). The purpose of public participation is clearly outlined in Regulation 40 of the EIA Regulations 2014 (GN R326) (as amended) and is being followed for this proposed project.

The sharing of information forms the basis of the public participation process and offers the opportunity for I&APs to become actively involved in the BA process from the outset. The public participation process is designed to provide sufficient and accessible information to I&APs in an objective manner. The public participation process affords I&APs opportunities to provide input into and receive information regarding the BA process in the following ways:

During the BA process the online stakeholder engagement platform will allow for the following:
» provide an opportunity to submit comments regarding the project;
» assist in identifying reasonable and feasible alternatives;
» contribute relevant local information and knowledge to the environmental assessment;
» allow registered I&APs to verify that their comments have been recorded, considered and addressed, where applicable, in the environmental investigations; and
» comment on the findings of the environmental assessments.

During the decision-making phase:
» to advise I&APs of the outcome of the competent authority's decision, and how and by when the decision can be appealed.

The public participation process therefore aims to ensure that:

» Information containing all relevant facts in respect of the application is made available to potential stakeholders and I&APs for their review.
» The information presented during the public participation process is presented in such a manner, i.e. local language and technical issues, that it avoids the possible alienation of the public and prevents them from participating.
» Public participation is facilitated in such a manner that I&APs are provided with a reasonable opportunity to comment on the project.
» Various ways are provided to I&APs to correspond and submit their comments i.e. fax, post, email, whatsapp and sms.
» An adequate review period is provided for I&APs to comment on the findings of the BA Report.

The Public Participation Process undertaken for the proposed development of Red Sands PV3 considers the restrictions and limitations imposed by various mechanisms implemented by government to reduce the

risks associated with COVID-19 in terms of consultations with I&APs. A Public Participation Plan was prepared and submitted to the DFFE on 3 November 2021. Approval of the Plan was provided by the DFFE Case Officer via email on **9 November 2021** (**Appendix C1**)

The alternative means of undertaking consultation have been designed and implemented by Savannah Environmental to ensure that I&APs are afforded sufficient opportunity to access project information and raise comments on the project through a web-based platform (i.e. website) readily available and accessible to any person registering their interest in the project, and ensures that the public participation process is undertaken in line with Regulations 41 to 44 of the EIA Regulations, 2014 as amended. The Public Participation Plan (**Appendix C1**) considered the limitations applied by the Disaster Management Act Regulations relevant at the time prohibiting the gathering of people, as well as limitations which certain I&APs may have in terms of access to computers and internet as well as access to public spaces currently not open for operation that inhibits access to hard copy documentation. The online website implemented by Savannah Environmental for the project allowed the EAP to visually present details regarding the project as well as consultation documentation, including project maps and plans, presentations and posters. The platform also contains the BA report available for review. The use of an online tool enables stakeholders and I&APs to explore the project-specific content in their own time, and still enables them to participate in a meaningful way in the consultation process.

The sharing of information forms the basis of the public participation process and offers the opportunity for I&APs to become actively involved in the BA process from the outset. The public participation process is designed to provide sufficient and accessible information to I&APs in an objective manner. The public participation process affords I&APs opportunities to provide input into and receive information regarding the BA process in the following ways:

During the BA process:

- Provide an opportunity to submit comments regarding the project;
- Assist in identifying reasonable and feasible alternatives;
- Contribute relevant local information and knowledge to the environmental assessment;
- Allow registered I&APs to verify that their comments have been recorded, considered and addressed, where applicable, in the environmental investigations;
- and
- Comment on the findings of the environmental assessments.

During the decision-making phase:

- To advise I&APs of the outcome of the competent authority's decision, and how and by when the decision can be appealed.

In terms of the requirement of Chapter 6 of the EIA Regulations of December 2014, as amended, the following key public participation tasks have been undertaken:

- Fix a notice board at a place conspicuous to the public at the boundary or on the fence of—
  - (i) the site where the activity to which the application relates is or is to be undertaken; and
  - (ii) any alternative site mentioned in the application;
- Give written notice to:
  - (i) the owner or person in control of that land if the applicant is not the owner or person in control of the land;

(ii) the occupiers of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
(iii) owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
(iv) the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;
(v) the municipality which has jurisdiction in the area;
(vi) any organ of state having jurisdiction in respect of any aspect of the activity; and
(vii) any other party as required by the competent authority.

» Place an advertisement in one local newspaper.
» Open and maintain a register of I&APs and Organs of State.
» Release a BA Report for a 30-day review period.
» Prepare a Comments and Responses (C&R) report which documents the comments received on the BA process and the responses provided by the project team.

The schematic illustration below provides an overview of the tools that are available to I&APs and stakeholders to access project information and interact with the public participation team to obtain project information and resolve any queries that may arise, and to meet the requirements for public participation.

i. Stakeholder identification and register of I&APs	•Register as an I&AP on the online platfrom (i.e. website), provison of contact information, by responding to an advert, or sending a 'please call me' which will be responded to. •State interest in the project. •Receive all project related information via email or other appropriate means.
ii. Advertisments and notifications	•Newspaper advertisements and/or radio live reads, site notices, written notifications provide information and details on where to access project information. •Notifications regarding the BA processes and availability of project reports for public review to be sent via email, post or SMS notifications.
iii. Public Involvement and consultation	•Availability of project information via the online platform or other appropriate means. •An opportunity for I&APs and stakeholders to request virtual meetings with the project team.
iv. Comment on the BA reports	•Availability of the project reports via the online platform for a minimum 30-day comment period. •Submission of comments via email or post to the PP team. •Comments recorded and responded to, as part of the process.
v. Identification and recording of comments	•Comments and Responses Report, including all comments received throughout the process to be included in the reporting.

i. Stakeholder identification and Register of Interested and Affected Parties

42. A proponent or applicant must ensure the opening and maintenance of a register of I&APs and submit such a register to the competent authority, which register must contain the names, contact details and addresses of –
    (a) All persons who, as a consequence of the public participation process conducted in respect of that application, have submitted written comments or attended meetings with the proponent, applicant or EAP;
    (b) All persons who have requested the proponent or applicant, in writing, for their names to be placed on the register; and
    (c) All organs of state which have jurisdiction in respect of the activity to which the application relates.

I&APs have been identified through a process of networking and referral, obtaining information from Savannah Environmental's existing stakeholder database, liaison with potentially affected parties in the greater surrounding area and a registration process involving the completion of a reply form. Key

stakeholders and affected and surrounding landowners have been identified and registered on the project database. Other stakeholders are required to formally register their interest in the project through either directly contacting the Savannah Environmental Public Participation team via email or fax or use of the online stakeholder engagement platform. An initial list of key stakeholders identified and registered is listed in **Table 5.2**.

Table 5.2: List of Stakeholders identified for the inclusion in the project database during the public participation process for Red Sands PV3

Organs of State
National Government Departments
Department of Mineral Resources and Energy (DMRE)
Department of Forestry, Fisheries, and the Environment (DFFE)
Department of Agriculture, Rural Development and Land Reform (DARDLR)
Department of Human Settlement, Water and Sanitation (DHSWS)
Government Bodies and State-Owned Companies
Eskom Holdings SOC Limited
National Energy Regulator of South Africa (NERSA)
South African Civil Aviation Authority (CAA)
South African Heritage Resources Agency (SAHRA)
South African National Roads Agency Limited (SANRAL)
Square Kilometre Array Project (SKA)
Telkom SA SOC Limited
Transnet SA SOC Limited
Provincial Government Departments
Northern Cape Department of Agriculture, Environmental Affairs, Rural Development, and Land Reform (DAEARD&LR)
Northern Cape Department of Roads and Public Works
Ngwao Boswa Kapa Bokone (NBKB)
Local Government Departments
ZF Mgcawu District Municipality
Tsantsabane Local Municipality
Key Stakeholders
BirdLife South Africa
Endangered Wildlife Trust (EWT)
SENTECH
Wildlife and Environment Society of South Africa (WESSA)
Landowners
Affected landowners, tenants and occupiers
Neighbouring landowners, tenants and occupiers

As per Regulation 42 of the EIA Regulations, 2014 (as amended), all relevant stakeholder and I&AP information has been recorded within a register of I&APs (refer to **Appendix C1** for a listing of the recorded parties). In addition to the above-mentioned EIA Regulations, point 4.1 of the Public Participation Guidelines has also been followed. The register of I&APs contains the names of[10]:

- all persons who requested to be registered on the database through the use of the online stakeholder engagement platform (i.e. website) or in writing and disclosed their interest in the project;
- all Organs of State which hold jurisdiction in respect of the activity to which the application relates; and all persons who submitted written comments or attended virtual meetings and viewed the narrated presentations on the Savannah Environmental online platform during the public participation process.

I&APs have been encouraged to register their interest in the BA process from the onset of the project, and the identification and registration of I&APs will be on-going for the duration of the BA process. The database of I&APs will be updated throughout the BA process and will act as a record of the I&APs involved in the public participation process.

ii. Advertisements and Notifications

40.(2)(a)	Fixing a notice board at a place conspicuous to and accessible by the public at the boundary, on the fence or along the corridor of – (i) The site where the activity to which the application or proposed application relates is or is to be undertaken; and (ii) Any alternative site.
40.(2)(b)	Giving written notice, in any of the manners provided for in section 47D of the Act, to – (i) The occupiers of the site and, if the proponent or applicant is not the owner or person in control of the site on which the activity is to be undertaken, the owner or person in control of the site where the activity is or is to be undertaken and to any alternative site where the activity is to be undertaken; (ii) Owners, persons in control of, and occupiers of land adjacent to the site where the activity is or is to be undertaken and to any alternative site where the activity is to be undertaken; (iii) The municipal councillor of the ward in which the site and alternative site is situated and any organisation of ratepayers that represent the community in the area; (iv) The municipality which has jurisdiction in the area; (v) Any organ of state having jurisdiction in respect of any aspect of the activity; and (vi) Any other party as required by the competent authority.
40.(2)(c)	Placing an advertisement in – (i) One local newspaper; or (ii) Any official Gazette that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations;
40.(2)(d)	Placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or district municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an

[10] Contact details and addresses have not been included in the I&AP database as this information is protected by the Protection of Personal Information Act (Act No. 4 of 2013).

	advertisement has been placed in an official Gazette referred to in paragraph (c)(ii); and
40.(2)(e)	Using reasonable alternative methods, as agreed to by the competent authority, in those instances where a person is desirous of but unable to participate in the process due to – (i) Illiteracy; (ii) Disability; or (iii) Any other disadvantage.

The BA process was announced with an invitation to the Organs of State, potentially affected and neighbouring landowners and general public to register as I&APs and to actively participate in the process. This was achieved via the following:

- Compilation of a background information document (BID) (refer to **Appendix C3**) providing technical and environmental details on the project and how to become involved in the BA process. The BID and the BA process notification letter announcing the BA process, notifying Organs of State, potentially affected and neighbouring landowners, as well as registered stakeholders/IAPs of Red Sands PV3, providing background information of the project and inviting I&APs to register on the project's database were distributed via email on **07 April 2022**. The evidence of the distribution is contained in **Appendix C** of the BA Report. The BID is also available electronically on the Savannah Environmental website (https://savannahsa.com/public-documents/energy-generation/red-sands-pv-cluster/).
- Placement of site notices announcing the BA process at visible points along the boundary of the study area (i.e. the boundaries of the affected property), in accordance with the requirements of the EIA Regulations on **2 December 2021**. Photographs and the GPS co-ordinates of the site notices are contained in **Appendix C2** of the BA Report and are also available on the Savannah Environmental online platform. Process notices announcing the BA were places at the notice board of the Municipal offices and Home Affairs in Groblershoop.
- Placement of an advertisement in the Gemsbok Newspaper on **30 March 2022** at the commencement of the 30-day review and comment period. This advert announced the project, the BA process, the details to access the Savannah Environmental online platform, as well as the availability of the BA report on this platform, and invited comment on the BA Report. This advert also included the details on the review period for the BA report. A copy of the newspaper advert as sent to the newspaper is included in **Appendix C2** of the BA Report. The newspaper advert tear sheet will be included in the Final BA Report in **Appendix C2.**
- The BA Report has been made available for review by I&APs for a 30-day review and comment period from **08 April 2022** to **12 May 2022.**[11] Electronic versions of the BA Report and CD copies were requested have been circulated to Organs of State via courier at the commencement of the review period. The BA Report is also available for download on the Savannah Environmental's website. The evidence of distribution of the BA Report will be included in the final BA Report, which will be submitted to the DFFE.

[11] Given unforeseen circumstance the advertised review period (04 April to 09 May 2022) was extended to 12 May 2022.

iii. Public Involvement and Consultation

In order to accommodate the varying needs of stakeholders and I&APs within the greater study area, as well as capture their views, comments, issues and concerns regarding the project, various opportunities have been and will continue to be provided to I&APs to note their comments and issues. I&APs are being consulted through the following means:

Table 5.3: Consultation undertaken with I&APs for Red Sands PV3

Activity	Date
Distribution of the process notification and stakeholder reply form announcing the BA process and inviting I&APs to register on the project database. The BID, notification letter, and electronic reply form was also made available on the virtual platform.	07 April 2022
Placement of site notices on-site and in public places (Local Municipality and Home Affairs).	02 December 2021
Advertising of the availability of the BA Report for a 30-day review period in the Gemsbok newspaper, including details on how to access the online platform and the BA Report via this means.	30 March 2022
Distribution of notification letters announcing the availability of the BA Report for a 30-day review and comment period. These letters were distributed to Organs of State, Government Departments, Ward Councillors, landowners within the surrounding area (including neighbouring landowners), registered I&APs and key stakeholder groups.	07 April 2022
30-day review and comment period of the BA Report.	08 April 2022 to 12 May 2022
Virtual Meetings through virtual presentations on the Savannah Environmental Virtual Platform: » Registered I&APs making use of the online platform » Adjacent Landowners Authorities and key stakeholders (including Organs of State, local municipality and community-based organisations. Where an I&AP does not have access to a computer and/or internet to view the virtual presentation telephonic discussions will be set-up to provide the presentation electronically with the discussion being recorded and minuted for inclusion. The preferred language of the I&AP has been considered when setting up these discussions.	To be undertaken during the 30-day review period
On-going consultation (i.e. telephone liaison; e-mail communication) with all I&APs	Throughout BA process

iv. Registered I&APs entitled to Comment on the BA Report

43.(1) A registered I&AP is entitled to comment, in writing, on all reports or plans submitted to such party during the public participation process contemplated in these Regulations and to bring to the attention of the proponent or applicant any issues which that party believes may be of significance to the consideration of the application, provided that the interested and affected party discloses any direct business, financial, personal or other interest which that party may have in the approval or refusal of the application.

(2) In order to give effect to section 24O of the Act, any State department that administers a law relating to a matter affecting the environment must be requested, subject to regulation 7(2), to comment within 30 days.

44.(1) The applicant must ensure that the comments of interested and affected parties are recorded in reports and plans and that such written comments, including responses to such comments and records of meetings, are attached to the reports and plans that are submitted to the competent authority in terms of these Regulations.
(2) Where a person desires but is unable to access written comments as contemplated in subregulation (1) due to –
(a) A lack of skills to read or write;
(b) Disability; or
(c) Any other disadvantage;
Reasonable alternative methods of recording comments must be provided for.

I&APs registered on the database have been notified by means of a notification letter via e-mail of the release of the BA Report for a 30-day review and comment period, invited to provide comment on the BA Report, and informed of the manner in which, and timeframe within which such comment must be made. The report has been made available in soft copies to I&APs due to restrictions and limitations on public spaces during the COVID-19 pandemic. Where possible to maintain sanitary conditions. Electronic copies of the BA Report have been made available for download from the Savannah online platform and in CD format (were requested) have also been made available for a 30-day review and comment period.

The BA Report has also been made available on the Savannah Environmental website (https://savannahsa.com/public-documents/energy-generation/red-sands-pv-cluster/). The notification was distributed prior to commencement of the 30-day review and comment period, on **07 April 2022**. Where I&APs were not able to provide written comments, other means of consultation, such telephonic discussions were used to provide the I&APs with a platform to verbally raise their concerns and comments on the proposed development. Submission of comments and queries were also enabled through the use of the Savannah Environmental online platform. The comments raised during the discussions and written comments have been recorded and included in **Appendix C8** of the BA Report.

v. Identification and Recording of Comments

Comments raised by I&APs over the duration of the BA process has been synthesised into a Comments and Responses (C&R) Report which is included in **Appendix C8** of the BA Report. This includes comments raised through the use of the Savannah Environmental online platform. The C&R Report includes detailed responses from members of the EIA project team and/or the project proponent to the issues and comments raised during the public participation process.

The C&R Report will consist of written comments received as well as responses from the project proponent, EAP and specialist consultants, where relevant.

Notes of all the telephonic discussions held and minutes of virtual meetings conducted during the 30-day review and comment period of the BA Report will be included in **Appendix C7**.

The C&R Report will be updated with all comments received during the 30-day review and comment period and will be included as **Appendix C8** in the final BA Report that will be submitted to the DFFE for decision-making

5.4 Assessment of Issues Identified through the BA Process

In terms of GN R960 (promulgated on 5 July 2019) and Regulation 16(1)(b)(v) of the 2014 EIA Regulations (as amended), the submission of a Screening Report generated from the national web based environmental screening tool is compulsory for the submission of applications in terms of Regulation 19 and 21 of the 2014 EIA Regulations.

The requirement for the submission of a Screening Report (**Appendix L**) for the proposed development is applicable as it triggers Regulation 19 of the 2014 EIA Regulations (as amended). **Table 5.5** provides a summary of the specialist assessment requirements identified for the project site in terms of the screening tool and responses to each assessment requirement based on the nature and extent of the project.

Table 5.5: Sensitivity ratings from the DFFE's web-based online Screening Tool associated with the development of Red Sands PV3

Specialist Theme	Sensitivity Rating as per the Screening Tool (relating to the need for the study)	Project Team Response
Agricultural	Low	A Soils and Agricultural Compliance Statement is included as **Appendix F**
Aquatic Biodiversity	Low	No watercourses are located within or in close proximity to the project development area (refer to Chapter 6). Description of aquatic biodiversity for the surrounding area is included in the Ecology Assessment (**Appendix D**) No further assessments have been undertaken.
Archaeological & Cultural Heritage	Low	A Heritage Impact Assessment Report, including assessment of impacts on archaeology and cultural landscape, is included in **Appendix G**
Bats	Low	Based on reviews of scientific literatures, there is no experimental observation or theoretical scientific literature on the effect solar panels may have on bats. Furthermore, the South African Bat Assessment Association (SABAA), also states that currently there is no evidence of photovoltaic (PV) facilities posing a direct threat of fatality impact on bats. No further assessments have been undertaken.
Civil Aviation	Low	The Civil Aviation Authority and ATNS will be consulted throughout the BA process to obtain input.
Defence	Low	A defence or military base is not located within close proximity to the PV facility.
Palaeontology	Medium	A Heritage Impact Assessment (which covers palaeontological aspects of the project site) is included as **Appendix G.**
RFI Theme	Low	The project site under consideration is not located within is close proximity to telecommunications towers.
Terrestrial Biodiversity	Low	Terrestrial Biodiversity (including flora and fauna) and Avifauna Impact Assessments have been undertaken for the PV facility and are included as **Appendix D** and **Appendix E** respectively. Based on the outcomes of the field survey, it has been indicated that the development area falls within the areas identified as High Biodiversity Importance as per the Terrestrial Plant
Plant Species	Low	
Animal Species	Medium	

Specialist Theme	Sensitivity Rating as per the Screening Tool (relating to the need for the study)	Project Team Response
		Species and Terrestrial Animal Species protocols (2020).
Geotechnical	No rating provided in screening tool	A preliminary geotechnical investigation has been undertaken by the applicant during the feasibility study to identify the development area (see Chapter 2 of this BA Report). A detailed geotechnical survey will be undertaken prior to construction during the detailed design phase once preferred bidder status is obtained. Contractors and suppliers will only be selected and appointed after preferred bidder status is obtained. In line with best practice, and to ensure that all aspects are covered in the assessment, suppliers of civil structures are required to provide input into the scope of work of the Geotechnical Assessment. Therefore, a detailed Geotechnical Assessment can only be undertaken during detailed design.

Based on the results of the screening, and from experience on similar projects and in the study area, the EIA project team has identified the following issues as requiring investigation.

Table 5.6: Issues identified for investigation and specialist consultants appointed to evaluate the potential impacts associated with Red Sands PV3

Issue/Assessment	Specialist Name	Specialist Company	Appendices
Biodiversity Impact Assessment	Andrew Husted	The Biodiversity Company	Appendix D
Avifauna Impact Assessment	Lindi Steyn	The Biodiversity Company	Appendix E
Soils Compliance Statement	Ivan Baker	The Biodiversity Company	Appendix F
Heritage Impact Assessment	Jenna Lavin Nicholas Willtshire	CTS Heritage	Appendix G
Visual Impact Assessment	Jon Marshall	Environmental Planning & Design	Appendix H
Social Impact Assessment	Nondumiso Bulunga	Savannah Environmental	Appendix I

Specialist studies considered direct and indirect environmental impacts associated with the development of all components of Red Sands PV3. Issues were assessed in terms of the following criteria:

- The **nature**, a description of what causes the effect, what will be affected, and how it will be affected;
- The **extent**, wherein it is indicated whether the impact will be local (limited to the immediate area or site of development), regional, national or international. A score of between 1 and 5 is assigned as appropriate (with a score of 1 being low and a score of 5 being high);
- The **duration**, wherein it is indicated whether:
  - The lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
  - The lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
  - Medium-term (5–15 years) – assigned a score of 3;
  - Long term (> 15 years) - assigned a score of 4;
  - Permanent - assigned a score of 5.
- The **magnitude**, quantified on a scale from 0-10, where a score is assigned:

- 0 is small and will have no effect on the environment;
- 2 is minor and will not result in an impact on processes;
- 4 is low and will cause a slight impact on processes;
- 6 is moderate and will result in processes continuing but in a modified way;
- 8 is high (processes are altered to the extent that they temporarily cease);
- 10 is very high and results in complete destruction of patterns and permanent cessation of processes.

» The **probability of occurrence**, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale, and a score assigned:
- Assigned a score of 1–5, where 1 is very improbable (probably will not happen);
- Assigned a score of 2 is improbable (some possibility, but low likelihood);
- Assigned a score of 3 is probable (distinct possibility);
- Assigned a score of 4 is highly probable (most likely);
- Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).

» The **significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high;
» The **status**, which is described as either positive, negative or neutral;
» The degree to which the impact can be reversed;
» The degree to which the impact may cause irreplaceable loss of resources;
» The degree to which the impact can be mitigated.

The **significance** is determined by combining the criteria in the following formula:

S = (E+D+M) P; where

S = Significance weighting.
E = Extent.
D = Duration.
M = Magnitude.
P = Probability.

The **significance weightings** for each potential impact are as follows:

» **< 30 points:** Low (i.e. where this impact would not have a direct influence on the decision to develop in the area);
» **30-60 points:** Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated);
» **> 60 points:** High (i.e. where the impact must have an influence on the decision process to develop in the area).

Specialist studies also considered cumulative impacts associated with similar developments within a 30km radius of the proposed project. The purpose of the cumulative assessment is to test if such impacts are relevant to the proposed project in the proposed location (i.e. whether the addition of the proposed project in the area will increase the impact). In this regard, specialist studies considered whether the construction of the proposed development will result in:

» Unacceptable risk

- Unacceptable loss
- Complete or whole-scale changes to the environment or sense of place
- Unacceptable increase in impact

A conclusion regarding whether the proposed development will result in any unacceptable loss or impact considering all the projects proposed in the area is included in the respective specialist reports.

As the Applicant has the responsibility to avoid or minimise impacts and plan for their management (in terms of the EIA Regulations, 2014 (as amended)), the mitigation of significant impacts is discussed. Assessment of impacts with mitigation is made in order to demonstrate the effectiveness of the proposed mitigation measures. An Environmental Management Programme (EMPr) is included as **Appendix J**.

5.6 Assumptions and Limitations of the BA Process

The following assumptions and limitations are applicable to the studies undertaken within this BA process:

- All information provided by the developer and I&APs to the environmental team was correct and valid at the time it was provided.
- It is assumed that the development footprint for the solar PV facility identified by the developer represents a technically suitable site for the establishment of Red Sands PV3 which is based on the design undertaken by technical consultants for the project.
- This report and its investigations are project-specific, and consequently the environmental team did not evaluate any other power generation alternatives.

Refer to the specialist studies in **Appendices D – I** for specialist study specific limitations.

5.7 Legislation and Guidelines that have informed the preparation of this Basic Assessment Report

The following legislation and guidelines have informed the scope and content of this BA Report:

- National Environmental Management Act (Act No. 107 of 1998);
- EIA Regulations of December 2014, published under Chapter 5 of NEMA (as amended in GNR R326 in Government Gazette No 40772 of April 2017);
- Department of Environmental Affairs (2017), Public Participation guidelines in terms of NEMA EIA Regulations;
- Department of Environmental Affairs (2017), Integrated Environmental Management Guideline: Guideline on Need and Desirability;
- Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation; and
- International guidelines – the Equator Principles, the IFC Performance Standards, the Sustainable Development Goals, World Bank Environmental and Social Framework, and the and World Bank Group Environmental, Health, and Safety Guidelines (EHS Guidelines).

Table 5.7 provides an outline of the legislative permitting requirements applicable to Red Sands PV3 as identified at this stage in the project development process.

Table 5.7: Applicable Legislation, Policies and/or Guidelines associated with the development of Red Sands PV3

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Legislation			
Constitution of the Republic of South Africa (No. 108 of 1996)	In terms of Section 24, the State has an obligation to give effect to the environmental right. The environmental right states that: "*Everyone has the right –* » *To an environment that is not harmful to their health or well-being, and* » *To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:* * *Prevent pollution and ecological degradation,* * *Promote conservation, and* * *Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development*."	Applicable to all authorities	There are no permitting requirements associated with this Act. The application of the Environmental Right however implies that environmental impacts associated with proposed developments are considered separately and cumulatively. It is also important to note that the "right to an environment clause" includes the notion that justifiable economic and social development should be promoted, through the use of natural resources and ecologically sustainable development.
National Environmental Management Act (No 107 of 1998) (NEMA)	The 2014 EIA Regulations have been promulgated in terms of Chapter 5 of NEMA. Listed activities which may not commence without EA are identified within the Listing Notices (GNR 327, GNR 325 and GNR 324) which form part of these Regulations (GNR 326). In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these listed activities must be assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation. Considering the location of the project site within the Upington Renewable Energy Development Zone (REDZ 7) and the requirements GNR114 of 16 February 2018, a Basic Assessment Process is required to be undertaken for the	DFFE – Competent Authority Northern Cape DAEARD&LR – Commenting Authority	The listed activities triggered by the proposed project have been identified and are being assessed as part of the BA process currently underway for the project. The BA process will culminate in the submission of a final BA Report to the competent in support of the application for EA.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	proposed project. All relevant listing notices for the project (GN R327, GN R325 and GN R324) will be applied for		
National Environmental Management Act (No 107 of 1998) (NEMA)	In terms of the "Duty of Care and Remediation of Environmental Damage" provision in Section 28(1) of NEMA every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment. In terms of NEMA, it is the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts.	DFFE Northern Cape DAEARD&LR	While no permitting or licensing requirements arise directly by virtue of the proposed project, this section finds application through the consideration of potential cumulative, direct, and indirect impacts. It will continue to apply throughout the life cycle of the project.
Environment Conservation Act (No. 73 of 1989) (ECA)	The Noise Control Regulations in terms of Section 25 of the ECA contain regulations applicable for the control of noise in the Provinces of Limpopo, North West, Mpumalanga, Northern Cape, Eastern Cape, and KwaZulu-Natal Provinces. The Noise Control Regulations cover the powers of a local authority, general prohibitions, prohibitions of disturbing noise, prohibitions of noise nuisance, use of measuring instruments, exemptions, attachments, and penalties. In terms of the Noise Control Regulations, no person shall make, produce or cause a disturbing noise, or allow it to be made, produced or caused by any person, machine, device or apparatus or any combination thereof (Regulation 04).	DFFE Northern Cape DAEARD&LR Tsantsabane Local Municipality	Noise impacts are expected to be associated with the construction phase of the project. As the site is located a great distance from noise sensitive receptors and communities, construction noise is unlikely to present a significant intrusion to the local community. There is therefore no requirement for a noise permit in terms of the legislation.
National Water Act (No. 36 of	A water use listed under Section 21 of the NWA must be	Regional Department	No watercourses or wetlands are present

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
1998) (NWA)	licensed with the Regional DWS, unless it is listed in Schedule 1 of the NWA (i.e. is an existing lawful use), is permissible under a GA, or if a responsible authority waives the need for a licence. Water use is defined broadly, and includes consumptive and non-consumptive water uses, taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities (activities which impact detrimentally on a water resource), altering a watercourse, removing water found underground for certain purposes, and recreation. Consumptive water uses may include taking water from a water resource (Section 21(a)), and storing water (Section 21(b)). Non-consumptive water uses may include impeding or diverting of flow in a water course (Section 21(c)), and altering of bed, banks or characteristics of a watercourse (Section 21(i)).	of Water and Sanitation	within the development area or within close proximity of the development area. The project proponent would need to apply for a WUL or register a GA with the DWS should any trigger water use activities be undertaken.
Minerals and Petroleum Resources Development Act (No. 28 of 2002) (MPRDA)	In accordance with the provisions of the MPRDA a mining permit is required in accordance with Section 27(6) of the Act where a mineral in question is to be mined, including the mining of materials from a borrow pit.	Department of Mineral Resources and Energy	Any person who wishes to apply for a mining permit in accordance with Section 27(6) must simultaneously apply for an Environmental Authorisation in terms of NEMA. No borrow pits are expected to be required for the construction of the project, and as a result a mining permit or EA is not required to be obtained.
	Section 53 of the MPRDA states that any person who intends to use the surface of any land in any way which may be contrary to any object of the Act, or which is likely to impede any such object must apply to the Minister for		In terms of Section 53 of the MPRDA approval is required from the Minister of Mineral Resources to ensure that the proposed development does not sterilise a

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	approval in the prescribed manner.		mineral resource that might occur on site.
National Environmental Management: Air Quality Act (No. 39 of 2004) (NEM:AQA)	The National Dust Control Regulations (GNR 827) published under Section 32 of NEM:AQA prescribe the general measures for the control of dust in all areas, and provide a standard for acceptable dustfall rates for residential and non-residential areas. In accordance with the Regulations (GNR 827) any person who conducts any activity in such a way as to give rise to dust in quantities and concentrations that may exceed the dustfall standard set out in Regulation 03 must, upon receipt of a notice from the air quality officer, implement a dustfall monitoring programme. Any person who has exceeded the dustfall standard set out in Regulation 03 must, within three months after submission of the dustfall monitoring report, develop and submit a dust management plan to the air quality officer for approval.	Northern Cape DAEARD&LR / ZF Mgcawu District Municipality	In the event that the project results in the generation of excessive levels of dust the possibility could exist that a dustfall monitoring programme would be required for the project, in which case dustfall monitoring results from the dustfall monitoring programme would need to be included in a dust monitoring report, and a dust management plan would need to be developed. However, with mitigation measures implemented, Red Sands PV3 is not anticipated to result in significant dust generation.
National Heritage Resources Act (No. 25 of 1999) (NHRA)	Section 07 of the NHRA stipulates assessment criteria and categories of heritage resources according to their significance. Section 35 of the NHRA provides for the protection of all archaeological and palaeontological sites, and meteorites. Section 36 of the NHRA provides for the conservation and care of cemeteries and graves by SAHRA where this is not the responsibility of any other authority. Section 38 of the NHRA lists activities which require developers or any person who intends to undertake a listed activity to notify the responsible heritage resources authority and furnish it with details regarding the location, nature,	South African Heritage Resources Agency Ngwao Boswa Kapa Bokone (NBKB)	A full Heritage Impact Assessment (HIA) and Archaeological Impact Assessment (with field work) has been undertaken as part of the BA process (refer to **Appendix H** of this BA Report). No heritage resources were identified within the Red Sands development footprint, although several isolated stone artefacts attributable to background scatter were noted. Should a heritage resource be impacted upon, a permit may be required from SAHRA or Ngwao Boswa Kapa Bokone (NBKB) in accordance with of Section 48 of the NHRA, and the SAHRA Permit

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	and extent of the proposed development. Section 44 of the NHRA requires the compilation of a Conservation Management Plan as well as a permit from SAHRA for the presentation of archaeological sites as part of tourism attraction.		Regulations (GNR 668). This will be determined once the final location of the development footprint and its associated infrastructure within the development area has been determined.
National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA)	Section 53 of NEM:BA provides for the MEC / Minister to identify any process or activity in such a listed ecosystem as a threatening process. Three government notices have been published in terms of Section 56(1) of NEM:BA as follows: » Commencement of TOPS Regulations, 2007 (GNR 150). » Lists of critically endangered, vulnerable and protected species (GNR 151). » TOPS Regulations (GNR 152). It provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), and vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (NEM:BA: National list of ecosystems that are threatened and in need of protection, (Government Gazette 37596, GNR 324), 29 April 2014).	DFFE Northern Cape DAEARD&LR	Under NEM:BA, a permit would be required for any activity which is of a nature that may negatively impact on the survival of a listed protected species. The Ecological Impact Assessment (**Appendix D**) identified listed species. Based on the SANBI POSA records for the site and surrounding area, 7 species of conservation concern are potentially present on the site. *Acanthopsis hoffmannseggiana, Dinteranthus wilmotianus, Aloidendron dichotomum, Eriocephalus macroglossus, Senecio monticola, Senecio trachylaenus Brachiaria dura var. pilosa*
National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA)	Chapter 5 of NEM:BA pertains to alien and invasive species, and states that a person may not carry out a restricted activity involving a specimen of an alien species without a	DFFE Northern Cape	Restricted Activities and the respective requirements applicable to persons in control of different categories of listed

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	permit issued in terms of Chapter 7 of NEM:BA, and that a permit may only be issued after a prescribed assessment of risks and potential impacts on biodiversity is carried out. Applicable, and exempted alien and invasive species are contained within the Alien and Invasive Species List (GNR 864).	DAEARD&LR	invasive species are contained within the Alien and Invasive Species Regulations (GNR 598) published under NEM:BA, together with the requirements of the Risk Assessment to be undertaken.
Conservation of Agricultural Resources Act (No. 43 of 1983) (CARA)	Section 05 of CARA provides for the prohibition of the spreading of weeds. Regulation 15 of GNR 1048 published under CARA provides for the classification of categories of weeds and invader plants, and restrictions in terms of where these species may occur. Regulation 15E of GNR 1048 published under CARA provides requirement and methods to implement control measures for different categories of alien and invasive plant species.	Department of Agriculture, Land Reform and Rural Development (DALRRD)	CARA will find application throughout the life cycle of the project. In this regard, soil erosion prevention and soil conservation strategies need to be developed and implemented. In addition, a weed control and management plan must be implemented. The permission of DALRRD will be required if Red Sands PV3 requires the draining of vleis, marshes or water sponges on land outside urban areas. However, this is not anticipated to be relevant for the project. In terms of Regulation 15E (GNR 1048) where Category 1, 2 or 3 plants occur a land user is required to control such plants by means of one or more of the following methods: » Uprooting, felling, cutting or burning. » Treatment with a weed killer that is registered for use in connection with such plants in accordance with the directions for the use of such a weed killer. » Biological control carried out in

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
			accordance with the stipulations of the Agricultural Pests Act (No. 36 of 1983), the ECA and any other applicable legislation. » Any other method of treatment recognised by the executive officer that has as its object the control of plants concerned, subject to the provisions of sub-regulation (4). » A combination of one or more of the methods prescribed, save that biological control reserves and areas where biological control agents are effective shall not be disturbed by other control methods to the extent that the agents are destroyed or become ineffective.
National Forests Act (No. 84 of 1998) (NFA)	According to this Act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. Notice of the List of Protected Tree Species under the National Forests Act (No. 84 of 1998) was published in GNR 734. The prohibitions provide that "no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister".	DFFE	A licence is required for the removal of protected trees. It is therefore necessary to conduct a survey that will determine the number and relevant details pertaining to protected tree species present in the development area for the submission of relevant permits to authorities prior to the disturbance of these individuals. The Ecological Impact Assessment undertaken as part of the BA Report indicated that two National Forest Act (Act No. 84 of 1998) of 1998 (NFA) protected tree species occur at the site; *Vachellia haematoxylon*, and *Boscia albitrunca*. A license in terms of the NFA will be required for impacting on the protected species

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
			identified at the site, (refer to **Appendix D** of this BA Report).
National Veld and Forest Fire Act (No. 101 of 1998) (NVFFA)	Chapter 4 of the NVFFA places a duty on owners to prepare and maintain firebreaks, the procedure in this regard, and the role of adjoining owners and the fire protection association. Provision is also made for the making of firebreaks on the international boundary of the Republic of South Africa. The applicant must ensure that firebreaks are wide and long enough to have a reasonable chance of preventing a veldfire from spreading to or from neighbouring land, it does not cause soil erosion, and it is reasonably free of inflammable material capable of carrying a veldfire across it. Chapter 5 of the Act places a duty on all owners to acquire equipment and have available personnel to fight fires. Every owner on whose land a veldfire may start or burn or from whose land it may spread must have such equipment, protective clothing and trained personnel for extinguishing fires, and ensure that in his or her absence responsible persons are present on or near his or her land who, in the event of fire, will extinguish the fire or assist in doing so, and take all reasonable steps to alert the owners of adjoining land and the relevant fire protection association, if any.	DFFE	While no permitting or licensing requirements arise from this legislation, this Act will be applicable during the construction and operation of Red Sands PV3, in terms of the preparation and maintenance of firebreaks, and the need to provide appropriate equipment and personnel for firefighting purposes.
Hazardous Substances Act (No. 15 of 1973) (HAS)	This Act regulates the control of substances that may cause injury, or ill health, or death due to their toxic, corrosive, irritant, strongly sensitising or inflammable nature or the generation of pressure thereby in certain instances and for the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger, to provide for the prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and	Department of Health (DoH)	It is necessary to identify and list all Group I, II, III, and IV hazardous substances that may be on site and in what operational context they are used, stored or handled. If applicable, a license would be required to be obtained from the Department of Health (DoH).

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	products. » Group I and II: Any substance or mixture of a substance that might by reason of its toxic, corrosive etc., nature or because it generates pressure through decomposition, heat or other means, cause extreme risk of injury etc., can be declared as Group I or Group II substance » Group IV: any electronic product, and » Group V: any radioactive material. The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.		
National Environmental Management: Waste Act (No. 59 of 2008) (NEM:WA)	The Minister may by notice in the Gazette publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment. The Minister may amend the list by – » Adding other waste management activities to the list. » Removing waste management activities from the list. » Making other changes to the particulars on the list. In terms of the Regulations published in terms of NEM:WA (GNR 912), a BA or EIA is required to be undertaken for identified listed activities. Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that: » The containers in which any waste is stored, are intact and not corroded or in » Any other way rendered unlit for the safe storage of waste.	DFFE – hazardous waste Northern Cape DAEARD&LR – general waste	No listed activities are triggered by Red Sands PV3 and therefore no Waste Management License is required to be obtained. General and hazardous waste handling, storage and disposal will be required during construction and operation. The National Norms and Standards for the Storage of Waste (GNR 926) published under Section 7(1)(c) of NEM:WA will need to be considered in this regard.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	» Adequate measures are taken to prevent accidental spillage or leaking. » The waste cannot be blown away. » Nuisances such as odour, visual impacts and breeding of vectors do not arise, and » Pollution of the environment and harm to health are prevented.		
National Road Traffic Act (No. 93 of 1996) (NRTA)	The technical recommendations for highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads" outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed. Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts. The general conditions, limitations, and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution, and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the National Road Traffic Act and the relevant Regulations.	SANRAL – national roads Northern Cape DoT	An abnormal load / vehicle permit may be required to transport the various components to site for construction. These include route clearances and permits will be required for vehicles carrying abnormally heavy or abnormally dimensioned loads. Transport vehicles exceeding the dimensional limitations (length) of 22m. Depending on the trailer configuration and height when loaded, some of the on-site substation components may not meet specified dimensional limitations (height and width).
Provincial Policies / Legislation			

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
Northern Cape Nature Conservation Act (Act No. 9 of 2009)	This Act provides for the sustainable utilisation of wild animals, aquatic biota and plants; provides for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora; provides for offences and penalties for contravention of the Act; provides for the appointment of nature conservators to implement the provisions of the Act; and provides for the issuing of permits and other authorisations. Amongst other regulations, the following may apply to the current project: » Boundary fences may not be altered in such a way as to prevent wild animals from freely moving onto or off of a property; » Aquatic habitats may not be destroyed or damaged; » The owner of land upon which an invasive species is found (plant or animal) must take the necessary steps to eradicate or destroy such species; The Act provides lists of protected species for the Province.	Northern Cape Department Agriculture, Environmental Affairs, Rural Development, and Land Reform (DAEARD&LR)	A collection/destruction permit must be obtained from Northern Cape Nature Conservation for the removal of any protected plant or animal species found on site. *Vachellia haematoxylon, Vachellia erioloba, Bosciam albitrunca,* and *Ammocharis coranica* are protected (national and provincial) species recorded in the area.

5.7.2 Best Practice Guidelines Birds & Solar Energy (2017)

The Best Practice Guidelines Birds & Solar Energy (2017) proposed by the Birds and Renewable Energy Specialist Group (BARESG) (convened by Bird Life South Africa and the Endangered Wildlife Trust) contain guidelines for assessing and monitoring the impact of solar generation facilities on birds in Southern Africa. The guidelines recognise the impact that solar energy may have on birds, through for example the alteration of habitat, the displacement of populations from preferred habitat, and collision and burn mortality associated with elements of solar hardware and ancillary infrastructure; and the fact that the nature and implications of these effects are poorly understood.

The guidelines are aimed at EAPs, avifaunal specialists, developers and regulators and propose a tiered assessment process, including:

(i) Preliminary avifaunal assessment – an initial assessment of the likely avifauna in the area and possible impacts, preferably informed by a brief site visit and by collation of available data; also including the design of a site-specific survey and monitoring project should this be deemed necessary.
(ii) Data collection – further accumulation and consolidation of the relevant avian data, possibly including the execution of baseline data collection work (as specified by the preliminary assessment), intended to inform the avian impact study.
(iii) Impact assessment – a full assessment of the likely impacts and available mitigation options, based on the results of systematic and quantified monitoring if this was deemed a requisite at preliminary assessment.
(iv) Monitoring – repetition of baseline data collection, plus the collection of mortality data. This helps to develop a complete before and after picture of impacts, and to determine if proposed mitigation measures are implemented and are effective, or require further refinement. Monitoring may only be necessary for projects with the potential for significant negative impacts on birds (i.e. large area affected and / or vulnerable species present).

In terms of the guidelines the quantity and quality of baseline data required to inform the assessment process at each site should be set in terms of the size of the site and the predicted impacts of the solar technology in question, the anticipated sensitivity of the local avifauna (for example, the diversity and relative abundance of priority species present, proximity to important flyways, wetlands or other focal sites) and the amount of existing data available for the area.

Data collection could vary from a single, short field visit (Regime 1, for e.g. at a small or medium sized site with low avifaunal sensitivity), to a series of multi-day survey periods, including the collection of various forms of data describing avian abundance, distribution and movement and spread over 12 months (Regime 3, for e.g. at a large developments located in a sensitive habitat, or which otherwise may have significant impacts on avifauna). **Table 5.8** is taken from the best practise guidelines and provides a summary of the recommended assessment regimes in relation to proposed solar energy technology, project size, and likely risk).

Table 5.8: Recommended avian assessment regimes in relation to proposed solar energy technology, project size, and known impact risks.

Type of technology*	Size**	Avifaunal Sensitivity***		
		Low	Medium	High
All except CSP power tower	Small (< 30ha)	Regime 1	Regime 1	Regime 2
	Medium (30 – 150ha)	Regime 1	Regime 2	Regime 2
	Large (> 150ha)	Regime 2****	Regime 2	Regime 3
CSP power tower	All	Regime 3		

Regime 1: One site visit (peak season); minimum 1 – 5 days.
Regime 2: Pre- and post-construction; minimum 2 – 3 x 3 – 5 days over 6 months (including peak season); carcass searches.
Regime 3: Pre- and post-construction; minimum 4 – 5 x 4 – 8 days over 12 months, carcass searches.

* Different technologies may carry different intrinsic levels of risk, which should be taken into account in impact significance ratings

** For multi-phased projects, the aggregate footprint of all the phases should be used. At 3ha per MW, Small = < 10MW, Medium = 10 – 50MW, Large = > 50MW.

*** The avifaunal sensitivity is based on the number of priority species present, or potentially present, the regional, national or global importance of the affected area for these species (both individually and collectively), and the perceived susceptibility of these species (both individually and collectively) to the anticipated impacts of development. For example, an area would be considered to be of high avifaunal sensitivity if one or more of the following is found (or suspected to occur) within the broader impact zone:

1) Avifaunal habitat (e.g. a wetlands, nesting or roost sites) of regional or national significance.
2) A population of a priority species that is of regional or national significance.
3) A bird movement corridor that is of regional or national significance.
4) A protected area and / or Important Bird and Biodiversity Area.

An area would be considered to be of medium avifaunal sensitivity if it does not qualify as high avifaunal sensitivity, but one or more of the following is found (or suspected to occur) within the broader impact zone

1) Avifaunal habitat (e.g. a wetland, nesting or roost sites) of local significance.
2) A locally significant population of a priority species.
3) A locally significant bird movement corridor.

An area would be considered to be of low avifaunal sensitivity if it is does not meet any of the above criteria.

**** Regime 1 may be applied to some large sites, but only in instances where there is abundant existing data to support the assessment of low sensitivity.

The Red Sands PV3 study area, including the development area, has been classified as a Regime 2 site, as the area has been defined as a medium sensitivity area in terms of the Bird Life South Africa Guidelines. Two surveys were undertaken (July 2021 and November 2021) to inform the Avifauna Impact Assessment.

5.7.2 The IFC EHS Guidelines

The IFC EHS Guidelines are technical reference documents with general and industry specific examples of Good International Industry Practice (GIIP). The following IFC EHS Guidelines have relevance to the proposed project:

» IFC EHS General Guidelines
» IFC EHS Guidelines for Electric Power Transmission and Distribution

The General EHS Guidelines are designed to be used together with the relevant Industry Sector EHS Guidelines, however no Industry Sector EHS Guidelines have been developed for PV solar power to date.

The application of the General EHS Guidelines should be tailored to the hazards and risks associated with a project, and should take into consideration site-specific variables which may be applicable, such as host country context, assimilative capacity of the environment, and other project factors. In instances where host country regulations differ from the standards presented in the EHS Guidelines, whichever is the more stringent of the two in this regard should be applied.

The General EHS Guidelines include consideration of the following:

- Environmental:
  - Air Emissions and Ambient Air Quality
  - Energy Conservation
  - Wastewater and Ambient Water Quality
  - Water Conservation
  - Hazardous Materials Management
  - Waste Management
  - Noise
  - Contaminated Land
- Occupational Health and Safety:
  - General Facility Design and Operation
  - Communication and Training
  - Physical Hazards
  - Chemical Hazards
  - Biological Hazards
  - Radiological Hazards
  - Personal Protective Equipment (PPE)
  - Special Hazard Environments
  - Monitoring
- Community Health and Safety:
  - Water Quality and Availability
  - Structural Safety of Project Infrastructure
  - Life and Fire Safety (L&FS)
  - Traffic Safety
  - Transport of Hazardous Materials
  - Disease Prevention
  - Emergency Preparedness and Response
- Construction and Decommissioning:
  - Environment
  - Occupational Health & Safety
  - Community Health & Safety

5.7.4 IFC's Project Developer's Guide to Utility-Scale Solar Photovoltaic Power Plants (2015)

While no Industry Sector EHS Guidelines have been developed for PV Solar Power, the IFC has published a Project Developer's Guide to Utility-Scale Solar Photovoltaic Power Plants (IFC, 2015). Chapter 8 of the Project Developer's Guide pertains to Permits, Licensing and Environmental Considerations, and states that in order to deliver a project which will be acceptable to international lending institutions, environmental and social assessments should be carried out in accordance with the requirements of the

key international standards and principles, namely the Equator Principles and IFC's Performance Standards.

Some of the key environmental considerations for solar PV power plants contained within the Project Developer's Guide include:

Construction Phase Impacts

Construction activities lead to temporary air emissions (dust and vehicle emissions), noise related to excavation, construction and vehicle transit, solid waste generation and wastewater generation from temporary building sites and worker accommodation. In addition, Occupational Health and Safety (OHS) is an issue that needs to be properly managed during construction in order to minimise the risk of preventable accidents leading to injuries and / or fatalities. Proper OHS risk identification and management measures should be incorporated in every project's management plan and standard Engineering, Procurement and Construction (EPC) contractual clauses.

Response:
Impacts associated with the construction phase of the development have been identified and assessed as part of the detailed independent specialist studies undertaken as part of the BA process. Where applicable, appropriate mitigation measures with which to minimise the significance of construction phase impacts have been identified and included in the EMPr prepared for Red Sands PV3 and attached as Appendix J to this BA Report.

Water Usage

Although water use requirements are typically low for solar PV plants, clusters of PV plants may have a high cumulative water use requirement in arid areas where local communities rely upon scarce groundwater resources. In such scenarios, water consumption should be estimated and compared to local water abstraction by communities (if any), to ensure no adverse impacts on local people. O&M methods in relation to water availability and use should be carefully reviewed where risks of adverse impacts to community usage are identified.

Response:
Water will be required for the construction and operation phases of the facility. Water will be abstracted from existing onsite boreholes or via municipal supply. The water requirements for the cleaning operations will be minimal for the 75MW plant

Land Matters

As solar power is one of the most land-intensive power generation technologies, land acquisition procedures and in particular the avoidance or proper mitigation of involuntary land acquisition / resettlement are critical to the success of the project. This includes land acquired either temporarily or permanently for the project site itself and any associated infrastructure – i.e., access roads, powerlines and construction camps (if any).. If involuntary land acquisition is unavoidable, a Resettlement Action Plan (RAP) (dealing with physical displacement and any associated economic displacement) or Livelihood Restoration Plan (LRP) (dealing with economic displacement only) will be required. This is often

a crucial issue with respect to local social license to operate, and needs to be handled with due care and attention by suitably qualified persons.

Response:
Red Sands PV3 and its associated infrastructure is proposed on privately owned properties. A landowner / lease agreement has been entered into between the project developer and the respective landowners to provide for the utilisation of the land for the development of the solar facility and its associated infrastructure. No involuntary land acquisition or resettlement is required or will take place as a result of the project.

Landscape and Visual Impacts

Key impacts can include the visibility of the solar panels within the wider landscape and associated impacts on landscape designations, character types and surrounding communities. Common mitigation measures to reduce impacts can include consideration of layout, size and scale during the design process and landscaping / planting in order to screen the modules from surrounding receptors. Note that it is important that the impact of shading on energy yield is considered for any new planting requirements. Solar panels are designed to absorb, not reflect, irradiation. However, glint and glare should be a consideration in the environmental assessment process to account for potential impacts on landscape / visual and aviation aspects.

Response:
Potential visual impacts associated with the development of Red Sands PV3 have been assessed as part of the Visual Impact Assessment specialist study conducted as part of the BA process. Measures with which to avoid, or if avoidance is not possible minimise, and mitigate any negative visual impacts have been identified, and are contained within the EMPr prepared for the project and attached as Appendix J to this BA Report.

Ecology and Natural Resources

Potential impacts on ecology can include habitat loss / fragmentation, impacts on designated areas and disturbance or displacement of protected or vulnerable species. Receptors of key consideration are likely to include nationally and internationally important sites for wildlife and protected species such as bats, breeding birds and reptiles. Ecological baseline surveys should be carried out where potentially sensitive habitat, including undisturbed natural habitat, is to be impacted, to determine key receptors of relevance to each site. Mitigation measures can include careful site layout and design to avoid areas of high ecological value or translocation of valued ecological receptors. Habitat enhancement measures could be considered where appropriate to offset adverse impacts on sensitive habitat at a site, though avoidance of such habitats is a far more preferable option.

Response:
Potential ecological impacts associated with the development of Red Sands PV3 have been assessed as part of the Ecology Impact Assessment (refer to Appendix D) and Avifauna Impact Assessment (refer to Appendix E) conducted as part of the BA process. Measures with which to avoid, or if avoidance is not possible minimise, and mitigate any negative ecological impacts have been identified, and are contained within the EMPr prepared for the project and attached as Appendix M to this BA Report. Areas of ecological importance are reflected in an environmental sensitivity map prepared for the

project (refer to Chapter 9) and have been utilised to inform the development layout.

Cultural Heritage

Potential impacts on cultural heritage can include impacts on the setting of designated sites or direct impacts on below-ground archaeological deposits as a result of ground disturbance during construction. Where indicated as a potential issue by the initial environmental review / scoping study, field surveys should be carried out prior to construction to determine key heritage and archaeological features at, or in proximity to, the site. Mitigation measures can include careful site layout and design to avoid areas of cultural heritage or archaeological value and implementation of a 'chance find' procedure that addresses and protects cultural heritage finds made during a project's construction and/or operation phases.

Response:
Heritage impacts associated with the development of Red Sands PV3 have been assessed as part of the Heritage Impact Assessment conducted as part of the BA process, which includes the consideration of heritage, archaeological, and palaeontological resources. Measures with which to avoid, or if avoidance is not possible minimise, and mitigate any negative heritage impacts (including those on heritage, archaeology, and palaeontology) have been identified, and are contained within the EMPr prepared for the project and attached as Appendix J to this BA Report.

Transport and Access

The impacts of transportation of materials and personnel should be assessed in order to identify the most appropriate transport route to the site while minimising the impacts on project-affected communities. The requirement for any oversized vehicles / abnormal loads should be considered to ensure access is appropriate. Onsite access tracks should be permeable and developed to minimise disturbance to agricultural land. Where project construction traffic has to traverse local communities, traffic management plans should be incorporated into the environmental and social management plan and EPC requirements for the project.

Response:
The project site can be readily accessed via existing access roads in the region (existing gravel main road off the N8). Within the facility development footprint, access will be required from new / existing roads for construction purposes (and limited access for maintenance during operation). The facility layout has been determined following the identification of site related sensitivities.

The national, regional, secondary and proposed internal access roads will be used to transport all components and equipment required during the construction phase of the solar PV facility. Some of the components (i.e. on-site substation transformer) may be defined as abnormal loads in terms of the National Road Traffic Act (No. 93 of 1996) (NRTO) by virtue of the dimensional limitations. A permit will be required in accordance with Section 81 of the National Road Traffic Act (No. 93 of 1996) (NRTA) which pertains to vehicles and loads which may be exempted from provisions of the Act.

Drainage / Flooding

A review of flood risk should be undertaken to determine if there are any areas of high flood risk associated with the site. Existing and new drainage should also be considered to ensure run-off is controlled to minimise erosion.

Response:
A stormwater management plan has been prepared for the project and is included in Appendix G of the EMPr, prepared for the project and attached as Appendix J to this BA Report.

Consultation and Disclosure

It is recommended that early stage consultation is sought with key authorities, statutory bodies, affected communities and other relevant stakeholders. This is valuable in the assessment of project viability, and may guide and increase the efficiency of the development process. Early consultation can also inform the design process to minimise potential environmental impacts and maintain overall sustainability of the project. The authorities, statutory bodies and stakeholders that should be consulted vary from country to country but usually include the following organisation types:

» Local and / or regional consenting authority.
» Government energy department / ministry.
» Environmental agencies / departments.
» Archaeological agencies / departments.
» Civil aviation authorities / Ministry of Defence (if located near an airport).
» Roads authority.
» Health and safety agencies / departments.
» Electricity utilities.
» Military authorities.

Community engagement is an important part of project development and should be an on-going process involving the disclosure of information to project-affected communities. The purpose of community engagement is to build and maintain over time a constructive relationship with communities located in close proximity to the project and to identify and mitigate the key impacts on project-affected communities. The nature and frequency of community engagement should reflect the project's risks to, and adverse impacts on, the affected communities.

Response:
A Public Participation Process as prescribed by Chapter 6 of the 2014 EIA Regulations (GNR 326) is being conducted as part of the BA process being undertaken for the project. This Public Participation Process includes consultation with key authorities, affected and surrounding landowners, local communities, and other relevant stakeholders.

Environmental and Social Management Plan (ESMP)

Whether or not an ESIA or equivalent has been completed for the site, an ESMP should be compiled to ensure that mitigation measures for relevant impacts of the type identified above (and any others) are identified and incorporated into project construction procedures and contracts. Mitigation measures

may include, for example, dust suppression during construction, safety induction, training and monitoring programs for workers, traffic management measures where routes traverse local communities, implementation of proper waste management procedures, introduction of periodic community engagement activities, implementation of chance find procedures for cultural heritage, erosion control measures, fencing off of any vulnerable or threatened flora species, and so forth. The ESMP should indicate which party will be responsible for (a) funding, and (b) implementing each action, and how this will be monitored and reported on at the project level. The plan should be commensurate to the nature and type of impacts identified.

Response:
Impacts associated with the construction phase of development have been identified and assessed as part of the independent specialist studies undertaken as part of the BA process. Appropriate mitigation measures with which to minimise the significance of negative impacts have been identified and are included in the EMPr prepared for the project and attached as Appendix M to this BA Report.

CHAPTER 6: DESCRIPTION OF THE RECEIVING ENVIRONMENT

This Chapter provides a description of the environment that may be affected by the development of Red Sands PV3. The information is provided in order to assist the reader in understanding the pre-development environment and the possible effects of the project on the environment within which it is proposed to be developed. Aspects of the biophysical and social environments that could be directly or indirectly affected by the development or could affect Red Sands PV3 have been described. This information has been sourced from both existing information available for the area as well as collected field data by specialist consultants and aims to provide the context within which this BA process is being conducted.

6.1 Legal Requirements as per the EIA Regulations, 2014 (as amended) for the undertaking of a Basic Assessment Report

This chapter of the BA Report includes the following information required in terms of Appendix 1: Content of the BA Report.

Requirement	Relevant Section
(h)(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects	The environmental attributes associated with the development of Red Sands PV3 are included within this chapter. The environmental attributes that are assessed within this chapter include the following:
	» The regional setting of Red Sands PV3 is described in **section 6.2**.
	» The climatic conditions of Upington and the study area are included in **section 6.3**.
	» Biophysical characteristics of the development area, study area and the surrounding areas are described in section 6.3 and **section 6.4**. These include landscape features such as, geology, soil and land types and biodiversity (i.e. ecology ((including fauna & flora)) and avifauna) of the area to be affected by the development of Red Sands PV3.
	» Heritage resources, including the archaeology and palaeontology of the study area and development area are described in **section 6.5**.
	» The visual quality of the affected area surrounding Red Sands PV3 is described in **section 6.6.**
	» Social characteristics of the area surrounding Red Sands PV3 is described in **section 6.7**.
	» A description of the site accessibility of the study area and the surrounding areas is included in **section 6.8**.

A more detailed description of each aspect of the affected environment is included in the specialist reports contained within **Appendix D – I**.

6.2 Regional Setting

The Northern Cape Province is located in the north-western extent of South Africa and constitutes South Africa's largest province, occupying an area of 372 889km² in extent, equivalent to nearly a third (30.5%) of the country's total land mass. It is also South Africa's most sparsely populated province with a population of 1 145 861, and a population density of 3.1/km². The capital city is Kimberley, and other important towns include Upington, Springbok, Kuruman, De Aar and Sutherland. It is bordered by the Western Cape, and Eastern Cape provinces to the south and south-east, Free State, and North West provinces to the east, Botswana and Namibia to the north, and the Atlantic Ocean to the west. The Northern Cape is the only South African province which borders Namibia and plays an important role in terms of providing linkages between Namibia and the rest of South Africa. The Orange River, which is South Africa's largest river, is a significant feature and is also the main source of water in the Province, while also constituting the international border between the Northern Cape (i.e. South Africa) and Namibia.

The Northern Cape is rich in minerals including alluvial diamonds, iron ore, asbestos, manganese, fluorspar, semi-precious stones and marble. The mining sector in the province is the largest contributor of the provincial Gross Domestic Product (GDP) and of a great importance to South Africa as it produces ~37% of the country's diamonds, 44% of its zinc, 70% of its silver, 84% of its iron ore, 93% of its lead and 99% of its manganese.

The province has fertile agricultural land in the Orange River Valley, especially at Upington, Kakamas and Keimoes, where grapes and fruit are cultivated intensively. The interior Karoo relies on sheep farming, while the karakul-pelt industry is one of the most important in the Gordonia District of Upington. Wheat, fruit, peanuts, maize and cotton are produced at the Vaalharts Irrigation Scheme near Warrenton. The agricultural sector employs approximately 19.5% of the total formally employed individuals in the province. The sector is also experiencing significant growth in value-added activities, including game-farming, while food production and processing for the local and export markets is also growing significantly (PGDS, July 2011). Furthermore, approximately 96% of the land in the province is used for livestock and game farming, while only approximately 2% is used for crop farming, mainly under irrigation in the Orange River Valley and the Vaalharts Irrigation Scheme.

The Northern Cape offers unique tourism opportunities including wildlife conservation destinations, natural features, historic sites, festivals, cultural sites, star gazing, adventure tourism, agricultural tourism, ecotourism, game farms, and hunting areas, etc. The Province is home to the Richtersveld Botanical and Landscape World Heritage Site, which comprises a United Nations Educational, Scientific and Cultural Organisation (UNESCO) World Heritage Site under the World Heritage Convention. The province is also home to two (2) Transfrontier National Parks, namely the Kgalagadi Transfrontier Park, and the Richtersveld /Ai-Ais Transfrontier Park, as well as five (5) national parks and six (6) provincial reserves. In addition, the province plays a significant role in South Africa's science and technology sector, as it is home to the Square Kilometre Array (SKA), the Southern African Large Telescope (SALT), and the Karoo Array Telescope (MeerKAT). In addition, the Augrabies National Park, a major tourist destination in the Province, is located 120km east of Upington near the town of Kakamas.

The Northern Cape is made up of five (5) district municipalities, namely Francis Baard, John Taolo Gaetsewe, Namakwa, Pixley ka Seme and ZF Mgcawu (refer to **Figure 6.2**).

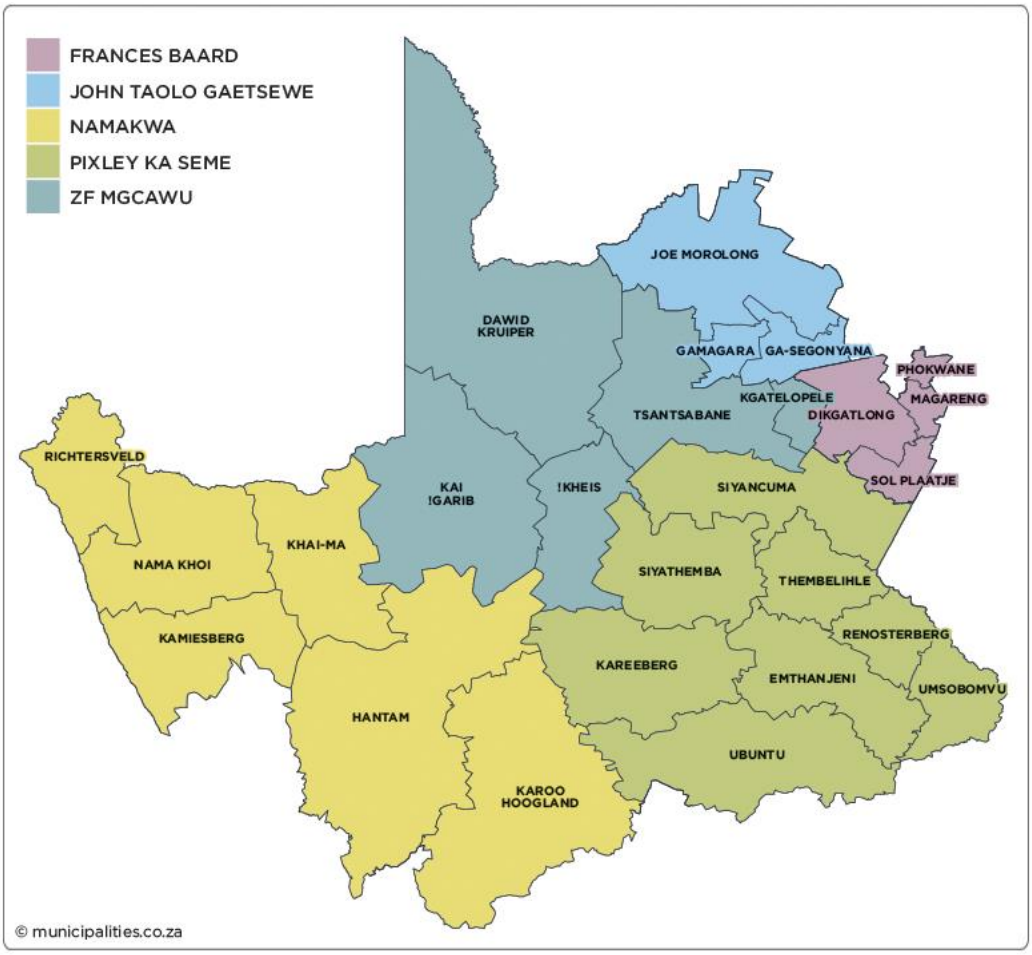

Figure 6.2: District municipalities of the Northern Cape Province (Source: Municipalities of South Africa)

The ZF Mgcawu District Municipality[12] (DM), within which the proposed Red Sands PV3 is located, is situated in the north-central extent of the Northern Cape Province, and is bordered by the Namakwa DM to the south-west and south, the Pixley ka Seme DM to the south and south-east, the Frances Baard and John Taolo Gaetsewe DM to the east, Botswana to the north, and Namibia to the west. The ZF Mgcawu DM occupies an area of land of approximately 102 484km² in extent, which is equivalent to over one quarter (approximately 27%) of the Northern Cape Province. Approximately 65 000km² of the DM's land mass comprises the Kalahari Desert, Kgalagadi Transfrontier Park, and the former Bushman Land.

The ZF Mgcawu DM includes the town of Upington, which is the capital of the DM, and where the DM's seat of government is located. The town is also the largest town in the DM and is located on the banks of the Orange River. Upington is also the centre of the karakul sheep and dried-fruit industries and is the most northerly winemaking region in South Africa. Other prominent cities and towns located within the DM include, Beeshoek, Brandboom, Danielskuil, Eksteenskuil, Groblershoop, Kakamas, Keimoes, Kenhardt, Lime

[12] Previously known as the Siyanda District Municipality

Acres, Mier, Postmasburg, and Rietfontein. The main economic activities within the DM include agriculture, mining, and tourism.

The ZF Mgcawu DM comprises five (5) local municipalities (LMs), namely Dawid Kruiper, Kai !Garib, Tsantsabane, Kheis and Kgatelopele (refer to **Figure 6.3**).

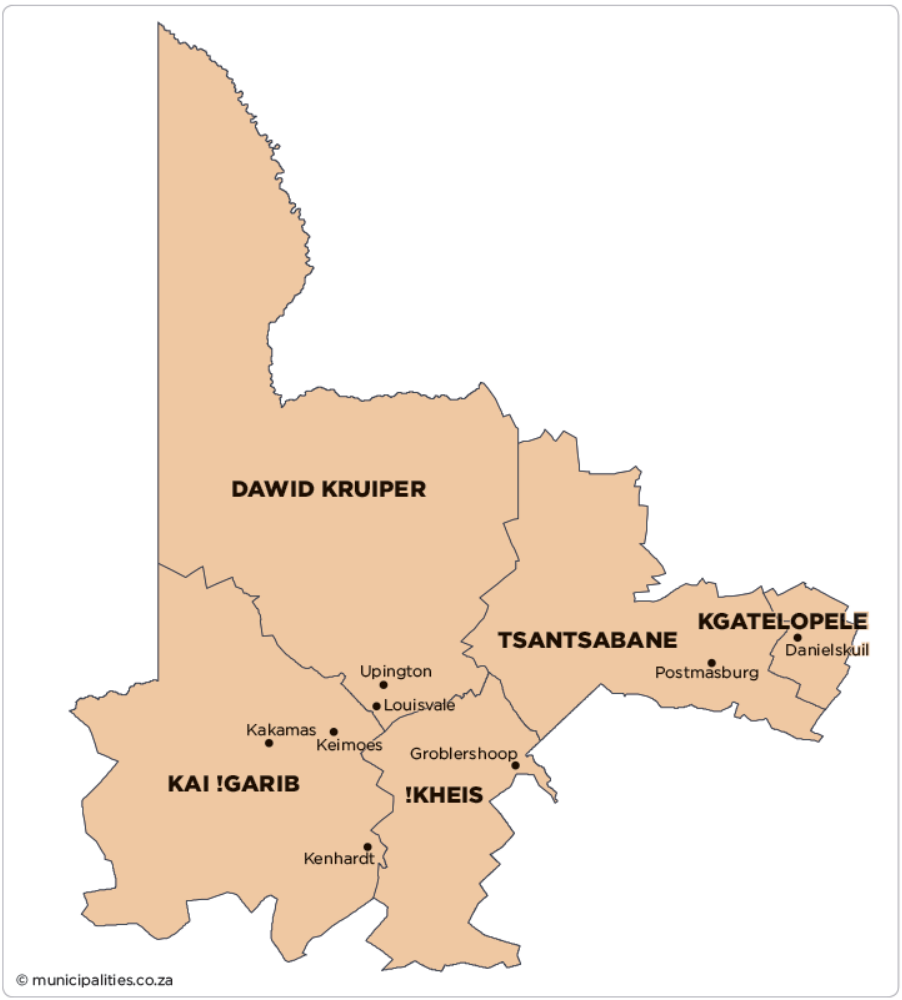

Figure 6.3: Local Municipalities of the ZF Mgcawu DM (Source: Municipalities of South Africa)

The !Kheis Local Municipality is a Category B municipality situated within the ZF Mgcawu District in the Northern Cape Province. It is one of the five municipalities that make up the district, accounting for 11% of its geographical area. Due to the climate of the area, there is huge potential to utilise solar energy more widely, especially in the remote areas of the district. The Orange River stretches through the area, from the south-east to the north-west. The presence of perennial river water contributes to the establishment of table grapes, which are marketed and exported to Western Europe.

6.3 Local Setting: Location and Description of the Study Area and Project site

The majority of the area within which the study area is located is sparsely populated and consists of an undulating landscape of wide-open expanses. The area surrounding the study area is characterised as a semi-arid desert region and vegetation cover is restricted to low shrublands, described as the Olifantshoek Plains and the Gordonia Duneveld. The local population is primarily concentrated in the smaller towns / settlements (Groblershoop) along the Orange River. The residents of the communities are primarily

employed by the local agricultural sector in the area, particularly viticulture and fruit farms and associated agro-processing facilities. The Orange River valley/ corridor is predominated by the presence of irrigated agriculture. Game farms (FM Safaris, Kalahari Onyx, and private nature reserves (Glen Lyon Nature Reserve) are also located within the surrounding area.

The Upington REDZ (also referred to as, 'Zone 7') has been specifically identified as an area where large-scale solar PV facilities can be developed in terms of the Strategic Integrated Project (SIP) 8. The REDZ area in this region, stretches from the south of the N10 national road and Upington in the north, to Kenhardt and Marydale in the south, and from Keimoes in the west, to Groblershoop in the east. The study area for the Red Sands PV3 PV is located along the eastern boundary of the Upington REDZ.

The main access routes to the area include the N8 and the N10. Several gravel main roads are located within the surrounding area, and generally in a good condition.

Major grid connection infrastructure available in the vicinity of the development area include Ferrum/Nieuwehoop 1 400kV, Garona/Lewensaar 1 275kV, Garona/Gordonia 1 132kV power lines, and the Garona Substation. The operational Bokpoort CSP facility is located approximately 11km west of the project site.

6.4 Climatic Conditions

The Groblershoop area is typically characterised as having a desert climate (BWh / hot desert climate). Very little rainfall occurs during the year, and the area is characterised by an average annual temperature of 19.3°C, and an average annual rainfall of 180mm.

Temperatures range from maximum highs of 34.6°C in January, to minimum lows of 2.5°C in July. January is the warmest month with average temperatures of 26.2°C, and July is the coldest month with average temperatures of 11.5°C. July is also typically the driest month, receiving an average of 2mm of rainfall, while March is the wettest month, receiving an average of 39mm of rainfall (as illustrated in **Figure 6.4** and **Table 6.1**). Rainfall within the area is erratic, both locally and seasonally, and therefore cannot be relied on for agricultural practices. The average evaporation is 2 375mm per year, peaking at 11.2mm per day in December. Frost occurs most years on 6 days on average between mid-June and mid-August.

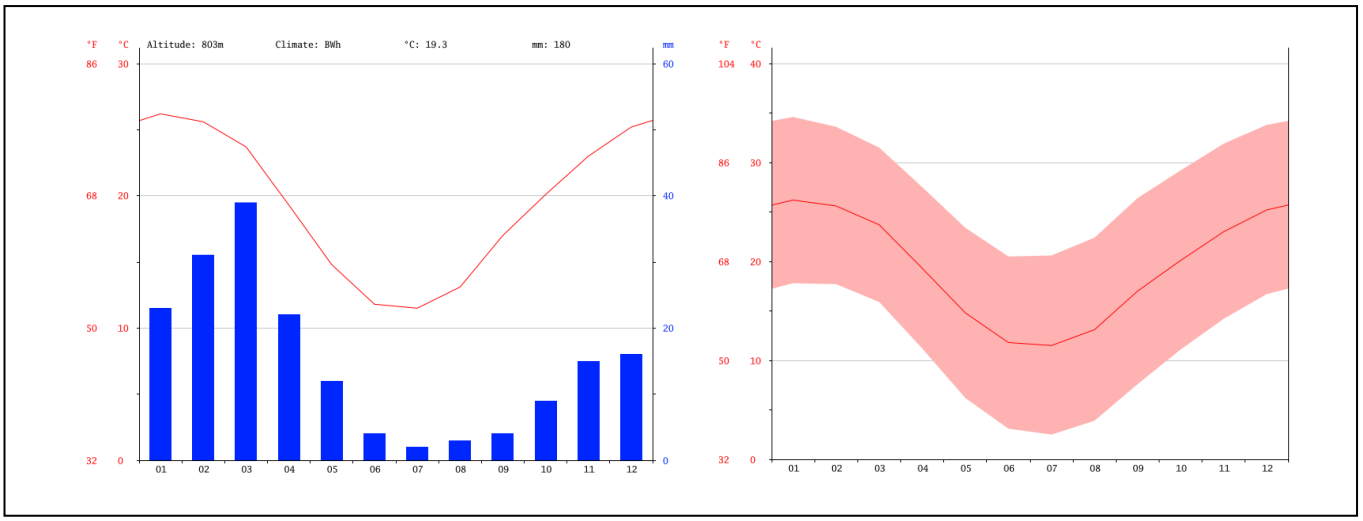

Figure 6.4: Climate and Temperature graphs for Upington, Northern Cape Province (Source: en.climate-data.org).

Table 6.1: Climate data for Groblershoop area, Northern Cape Province (Source: en.climate-data.org).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Temp. (˚C)	26.2	25.6	23.7	19.3	14.8	11.8	11.5	13.1	17	20.1	23	25.2
Minimum Temp. (˚C)	17.8	17.7	15.9	11.2	6.2	3.1	2.5	3.9	7.6	11.1	14.2	16.7
Maximum Temp. (˚C)	34.6	33.6	31.5	27.5	23.4	20.5	20.6	22.4	26.4	29.2	31.9	33.8
Precipitation (mm)	23	31	39	22	12	4	2	3	4	9	15	16

6.5 Landscape features

The project site is located on the southern edge of the Kalahari Basin and ranges in elevation from approximately 970m amsl to about 1500m amsl at the top of local hills. The dominant topographical unit or terrain type is flat undulating plains which slope gently towards the Orange River.

The landscape is covered predominantly by pale red sands of Aeolian origin underlain by calcite. This is further underlain by granite.

Granite outcrops approximately occur within the flat plain close to the proposed site as well as immediately to the south of the Orange River forming a series of minor ridgelines that run roughly in a north to south and east west direction respectively.

The project site has relatively tall ridgelines to the east and west. These ridgelines largely enclose the development area of Red Sands PV3.

6.7 Typography, Soil and Land Types

In terms of terrain, the majority of the development area is characterised by a slope percentage between 0 and 5%, with some smaller patches within the project area characterised by a slope percentage up to 11. The development area in general uniform, relatively gentle topography with gentle slopes being present.

According to the land type database (Land Type Survey Staff, 1972 - 2006) the project development area falls within the Ae 4 and Af 29 land types. The Ae land type consists of red-yellow apedal soils which are freely drained. The soils tend to have a high base status and is deeper than 300 mm. The Af land type is characterised by freely drained Red-Yellow Apedal soils with a high base status and a depth of more than 300 mm.

6.8 Agricultural Potential & Land Capability

The area occupied by Red Sands PV3 comprises of one dominant soil form, namely the Hutton soil form. The Hutton soil forms consists of an orthic topsoil on top of a deep red apedal horizon.

The abovementioned soil has been determined to have a land capability of class "III" and "IV" as well as a climate capability level 8 given the low Mean Annual Precipitation (MAP) and the high Mean Annual Potential Evapotranspiration (MAPE) rates. The combination between the determined land capabilities and climate capabilities results in a land potential of "L6", which is defined as having very restricted potential.

6.9 Hydrology and Surface Water

The project site is located in the Orange Water Management Area (WMA) (NWA, 2016), and the Southern Kalahari lower aquatic ecoregion. The watercourses in the surrounding landscape of the project area are characterised as ephemeral drainage lines, which do not drain into the Orange River, located approximately 16 km to the south of the proposed project.

No watercourses or wetlands are located within the proposed development area for Red Sands PV3.

6.10 Ecological Profile of the Study Area and Development Area

The project site is situated within the two vegetation types, namely Gordonia Duneveld and Olifantshoek Plains Thornveld. The Gordonia Duneveld is mostly characterised by dunes and inter dunes areas dominated by tall and low shrubs, succulent shrubs and herbs. The Olifantshoek Plains Thornveld consists of a very wide and diverse unit on plains with usually open tree and shrub layers with a usually sparse grass layer (**Figure 6.6**).

Figure 6.6: Overview of the habitat condition present within the proposed Red Sands PV3 Facility

i) Protected and Conservation Areas

According to the SAPAD dataset (2021), the proposed development area does not occur within any protected area (**Figure 6.7**). The Glen Lyon Nature Reserve is located approximately 12 km to the east and the Witsand Nature Reserve is located approximately 34 km to the northeast. The proposed activity is unlikely to influence these protected areas as they are situated outside of the buffer zone required to maintain the functioning of protected areas. In addition, there are no NPAES focus areas within the surrounding landscape.

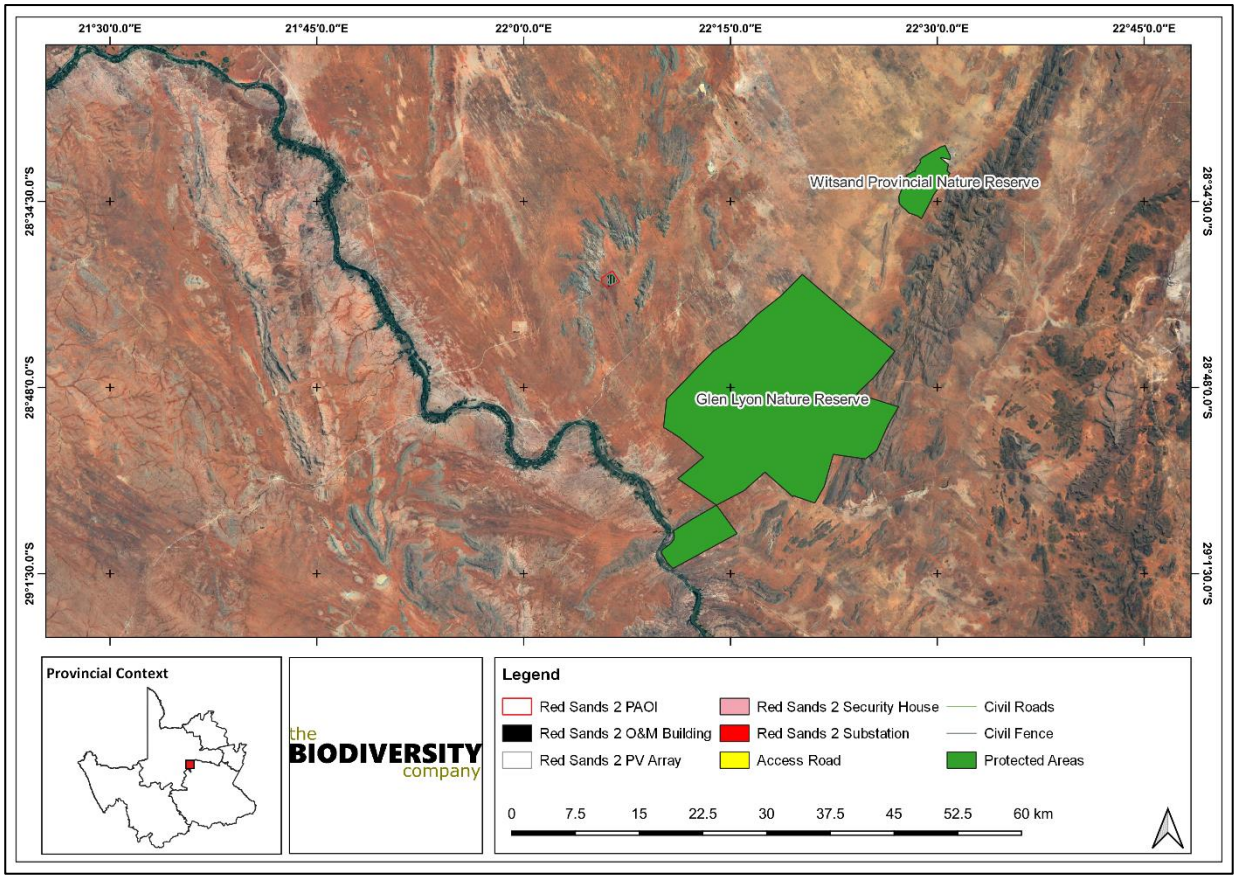

Figure 6.7: Map illustrating the location of protected areas in relation to the proposed Red Sands PV3

ii) Ecosystem Threat Status and Protection Level

The Ecosystem Threat Status is an indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. The development area overlaps with ecosystems of Least Concern (LC). The protection level of the ecosystem is however under protected.

iii) Critical Biodiversity Areas

According to the Northern Cape Critical Biodiversity Areas spatial data (2016) the project development area intersects with Other Natural Areas (ONA). These areas are usually characterised as having a good or fair ecological condition (natural, near-natural or semi-natural) that is not required to meet biodiversity targets for ecosystem types, species or ecological processes. No ESAs or CBAs intersect with the development area however, ESAs are located to the east and north of the development area.

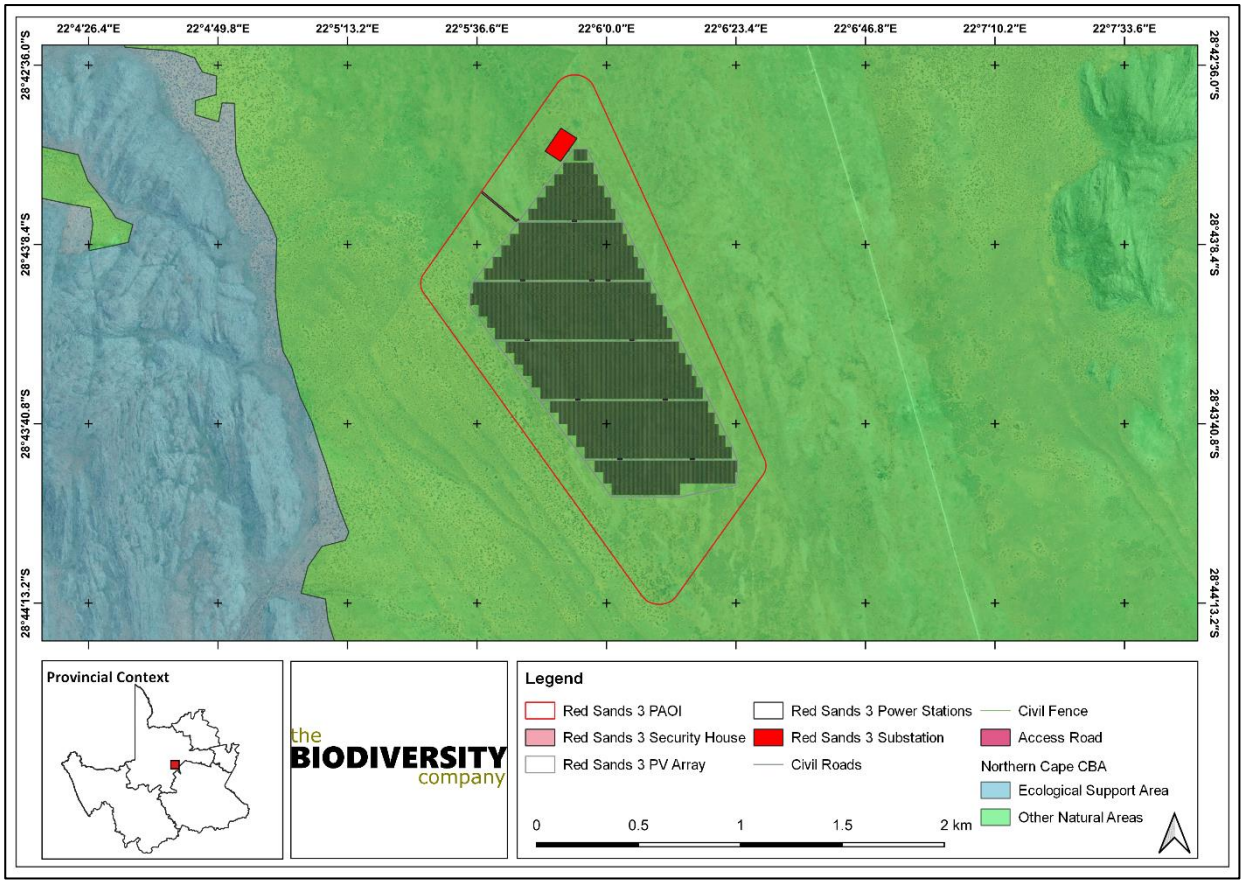

Figure 6.8: Map illustrating Red Sands PV3 within ONA in terms of the Northern Cape CBA data

iv) Expected Flora and Fauna Species of Conservation Concern

Flora

It is expected that 576 species of indigenous plants occur within the area surrounding the project site. Seven (7) species of conservation concern (SCC) based on their conservation status could be expected to occur within the development area, as detailed in **Table 6.2** below. Three of these expected species are endemic to South Africa. The likelihood of occurrence indicated in Table 6.2 was determined by considering the species habitat requirements and examining records on the Global Biodiversity Information Facility (GBIF) database.

Table 6.2: Threatened flora species that may occur within the proposed Red Sands PV3 development area

Family	Species Name	Conservation Status	Endemism	Habitat	Likelihood of Occurrence
Acanthaceae	*Acanthopsis hoffmannseggiana*	DD		Sandy plains, stony hillsides and ridges, usually associated with weathered quartzite and granite, but also occurs on mudstone (in Prince Albert area) and limestone (Asbestos Mountains), usually at an elevation between 650 and 1000 m.	High

Family	Species Name	Conservation Status	Endemism	Habitat	Likelihood of Occurrence
Aizoaceae	*Dinteranthus wilmotianus*	NT	Endemic	Quartz slopes and alluvial gravel soils. EOO < 10 000 km², suspected to occur at 10-20 locations.	Low
Asphodelaceae	*Aloidendron dichotomum*	VU	Near-Endemic	On north-facing rocky slopes (particularly dolomite) in the south of its range. Any slopes and sandy flats in the central and northern parts of range.	Low
Asteraceae	*Eriocephalus macroglossus*	NT	Endemic	Rocky lower slopes in Richtersveld and northern Namaqualand, from Kubus to Springbok.	Low
Asteraceae	*Senecio monticola*	DD		Literature is lacking. Data Deficient - Taxonomically Problematic.	Low
Asteraceae	*Senecio trachylaenus*	DD	Endemic	Literature is lacking. Data Deficient - Taxonomically Problematic.	Low
Poaceae	*Brachiaria dura var. pilosa*	DD		Savanna woodland and grassland on sandy soils.	Low

Fauna

The IUCN Red List Spatial Data indicates that 49 mammal species are expected to occur within the area surrounding the project site. Five (5) threatened mammal species could be expected to occur within the project development area (refer to **Table 6.3**).

Table 6.3: Threatened mammal species that are expected to occur within the proposed Red Sands PV3 development area

Family	Scientific Name	Common Name	Conservation Status		Likelihood of Occurrence
			Regional	Global	
Felidae	*Felis nigripes*	Black-footed Cat	VU	VU	High
Felidae	*Panthera pardus*	Leopard	VU	VU	Low
Hyaenidae	*Parahyaena brunnea*	Brown Hyaena	NT	NT	Low
Manidae	*Smutsia temminckii*	Temminck's Pangolin	VU	VU	Low
Mustelidae	*Aonyx capensis*	Cape Clawless Otter	NT	NT	Low

Felis nigripes (Black-footed cat) is endemic to the arid regions of southern Africa. This species is naturally rare, has cryptic colouring is small in size and is nocturnal. These factors have contributed to a lack of information on this species. The estimated number of mature individuals is 9 707, with the population exhibiting a continuing decline (Sliwa *et al*, 2016). The principle long-term threat for the species is the loss of key resources, such as den sites and prey, from anthropogenic disturbance or habitat degradation (Sliwa *et al*, 2016). An additional threat is indirect persecution, such as accidental poisonings (for example locust spraying, predator control lures/baits) and general predator persecution throughout most of their range. The long-term effects of climate change should not be overlooked and may lead to changes in range, changes in timing of breeding events, increases in severe weather such as flooding and droughts, as well as increased disease patterns or risks of the spread of pathogens from parasites. It is noted that the

species was not observed within the development area, and areas where signs of the species presence were located during the screening survey (refer to Chapter 2) was not considered for development and will not be impacted upon. However, the likelihood of occurrence for the species within the development area was rated as 'High', due to the presence of suitable habitat, burrows and available prey.

In terms of reptiles and amphibians, none of the species expected to occur in the surrounding area are regarded as threatened.

Avifauna

Based on the South African Bird Atlas Project, Version 2 (SABAP2) database, 164 bird species have the potential to occur in the vicinity of the project site (**Table 6.4**).

Table 6.4: List of bird SCCs that are expected to occur in close vicinity to the project site and their reporting rates (SABAP2).

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2021)	
Anthus crenatus	Pipit, African Rock	NT	LC	Moderate
Aquila verreauxii	Eagle, Verreaux's	VU	LC	High
Ardeotis kori	Bustard, Kori	NT	NT	High
Ciconia abdimii	Stork, Abdim's	NT	LC	Moderate
Eupodotis vigorsii	Korhaan, Karoo	NT	LC	High
Falco biarmicus	Falcon, Lanner	VU	LC	High

Eighty-five (85) bird species have been recorded during the pre-construction monitoring. Two of the species recorded were SCCs on a national or international scale (Cape Vulture and Verreaux's Eagle). Thirteen individuals of the Cape Vulture were recorded on the property itself - it appears as if they roosted on the pylons on the edge of the project site. A further 30 were observed circling on the main road to the north of the project site. There has been an influx of vultures noted in the area, as area has been in a drought for 5 years. Two Verreaux's Eagles were recoded soaring next to the property.

A number of species recorded are protected under the NC Conservation Act of 2009 (schedule 2), however three species are being highlighted here, the Pygmy Falcon as well as the Northern Black Korhaan and the Red Crested Korhaan.

6.11 Heritage Resources, including archaeology and palaeontology

6.11.1 Archaeology and the Built Environment

Several archaeological surveys have been undertaken in the area surrounding the proposed development site. Areas surveyed southwest of the project area revealed several Middle Stone Age (MSA) sites, as well as ruined historical stone structures. Stone tools made from banded ironstone, chalcedony and quartzites were found west of the project site. These were predominantly MSA in age and showed few pieces with retouch as most of the flakes were discarded without being further reduced and retouched.

Other areas located to the west of the study area were also surveyed revealing a number of Karoo stone age sites, however similar densities of stone age sites are not known from the proposed development area. Several Later Stone Age artefacts associated with a non-perennial stream, as well as two small historic structures made of clay bricks of low heritage significance. Gaigher (2012, SAHRIS ID 34135) also completed an archaeological assessment in the broader area. Gaigher identified "limited scatterings of Middle to Later Stone Age tools found in various areas". The various assessments conducted in this area provide a robust baseline for the archaeology expected in this area. Van der Walt (2015 & 2016) also notes that "*Although artefacts dating to the Early, Middle and Later Stone Age were recorded in the larger area, they occur as isolated finds that are temporally mixed, in deflated and un-stratified contexts without organic remains and other cultural materials. As a result, the archaeological record of the larger area is considered to be of low significance*." Given the ubiquity of Stone Age material recorded on farms to the west and southwest of this development area it is highly likely that more Stone Age material, particularly Middle Stone Age, of a similar nature to that described above will be found in a field survey of the proposed development area.

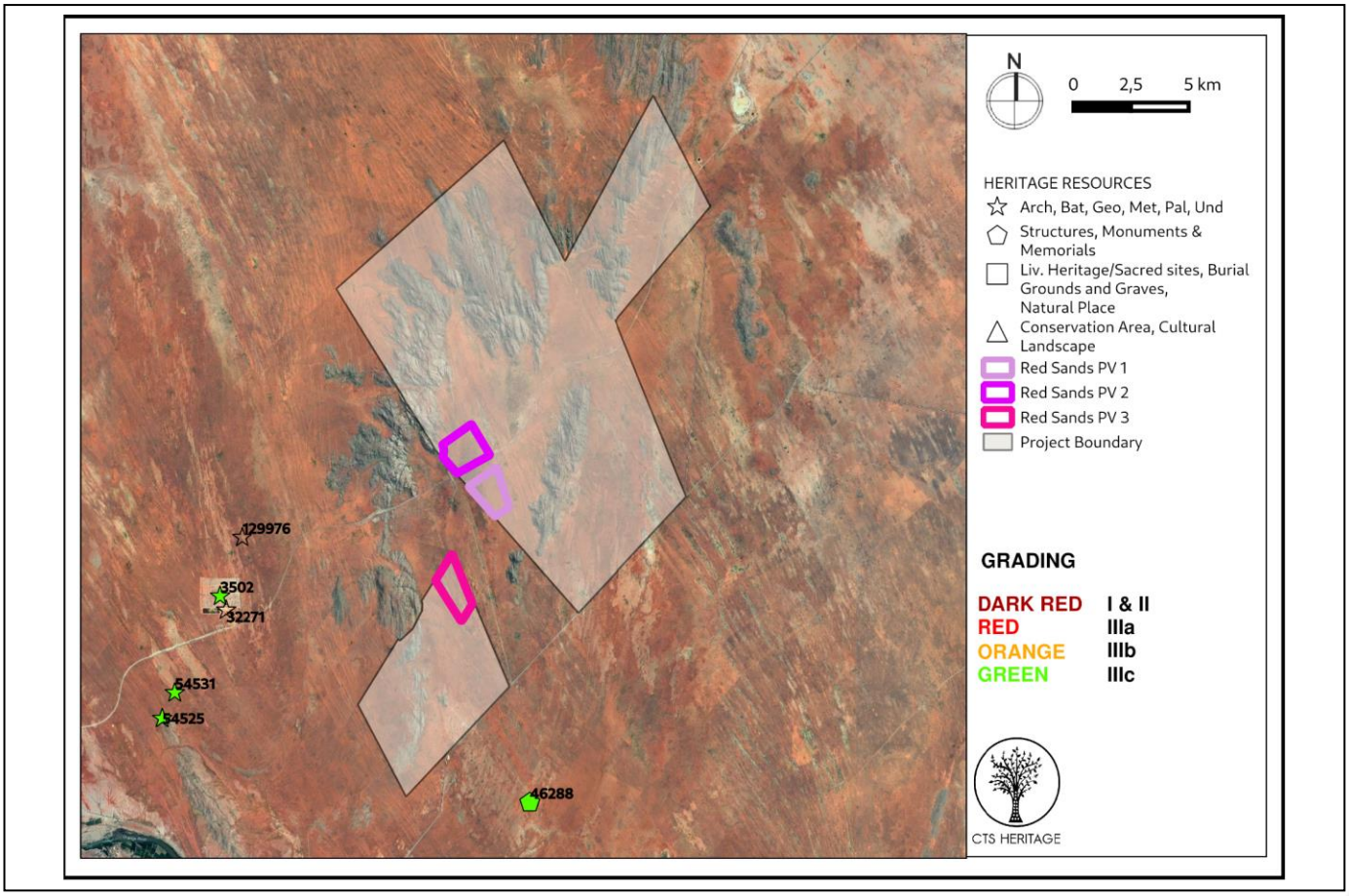

Figure 6.8: Map illustrating the heritage sites identified within the entire study area and development area of the Red Sands Cluster and Red Sands PV3.

6.11.2 Palaeontology

According to Almond's Desktop PIA for the proposed Eskom Groblershoop Substation & Garona-Groblershoop 132kV Powerline (2013), the area is "underlain, at or below the surface, by highly metamorphosed Precambrian basement rocks (schists, quartzites, gneisses) of the Namaqua-Natal

Province that are entirely unfossiliferous. These are locally mantled by Late Caenozoic superficial sediments including Quaternary aeolian sands of the Gordonia Formation (Kalahari Group), calcrete pedocretes and alluvium of the Orange River and its tributaries. These younger superficial sediments are generally of low palaeontological sensitivity". This study area is right next to the area assessed by Almond and has the same geological context.

The Gordonia Formation dune sands were mainly active during cold, drier intervals of the Pleistocene Epoch that were inimical to most forms of life, apart from hardy, desert-adapted species. Porous dune sands are not generally conducive to fossil preservation. However, mummification of soft tissues may play a role here and migrating lime-rich groundwaters derived from the underlying bedrocks (including, for example, dolerite) may lead to the rapid calcretisation of organic structures such as burrows and root casts. Occasional terrestrial fossil remains that might be expected within this unit include calcretized rhizoliths (root casts) and termitaria (e.g. Hodotermes, the harvester termite), ostrich egg shells (Struthio) and shells of land snails (e.g. Trigonephrus) (Almond 2008, Almond & Pether 2008). Other fossil groups such as freshwater bivalves and gastropods (e.g. Corbula, Unio) and snails, ostracods (seed shrimps), charophytes (stonewort algae), diatoms (microscopic algae within siliceous shells) and stromatolites (laminated microbial limestones) are associated with local watercourses and pans. Microfossils such as diatoms may be blown by wind into nearby dune sands. These Kalahari fossils (or subfossils) can be expected to occur sporadically but widely, and the overall palaeontological sensitivity of the Gordonia Formation is therefore considered to be low and the Prynnsberg quartzites are unfossiliferous.

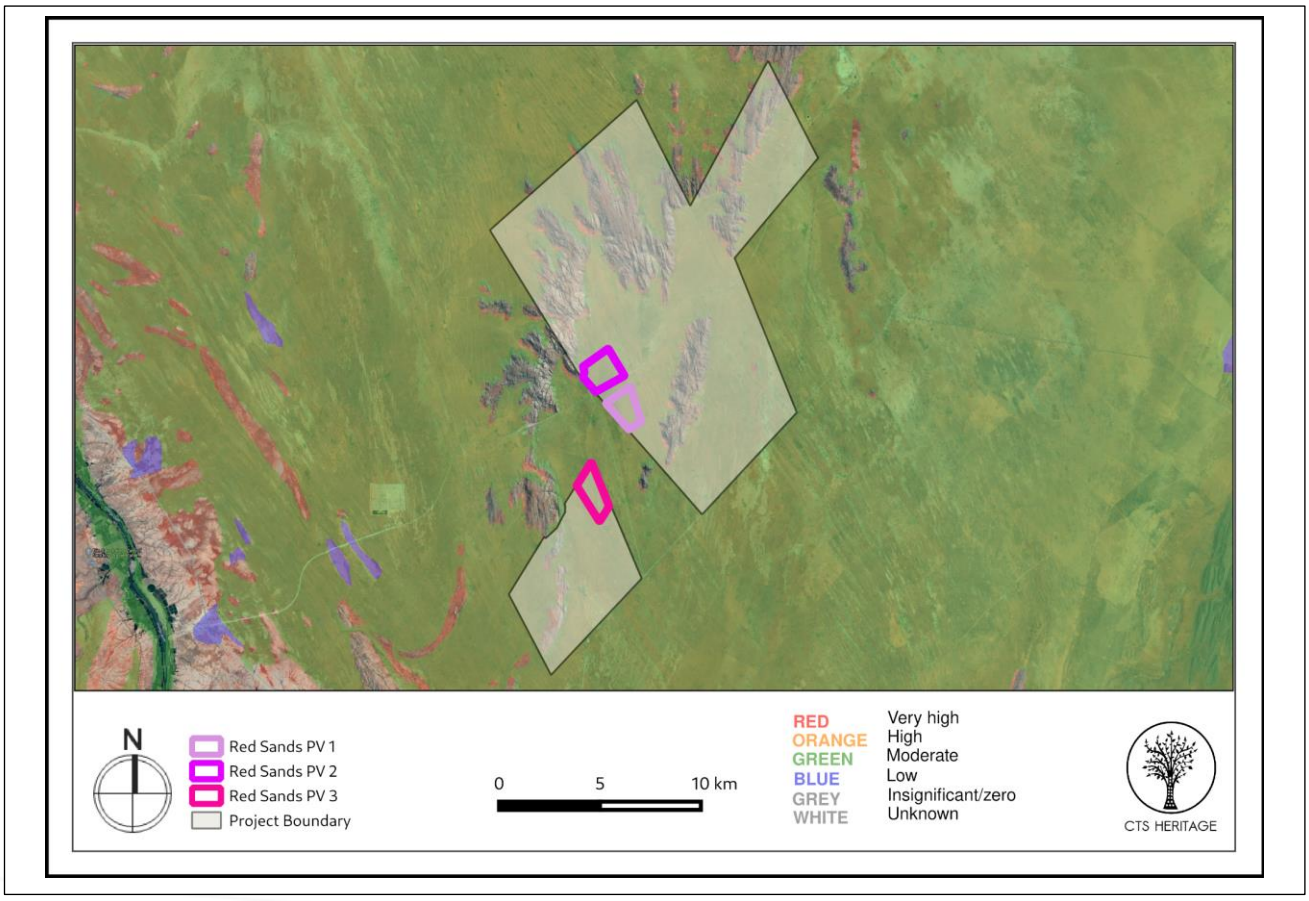

Figure 6.9: A palaeosensitivity map illustrating the location of the Red Sands PV3 project site

6.12 Visual Quality

Landscape Character Areas (LCAs) are defined as "single unique areas which are the discrete geographical areas of a particular landscape type".

The affected landscape can be broadly divided into the following LCAs that are largely defined by landform and vegetation (refer to **Figure 6.10**):

- **Low Undulating plain.** Gently undulating topography with low intensity grazing / game farming, low level grassland / shrub land, occasional non perennial streams, occasional farmstead. This LCA is characteristic of the Nama Karoo. It is important as both an agricultural and a tourism resource.
- **The Orange River Corridor** which is generally lower than the proposed development area and is comprised of open cultivated land with numerous agricultural buildings. The fringes of the LCA and areas around farm structures are also largely covered with taller woody vegetation. This LCA provides a marked contrast to the arid plain that surrounds it. Its primary importance is as an agricultural resource. It also has significant importance for tourism and recreation.
- **Upland Areas** consisting of low north south running ridgelines in the vicinity of the site and slightly taller east west running ridgelines to the south of the Orange River. These areas have little direct agricultural or tourism significance. In visual terms, they provide dramatic contrast with the flat plain that surrounds them.
- **Urban Area of Groblershoop** which is important as a living and working area. This is a relatively dense urban area that has probably grown due to its location as a bridging on the Orange River. It is also important as an agricultural service centre.

The two protected areas (Witsand and Glen Lyon) in the vicinity of the proposed project are part of the low Undulating Plain LCA.

Potential visual receptors identified within surrounding area include the following:

- **Area Receptors** which include activity areas that could be sensitive to their outlook as sporting or tourism areas. Area receptors identified include;
  - The Witsand Nature Reserve;
  - The Glen Lyon Nature Reserve; and
  - The Groblershoop Urban Area.
- **Linear Receptors** which include the N10, the N8 as well as the two local unsurfaced routes that run to the east and north of the proposed development.
- **Point Receptors** include isolated and small groups of homesteads that are generally associated with and located within the low undulating plain as well as the homesteads on the agricultural land in the Orange River Corridor.

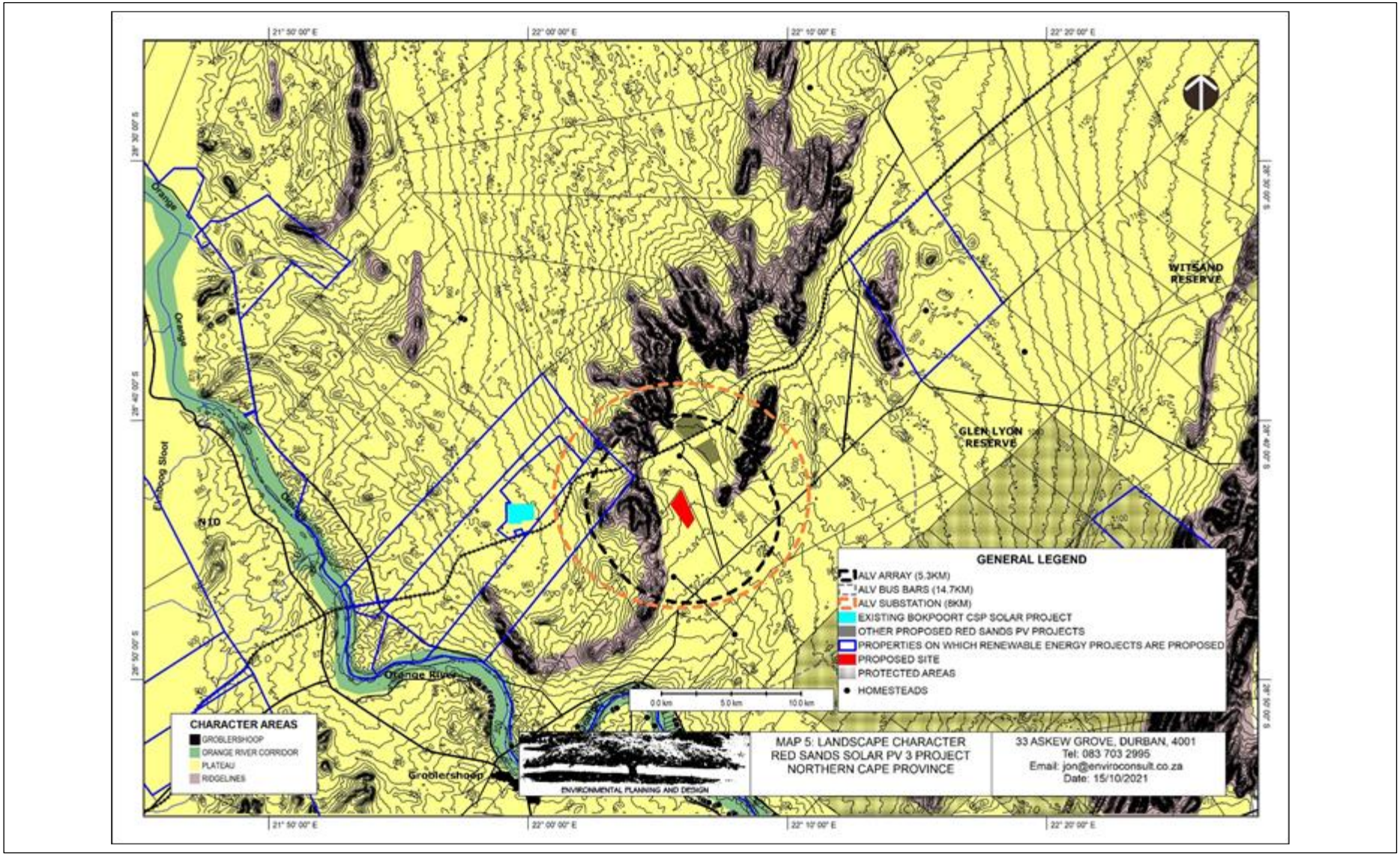

Figure 6.10: Landscape Character Areas and potential visual receptors related to the Red Sands PV3 development area.

6.13 Social Profile

The social profile provides an indication of the specific social aspects within the area which will be relevant to the development of the Red Sands PV3, and which may be affected with the development of the proposed project.

Table 6.5 provides a baseline summary of the socio-economic profile of the !Kheis Local Municipality within which Red Sands PV3 is proposed. In order to provide context against which the Local Municipality's socio-economic profile can be compared, the socio-economic profiles of the ZF Mgcawu District, Northern Cape Province, and South Africa as a whole have also been provided where applicable. The data presented in this section have been derived from the 2011 Census, the Northern Cape Provincial Spatial Development Framework (PSDF), and the ZF Mgcawu DM and !Kheis LM IDPs.

Table 6.5: Baseline description of the socio-economic characteristics of the area within which Red Sand PV3 is loctaed

Location characteristics
» The project is proposed within the Northern Cape Province, located in the North western corner of South Africa. » The project is proposed within the !Kheis LM of the ZF Mgcawu DM. » The !Kheis LM is approximately 11 102km² in extent.
Population characteristics
» Tsantsabane LM has a population of 39 344 which is less than a fifth of the figure in Z F Mgcawu. » Compared to the 2011 Census the population of the municipal area has increased, mainly due to job migration and other factors. » The gender population has also increased with 24% in male population and 2.7% increase in the female population » The 2011 census recorded that the majority (52.8%) of the population are black, while the rest are coloured (37.6%) and white (8.4%) » The attributing factor to this population growth is the increase of people who come to the municipal area in search for better living conditions or jobs in the mining and solar industrial sectors. » The main languages spoken in this municipal area are Afrikaans (55.2%) and Tswana 933.2%) » The age pyramid indicated that the population of Tsantsabane is predominately young people.
Economic, education and household characteristics
» From a statistical analysis it is clear that there has been an increase of people obtaining Matric since 2001. » There is also an increase in the number of people with higher education. » Males seems to be doing much better when it comes to education levels, as more men have some secondary education, grade 12 and higher education that their female counterparts. » According to StatsSA unemployment figure has drastically reduced from 4 466 in 2011 to 3 795 in 2011 this shows a decrease of 15%. » Employment has increased by 69% in 2011, this clearly indicates that the there are more people working in 2011 than in 2001. » There is a very high level of economically inactive members in 2011 than it was in 2001. » The high number of economical inactive could indicate a high level of dependency on those who are employed. » Almost half of the population has no income, whole more than 10% of population earns less than R1400,00pm. » Residents of the municipality have access to educational facilities such as primary schools and high schools, however there is a need for Primary Schools. » Mining is the single biggest contributor of all industry to the GDP. » Mining contributed 74%, namely R3.9 billion and tertiary sector contributed 4% and 20% respectively.
Services
» Regarding water provision the percentage of households having access to pipe water inside their dwellings have

also increased from 37.1% to 62% (2001 and 2011 period)

- Most residents in the LM drink water that is from a water scheme.
- Small percentage drinks water from borehole
- There is a general increase in the number of people having access to electricity, across the country
- 2011 StatsSA indicates that 8211 households use electricity for lighting while 1356 households use candles
- The community survey of 2007 further indicates an improvement in sanitation and sewerage provision. However, there are still 552 households that use bucket toilets.
- Most of the residents (6563 households) use a flush toilet that is connected to a sewerage system.
- The number of households receiving refuses removal services by the local authority have strangely decreased to 77.9% in comparison to the 83% in 2001.

CHAPTER 7: ASSESSMENT OF POTENTIAL IMPACTS

This Chapter serves to assess the significance of the positive and negative environmental impacts (direct, indirect, and cumulative) expected to be associated with the development of Red Sands PV3 and its associated infrastructure. This assessment has considered the construction of a PV facility with a contracted capacity of up to 75MW, within a development area of 184ha in extent. Red Sands PV3 will comprise the following key infrastructure and components:

- Solar PV array comprising PV modules and mounting structures;
- Inverters and transformers;
- Low voltage cabling between the PV modules to the inverters;
- A fence around the project development area;
- Camera surveillance;
- Internet connection;
- 33kV cabling between the project components and the facility substation;
- 33/132kV onsite facility substation[13];
- Battery Energy Storage System (BESS);
- Site offices and maintenance buildings, including workshop areas for maintenance and storage;
- Laydown areas; and
- Access roads (up to 6m) and internal distribution roads (up to 4m).

The full extent of the project site (~3 380ha) and development area (~184ha) was considered. As detailed in Chapter 2, the identification of a development area for the solar facility within the project site was undertaken by the developer through consideration of the sensitive environmental features and areas and application of a mitigation hierarchy which aimed at avoidance as the first level of mitigation. A layout within the development area was proposed by the developer and is assessed in this BA Report (refer to **Figure 7.1**).

13 A 132kV power line will be assessed through a separate Basic Assessment Process

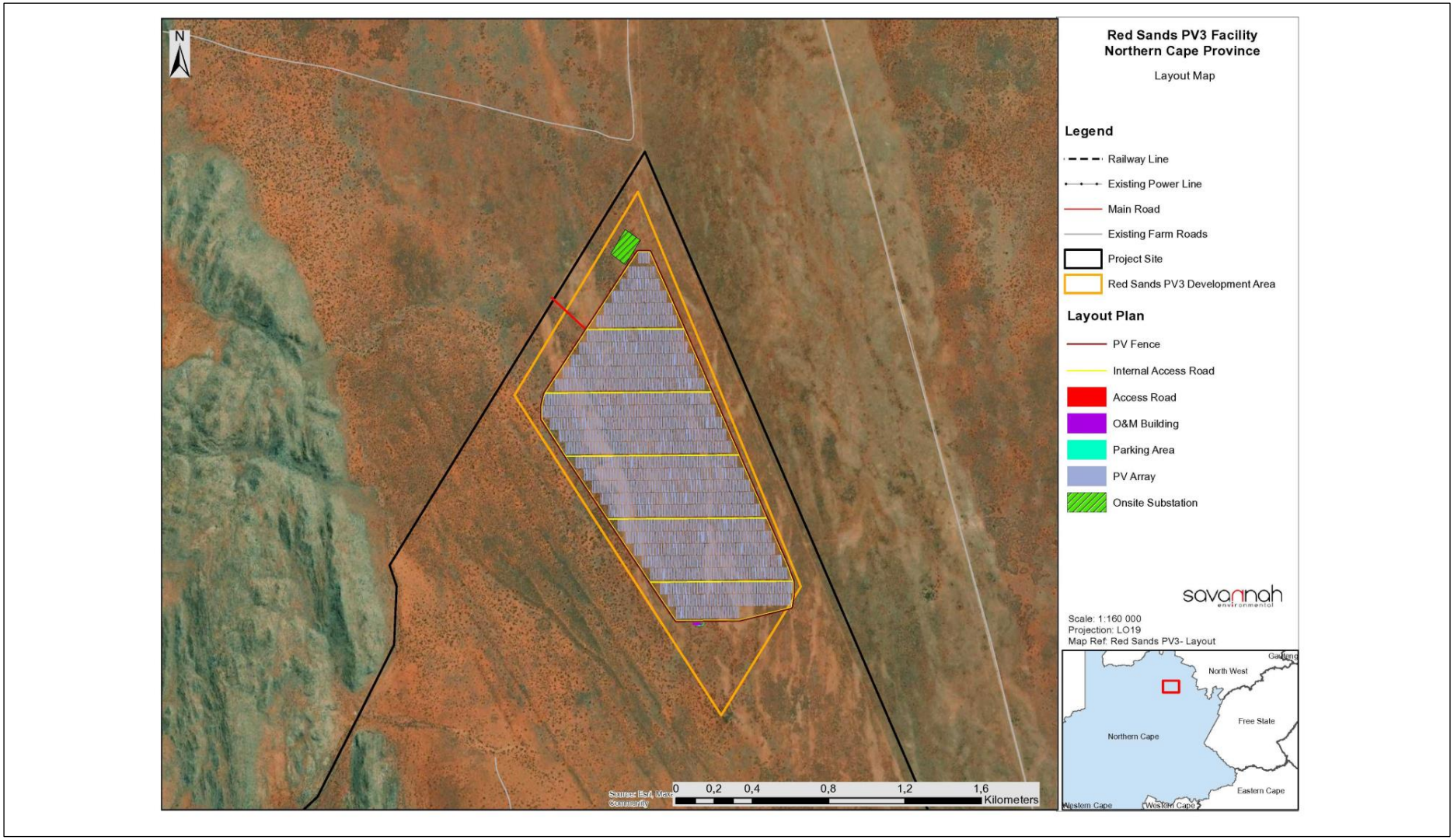

Figure 7.1: Map of Red Sands PV3 development area including associated infrastructure

The proposed development of Red Sands PV3 will comprise the following phases:

» *Pre-Construction and Construction* – will include pre-construction surveys; site preparation; establishment of access roads; a temporary laydown area and facility infrastructure; construction of foundations involving excavations, the transportation of components/construction equipment to site, manoeuvring and operating vehicles for unloading and installation of equipment; laying cabling; and commissioning of new equipment and site rehabilitation. The construction phase for Red Sands PV3 is estimated at 12 – 18 months.

» *Operation* – will include the operation of the PV facility and the generation of electricity, which will be fed into the national grid via the on-site substation and a 132kV power line to connect to the Gorana Substation. The operation phase of the Red Sands PV3 is expected to be approximately 20 years (with maintenance).

»

» *Decommissioning* – depending on the economic viability of the PV facility, the length of the operation phase may be extended beyond a 20-year period. At the end of the project's life, decommissioning will include site preparation, disassembling of the components of the PV facility its associated infrastructure, clearance of the relevant infrastructure at the PV panel area, and rehabilitation. Note that impacts associated with decommissioning are expected to be similar to those associated with construction activities; however, in certain instances decommissioning impacts have been considered separately.

Environmental impacts associated with the pre-construction, construction (and decommissioning) of Red Sands PV3 will include, among others, habitat loss (for fauna and avifauna species); impacts on vegetation and protected plant species and habitat degradation as a result of erosion and alien plant species invasion; a reduced ability to meet conservation obligations and targets; and impacts on broad-scale biological resources. Impacts anticipated for the operation phase of the solar PV facility, among others include, visual impacts, particularly, from the security lighting of the facility on night-time observers.

7.1 Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This chapter of the BA Report includes the following information required in terms of Appendix 1: Content of the BA Report:

Requirement	Relevant Section
3(h)(v) the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts (aa) can be reversed, (bb) may cause irreplaceable loss of resources, and (cc) can be avoided, managed or mitigated.	The impacts and risks associated with the development of Red Sands PV3 including the nature, significance, consequence, extent, duration and probability of the impacts and the degree to which the impact can be reversed and cause an irreplaceable loss of resources are included in **7.3.3, 7.4.3, 7.5.3, 7.6.3, 7.7.3, 7.8.3, 7.9.3 and 7.10.3**.
3(h)(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects	The positive and negative impacts associated with the development of Red Sands PV3 are included in **sections 7.3.2, 7.4.2, 7.5.2, 7.6.2, 7.7.2, 7.8.2. 7.9.2 and 7.10.2**.
3(h)(viii) the possible mitigation measures that could be	The mitigation measures that can be applied to the

Requirement	Relevant Section
applied and the level of residual risk.	impacts associated with Red Sands PV3 are included in **sections 7.3.3, 7.4.3, 7.5.3, 7.6.3, 7.7.3, 7.8.3, 7.9.3 and 7.10.3**.
3(i) a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.	A description of all environmental impacts identified for Red Sands PV3 during the BA process, and the extent to which the impact significance can be reduced through the implementation of the recommended mitigation measures provided by the specialists are included in **sections 7.3.3, 7.4.3, 7.5.3, 7.6.3, 7.7.3, 7.8.3, 7.9.3 and 7.10.3**.
3(j) an assessment of each identified potentially significant impact and risk, including (i) cumulative impacts, (ii) the nature, significance and consequences of the impact and risk, (iii) the extent and duration of the impact and risk, (iv) the probability of the impact and risk occurring, (v) the degree to which the impact and risk can be reversed, (vi) the degree to which the impact and risk may cause irreplaceable loss of resources and, (vii) the degree to which the impact and risk can be avoided, managed or mitigated.	An assessment of each impact associated with the development of Red Sands PV3, including the nature and significance, the extent and duration, the probability, the reversibility, and the potential loss of irreplaceable resources, as well as the degree to which the significance of the impacts can be mitigated are included in **sections 7.3.3, 7.4.3, 7.5.3, 7.6.3, 7.7.3, 7.8.3, 7.9.3 and 7.10.3**.
3(m) based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management outcomes for the development for inclusion in the EMPr.	Mitigation measures recommended by the various specialists for the reduction of the impact significance are included in **sections 7.3.3, 7.4.3, 7.5.3, 7.6.3, 7.7.3, 7.8.3, 7.9.3 and 7.10.3**.

7.2. Quantification of Areas of Disturbance within the Development Area

In order to quantitively assess the impacts associated with the development of Red Sands PV3, it is necessary to consider the extent of the identified development area to be affected by the pre-construction and construction activities of the proposed solar PV facility. An area of 184ha is proposed for the placement of the PV facility and associated infrastructure. This equates to 5.4% of the larger project site.

7.3. Aspects determined through specialist investigation not requiring further assessment

From the specialist studies undertaken it was determined that soils and agricultural aspects did not require any further assessment. A Compliance Statement in this regard has been prepared in compliance with the relevant specialist protocols.

The Pedological Compliance Statement (refer to **Appendix F**) identified one (1) soil form within the development area, namely the Hutton soil form. This soil form has very restricted potential, and regular and/or severe limitations due to soil, slope, temperatures, or rainfall.

The land capability sensitivities (DAFF, 2017) indicate land capabilities with "Low" sensitivities, which correlates with the findings from the baseline soil assessment.

The Red Sands PV3 development area is not associated with any arable soils, due to the type of soil as well as the climate, which limits crop production significantly. The land capabilities associated with the regulated area are only suitable for grazing, which corresponds with the current land use.

It is the specialist's opinion that the proposed developments will have no impacts on the agricultural production ability of the land. Therefore, the proposed development may be favourably considered for a soils and agricultural perspective.

7.4. Assessment of Impacts on Ecology (Fauna and Flora)

The development and operation of Red Sands PV3 will have an impact on the ecological resources identified within the development area. These resources include vegetation, protected and listed plant species; fauna; habitat; conservation and broad-scale ecological processes.

Habitat Assessment

The habitat structure within the Red Sands PV3 development area is homogeneous, with no distinctive variability, and therefore, a single habitat type was delineated. This was termed Plains Thornveld. The overall habitat condition can be regarded as degraded due to the dense stands of *Rhigozum trichotomum* and *Senegalia mellifera* subsp. *detinens* in certain areas.

Three recorded flora species are protected under national and provincial legislation and therefore, the necessary permits are required from the relevant authority for their removal and/or relocation where possible. The density of the protected flora recorded on site can be summarised as follows:

- *Aloe claviflora – 12 individuals in 181.93 ha = 0.066 ind.ha-1;*
- *Boscia albitrunca – 4 individuals in 181.93 ha = 0.02 ind.ha-1;*
- *Ledebouria apertiflora – 2 individuals in 181.93 ha = 0.01 ind.ha-1;32*
- *Vachellia erioloba – 32 individuals in 181.93 ha = 0.18 ind.ha-1; and*
- *Vachellia haematoxylon – 58 individuals in 181.93 ha = 0.32 ind.ha-1.*

Furthermore, during the field survey of the development area, the species richness of the Formicidae was recorded. Formicidae are reliable indicators of habitat condition because each species or group differ in their tolerance to anthropogenic drivers (Andersen et al, 2002; Gollan et al, 2011). In addition to being reliable bio-indicators, they are important in maintaining ecosystem functioning as they predate on other invertebrate species, turnover soil, control plant pathogens and distribute of myrmecochorous seeds. Due to the arid environment of the project area, a diverse assemblage is not expected under natural conditions. However, the community was not dominated by a single species or generalist species, with arid specialists comprising the community. This suggests that although degraded, degradation is not severe and there is still a level of good ecological condition.

Site Sensitivity

The Relative Plant Species Theme Sensitivity as indicated in the screening report was derived to be 'Low' and the Relative Animal Species Theme Sensitivity was derived to be 'Medium' (**Figure 7.1**).

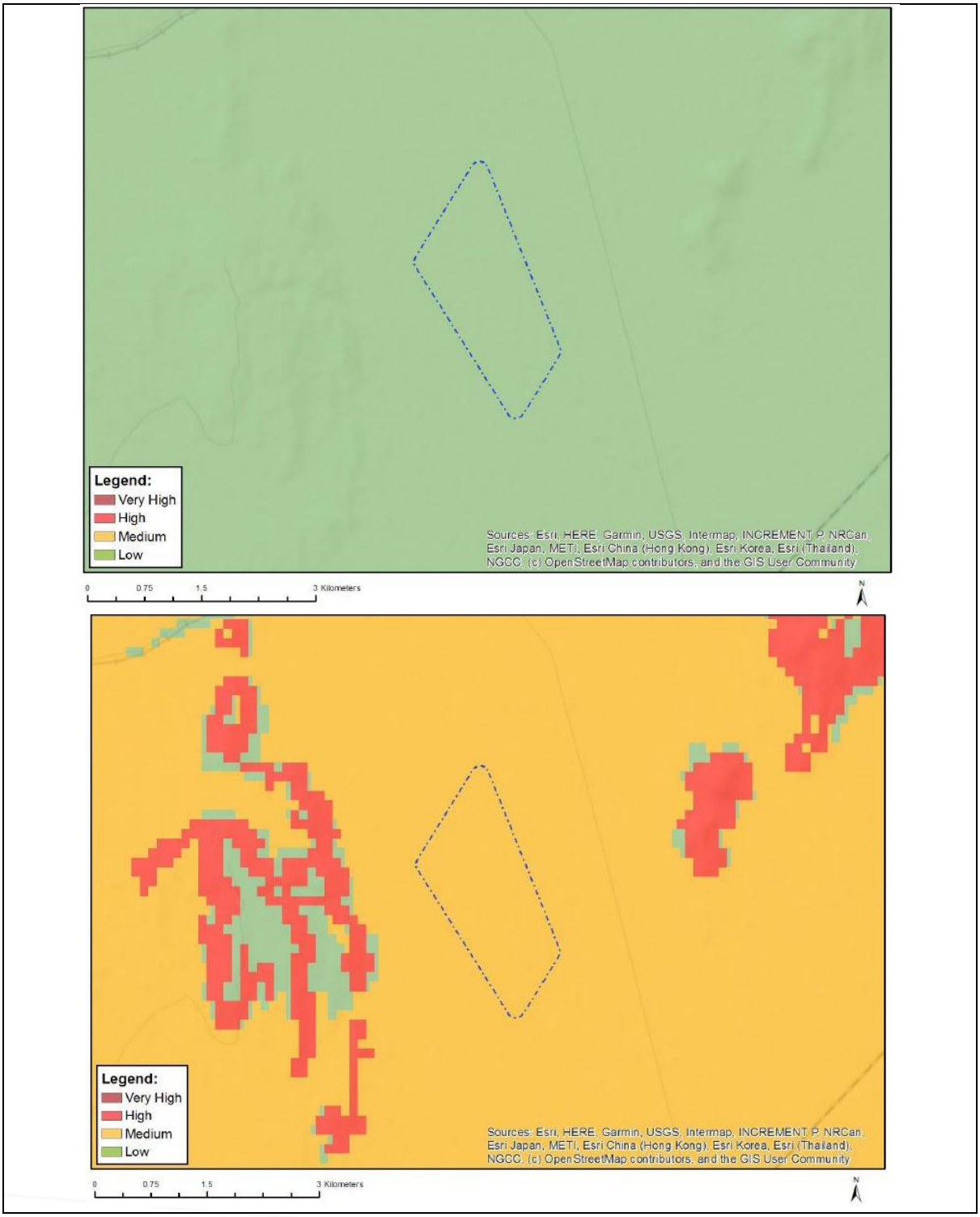

Figure 7.1: Relative Plant Species Theme Sensitivity (top) and Relative Animal Species Theme Sensitivity (bottom) for the proposed Red Sands PV3 development areal

Site Ecological Importance

The habitat assessment, as detailed above, informed the Site Ecological Importance[14], which is a function of Biodiversity Importance and Receptor Resilience. In accordance with the Species Environmental Assessment Guideline (SANBI, 2020), the Plains Thornveld habitat delineated within the development area was categorised as possessing a High ecological importance (refer to **Figure 7.2** and **Table 7.1**)

Habitat (Area [ha])	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Plains Thornveld (218.949)	High Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km². IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A.	Very High » Very large (> 100 ha) intact area for any conservation status of ecosystem type. » High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches.	Very High	High	High

7.4.1 Description of Ecological Impacts

Potential impacts on fauna and flora anticipated to occur with the development of Red Sands PV3 include:

» Destruction, fragmentation and degradation of habitats and ecosystems resulting from the physical removal of vegetation (if present), the construction of internal access roads, soils dust precipitation and random events such as fire.

» Spread and/or establishment of alien and/or invasive species due to vegetation removal (if present), vehicles potentially spreading seeds, unsanitary conditions surrounding infrastructure and thus promoting the establishment of alien and/or invasive rodents and the establishment of infrastructure suitable for breeding activities of alien and/or invasive birds.

» Direct mortality of fauna due to the clearing of vegetation (if present), vehicle collision, and chemical spills and the intentional killing of fauna for food resulting from unregulated/unsupervised outdoor activities.

[14] Site Ecological Importance (SEI) is a function of the Biodiversity Importance (BI) of the receptor (e.g., SCC, the vegetation/fauna community or habitat type present on the site) and Receptor Resilience (RR) (its resilience to impacts). An understanding of residual risk to SEI is important in determining acceptability of impact.

» Reduced dispersal/migration of fauna resulting from loss of landscape used as a corridor, compacted roads and the removal of vegetation (if present).

» Environmental pollution due to water runoff, spills from vehicles, machinery and erosion.

» Disruption/alteration of ecological life cycles (breeding, migration, feeding) due to noise, dust and light pollution resulting from the operation of machinery and vehicles on site. .

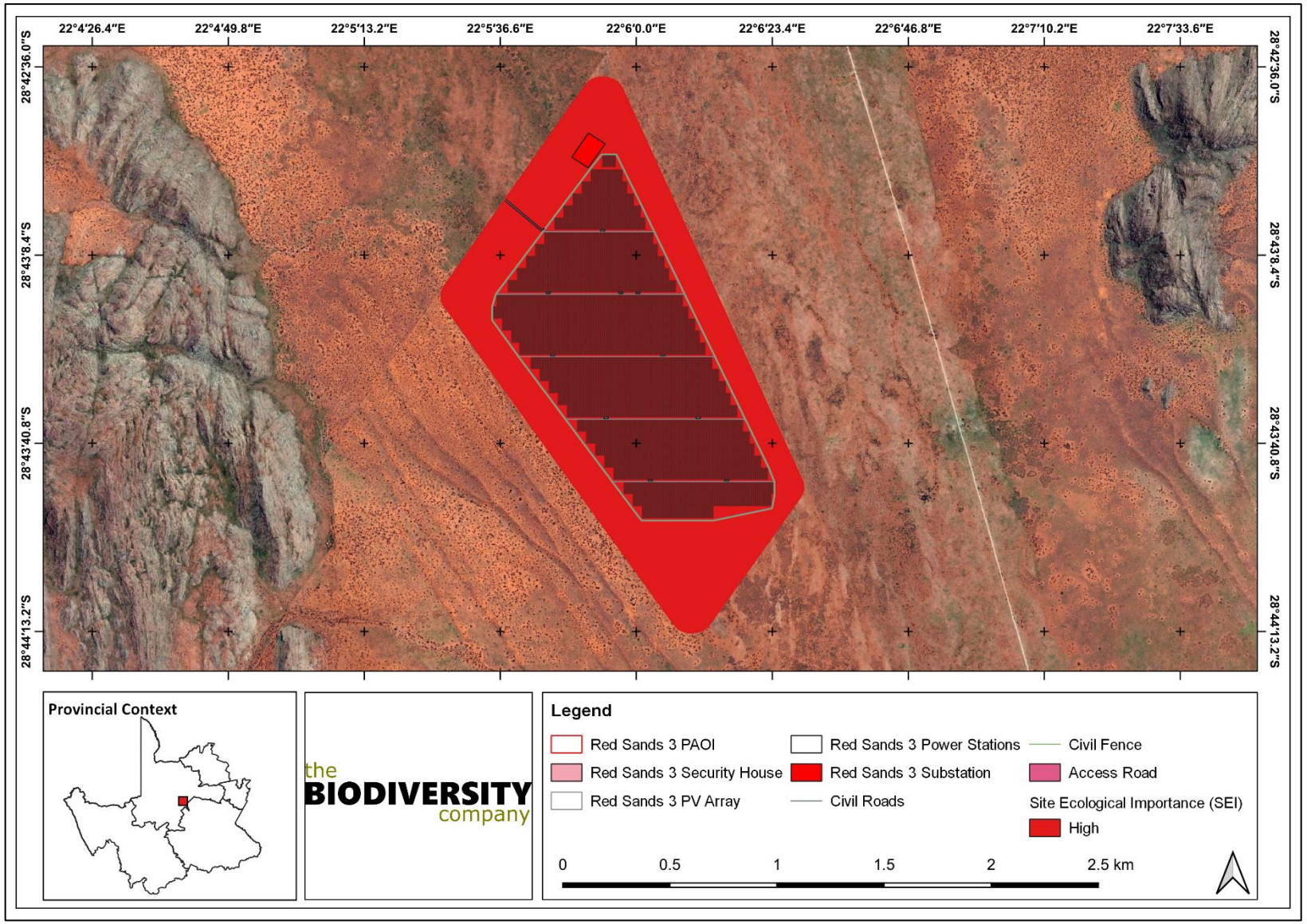

Figure 7.2: Map illustrating the Site Ecological Importance (SEI) of the habitats delineated within the Red Sands PV3 development area

7.4.2 Impact tables summarising the significance of impacts on ecology during construction, operation and decommissioning

Construction Phase Impacts

Impact Nature: Loss of habitat within development footprint

There will be a loss of natural vegetation and habitat due to construction of the solar energy facility. This impact was considered for both the construction and operational phases.

	Without mitigation	With mitigation
Extent	Low (2)	Low (2)
Duration	Long term (4)	Long term (4)
Magnitude	Very high (10)	Moderate (6)
Probability	Definite (5)	Definite (5)
Significance	**High**	**Medium**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, albeit to a limited extent.	

Mitigation:

- Solar panels must be mounted on pile driven or screw foundations, such as post support spikes, rather than heavy foundations, such as trench-fill or mass concrete foundations, to reduce the negative effects on natural soil functioning, such as its filtering and buffering characteristics, while maintaining habitats for both fossorial and epigeic biodiversity (Bennun et al, 2021).
- Indigenous vegetation to be maintained under the solar panels to ensure biodiversity is maintained and to prevent soil erosion (Beatty et al, 2017; Sinha et al, 2018). The photographs below are sourced from these documents.


- Vegetation clearing to commence only after the necessary permits have been obtained.
- Environmental Officer (EO) to provide supervision and oversight of vegetation clearing activities.

Residual Impacts:

The loss of indigenous vegetation is an unavoidable consequence of the development and cannot be entirely mitigated. The residual impact would be moderate.

Impact Nature: Degradation and loss of surrounding natural habitat

Degradation and loss of surrounding natural vegetation arising from construction activities if these are allowed to penetrate into the surrounding area.

	Without mitigation	With mitigation
Extent	Moderate (3)	Low (2)
Duration	Long term (4)	Very short term (1)
Magnitude	Moderate (6)	None (0)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative

Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

» Pre-construction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness of no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, remaining within demarcated construction areas etc.
» All construction activity and roads to be within the clearly defined and demarcated areas.
» Temporary laydown areas should be clearly demarcated and rehabilitated subsequent to end of use.
» Appropriate dust control measures to be implemented. It is recommended that a wind fence be constructed to prevent excessive dust pollution, especially due the sandy nature of the soil.
» Suitable sanitary facilities to be provided for construction staff as per the guidelines in Health and Safety Act.
» All hazardous materials, if any, should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner.

Residual Impacts:

It is unlikely that residual impacts will result if the appropriate mitigation measures are implemented. However, there may still be minimal degradation due to dust precipitation.

Impact Nature: Direct mortality of fauna

Construction activity will likely lead to direct mortality of fauna due to earthworks, vehicle collisions, accidental hazardous chemical spills and persecution.

	Without mitigation	**With mitigation**
Extent	Moderate (3)	Low (2)
Duration	Short term (2)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, vehicle collisions, poaching, and persecution can be mitigated.	

Mitigation:

» All personnel should undergo environmental induction with regards to fauna and awareness about not harming or collecting species.
» Prior to commencing work each day, two individuals should traverse the working area in order to disturb any fauna and so they have a chance to vacate.
» Any fauna threatened by the construction activities should be removed safely by an appropriately qualified environmental officer or removal specialist.
» All construction vehicles should adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected.
» All hazardous materials, if any, should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner.
» Any excavations should not be left open for extended periods of time as fauna may fall in and become trapped in them. Excavations should only be dug when they are required and should be used and filled shortly thereafter.

Residual Impacts:

It is probable that some individuals of susceptible species will be lost to construction-related activities despite mitigation. However, this is not likely to impact the viability of the local population of any fauna species.

Impact Nature: Emigration of fauna due to noise pollution

Construction activity will likely lead to the emigration of fauna due to noise pollution.		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Moderate (3)
Duration	Short term (2)	Short term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Highly probable (4)
Significance	**Medium**	**Medium**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, but only to a limited extent. The mitigation of noise pollution during construction is difficult to mitigate against	

Mitigation:

» Considering that many of the mammal fauna recorded within the project area are nocturnal, no construction activity is to occur at night.

Residual Impacts:

It is probable that some individuals of susceptible species will emigrate due to the noise generated from the construction activity. However, this is not likely to impact the viability of the local population of any fauna species.

Operational Phase

Impact Nature: Loss of habitat within development footprint

There will be a loss of natural vegetation and habitat due to construction of the solar energy facility. This impact was considered for both the construction and operational phases.

	Without mitigation	**With mitigation**
Extent	Low (2)	Low (2)
Duration	Long term (4)	Long term (4)
Magnitude	Very high (10)	Moderate (6)
Probability	Definite (5)	Definite (5)
Significance	**High**	**Medium**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, albeit to a limited extent.	

Mitigation:

» Solar panels must be mounted on pile driven or screw foundations, such as post support spikes, rather than heavy foundations, such as trench-fill or mass concrete foundations, to reduce the negative effects on natural soil functioning, such as its filtering and buffering characteristics, while maintaining habitats for both below and above-ground biodiversity (Bennun et al, 2021).

» Indigenous vegetation to be maintained under the solar panels to ensure biodiversity is maintained and to prevent soil erosion (Beatty et al, 2017; Sinha et al, 2018). The photographs below are sourced from these documents.

» Vegetation clearing to commence only after the necessary permits have been obtained.

» Environmental Officer (EO) to provide supervision and oversight of vegetation clearing activities.
Residual Impacts: The loss of indigenous vegetation is an unavoidable consequence of the development and cannot be entirely mitigated. The residual impact would be moderate.

Impact Nature: Encroachment of Invasive Alien Plants into disturbed areas

Invasive Alien Plants (IAPs) tend to encroach into disturbed areas and can outcompete/displace indigenous vegetation.

	Without mitigation	With mitigation
Extent	Moderate (3)	Moderate (3)
Duration	Permanent (5)	Very short term (1)
Magnitude	High (8)	Mlinor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**High**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

» An IAP Management Plan must be written for the development.
» Regular monitoring for IAP encroachment during the operation phase to ensure that no alien invasion problems have developed as result of the disturbance. This should be every 3 months during the first two years of the operation phase and every six months for the life of the project.
» All IAP species must be removed/controlled using the appropriate techniques as indicated in the IAP management plan.

Residual Impacts:

Based on the lack of IAPs within the development area and the implementation of an IAP Management Plan there are unlikely to be residual impacts

Impact Nature: Soil erosion and continued habitat degradation

Disturbance created during the construction phase will leave the development area vulnerable to erosion

	Without mitigation	With mitigation
Extent	Moderate (3)	Moderate (3)
Duration	Permanent (5)	Very short term (1)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**High**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

» A Rehabilitation Plan must be compiled for the development area and ensured that it be adhered to.
» Access roads should have run-off control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk.
» All erosion observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques.
» There should be follow-up rehabilitation and re-vegetation of any remaining denuded areas with local indigenous perennial shrubs and succulents from the area.

Residual Impacts: There is still the potential for erosion but would have a low impact.

Impact Nature: Impacts to fauna movement patterns due to reflection effects The reflection caused by solar panels may affect the movement patterns of fauna within the landscape		
	Without Mitigation	**With Mitigation**
Extent	High (4)	High (4)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	**Medium**	**Low**
Status	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	Yes	
Mitigation: » Non-polarising white tape can be used around and/or across panels to minimise reflection (Bennun *et al*, 2021).		
Residual Impacts There is still the potential for reflection impacts but would have a low impact.		

Impact Nature: Disturbance or persecution of fauna The operation and maintenance of the Solar Energy Facility may lead to disturbance or persecution of fauna in the vicinity of the development.		
	Without Mitigation	**With Mitigation**
Extent	Low (2)	Low (2)
Duration	Long term (4)	Very short term (1)
Magnitude	High (8)	Minor (2)
Probability	Probable (3)	Very improbable (1)
Significance	**Medium**	**Low**
Status	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	Yes	
Mitigation: » All staff are to be educated on the importance of local fauna and must be made aware that no poaching or persecution is allowed. » Any fauna threatened by the maintenance and operational activities should be removed to a safe location by an appropriate individual. » All vehicles accessing the site should adhere to a max 40 km/h max to avoid collisions. Appropriate signs must be erected. » If any excavations are to be dug these must not be left open for more than a few hours without ramps for trapped fauna to leave and must be filled at night.		
Residual Impacts: Disturbance from maintenance activities will occur albeit at a low and infrequent level.		

7.4.4 Implications for Project Implementation

The habitats present within the project area are not diverse and considered to be homogenous. However, based on the ecological condition and the diversity of mesocarnivores, the area possesses biodiversity value. The site ecological importance (SEI) was determined to 'High' based on the high likelihood of occurrence for a globally VU species, the extent of the area considered and its connectivity to natural areas within the landscape. The sensitivity of the site for flora and fauna is low to medium. The main expected impact of the proposed Red Sands 1 Solar PV Cluster will be the loss of habitat and emigration of fauna. However, with the implementation of mitigation measures the impact significance can be reduced to medium or low with no residual impacts of high significance. As a result of the limited residual risk, which is expected to be of medium significance, the project is considered to be acceptable.

It is recommended that should any future developments be proposed for the remaining extent of the 'High' and 'Very High' SEI areas within the larger project site, that compensation strategies be required for these authorisations.

7.5. Assessment of Impacts on Avifauna

Eighty-five (85) bird species have been recorded during the surveys undertaken on the project site (June 2021 and November 2021). Two of the species recorded were species of conservation concern (SCC) on a national or international scale, namely the Cape Vulture and Verreaux's Eagle. Thirteen individuals of the Cape Vulture were recorded within the project site, and it appears as if they roosted on the pylons on the edge of the project site. Two Verreaux's Eagles were recoded soaring adjacent to the development area. A 3 km buffer was however placed around the Verreaux's Eagle nests to ensure this sensitive species' nest is not disturbed.

Several avifaunal species recorded are protected under the NC Conservation Act of 2009 (schedule 2), however three species have been highlighted including, the Pygmy Falcon (due to the nest found), the Northern Black Korhaan and the Red Crested Korhaan (due to their small territories). A Pygmy Falcon nest was found at the water trough, just to the east of the project development area. Upon consultation with Dr Robert Thomson (Pygmy Falcon Specialist) a 500m buffer was recommended for the nest, as this is the core home range as per unpublished data. These falcons are highly dependent on the Sociable Weaver nests in which they nest. Should the Sociable Weavers abandon their nest these falcons would lose their nesting site as well. It is therefore imperative that should the project go ahead that the grass be preserved under the panels to allow the sociable weaver to maintain their nests. The Northern Black Korhaan and the Red Crested Korhaan males are said to be highly territorial, with the territories only being 200-300m. Only a few of the locations of the korhaans recorded are shown on the map below (refer to **Figure 7.4**), but this does highlight the importance of the project site as habitat for these species. **Figure 7.3** illustrates the location of nests and recordings of avifauna species of conservation concern.

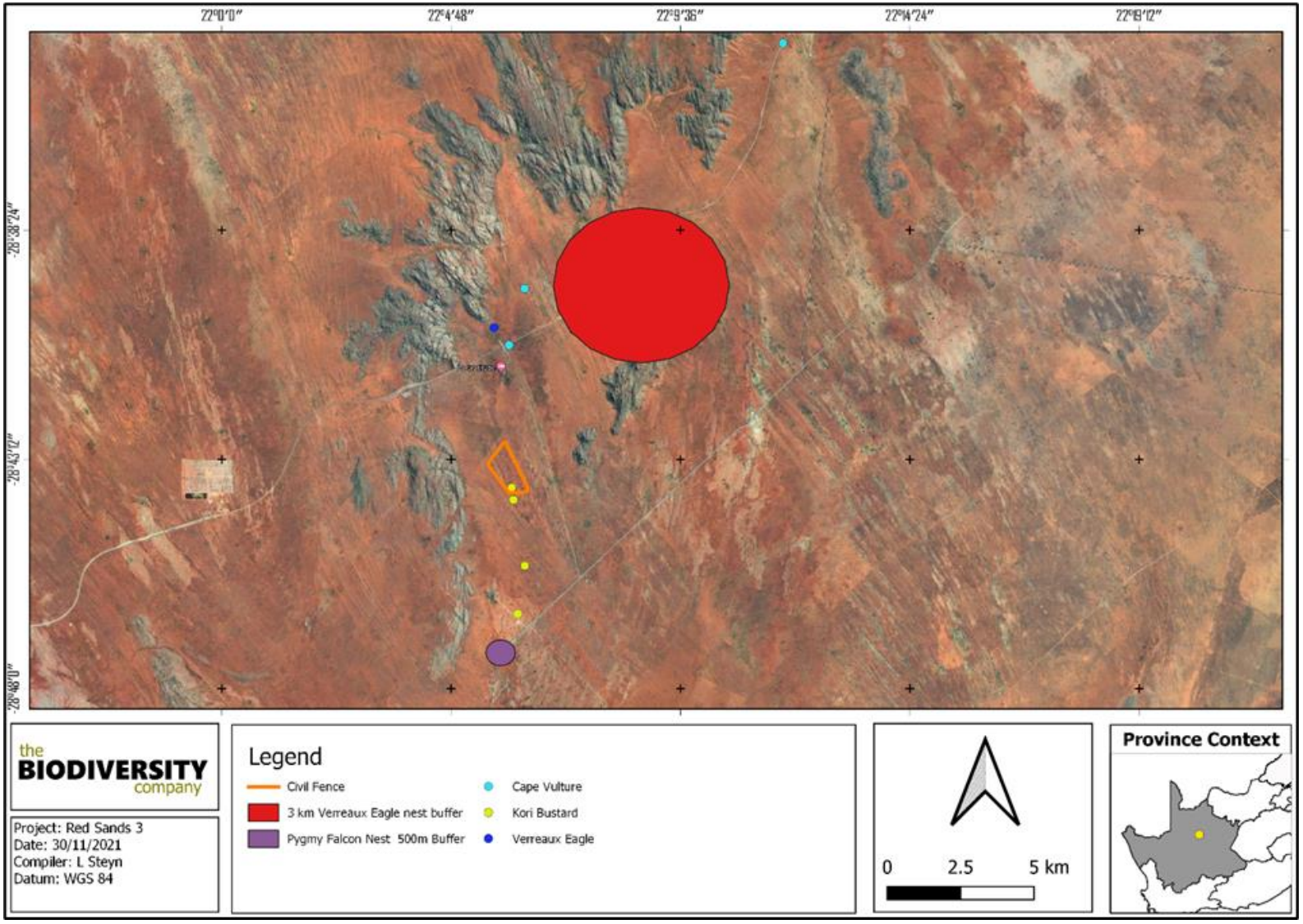

Figure 7.3: Map of nest and recordings of avifauna species of conservation concern within the Red Sands PV3 project site

7.5.1 Description of Impacts on Avifauna

Construction Phase Impacts

During the construction phase vegetation clearing and brush cutting of vegetation for the associated infrastructure will lead to direct habitat loss. Vegetation clearing will create a disturbance and will therefore potentially lead to the displacement of avifaunal species. The operation of construction machinery on site will generate noise and cause dust pollution.

Operational Phase Impacts

The principal impacts of the operational phase are electrocution, collisions, fencing, chemical pollution due to chemicals for the cleaning of the PV panels and habitat loss. Solar panels have been implicated as a potential risk for bird collisions.

7.5.2 Impact tables summarising the significance of impacts on avifauna during construction, operation and decommissioning

The various identified impacts are assessed below for the different phases of the development:

Construction Phase Impacts

Nature: Destruction, fragmentation and degradation of habitats;

Portions of habitat for both the Cape Vulture and the Verreaux's Eagle will be lost. The nests and territories of the NC protected Pygmy Falcon, Northern Black Korhaan and Red-crested Korhaan will be disturbed or lost.

	Without mitigation	**With mitigation**
Extent	Regional (3)	Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	High (8)
Probability	Highly probable (4)	Highly probable (4)
Significance	**Medium**	**Medium**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	No	

Mitigation:

» The loss of habitat in the project footprint cannot be mitigated. This will result in the loss of territory, feeding area, nesting sites and prey availability for numerous species.
» The habitat outside the footprint can be protected by implementing the following compensatory measures:
  - Construction activity to only be within the project footprint and the area is to be well demarcated.
  - Areas where vegetation has been cleared must be re-vegetated within local indigenous plant species.
  - The affected area must be monitored for invasive plant encroachment and erosion and must be controlled.
» The use of laydown areas within the development footprint must be used, to avoid habitat loss and disturbance to adjoining areas.
» All areas to be developed must be walked through prior to any activity to ensure no nests or avifauna species are found in the area.
» Should any Species of Conservation Concern not move out of the area or their nest be found in the area a

suitably qualified specialist must be consulted to advise on the correct actions to be taken.
***Residual Impacts**:* The loss of habitat is a residual impact that is unavoidable. The disturbance may also cause some erosion and invasive alien plant encroachment. Movement corridors will be disrupted in the area., the species will however move into adjacent areas. Based on the total area lost the residual impact is acceptable.

Nature: Displacement of avifaunal community (Including several SCC) due to disturbance such as noise, light, dust, vibration

The operation of construction machinery on site will generate noise and cause dust pollution which may temporarily displace birds. .

	Without mitigation	**With mitigation**
Extent	Regional (4)	Regional (3)
Duration	Long term (4)	Short term (2)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Probable (3)
Significance	**High**	**Medium**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes, but only to a limited extent. The mitigation of noise pollution during construction is difficult to mitigate against	

Mitigation:

- Minimize disturbance impact by abbreviating construction time.
- Schedule the activities to avoid breeding and movement time
- Ensure lights are kept to a minimum, lights must be red or green and not white to reduce confusion for nocturnal migrants.
- Dust management need to be done in the areas where the vegetation will be removed, this includes wetting of the soil.

Residual Impacts:
Displacement of endemic and SCC avifauna species from the 184ha development area.

Nature: *Collection of eggs and poaching*

	Without mitigation	**With mitigation**
Extent	Regional (4)	Local (2)
Duration	Permanent (5)	Short term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	

Mitigation:

- All personnel should undergo environmental induction with regards to avifauna and in particular awareness about not harming, collecting or hunting terrestrial species (e.g. bustards, korhaans, francolin), and owls, which are often persecuted out of superstition.
- Signs must be put up stating that should any person be found poaching any species they must be fined.

Residual Impacts:
There is a possibility that the eggs to be poached could be that of an SCC with decreasing numbers

Nature: *Roadkill*		
	Without mitigation	**With mitigation**
Extent	Regional (3)	Local(2)
Duration	Short term (2)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
» All construction vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed outside of the construction area. » All vehicles (construction or other) accessing the site should adhere to a low speed limit on site (40 km/h max) to avoid collisions with susceptible avifauna, such as nocturnal and crepuscular species (e.g. nightjars and owls) which sometimes forage or rest on roads, especially at night.		
Residual Impacts:		
Roadkills could still occur resulting in loss of individuals.		

Operational Phase Impacts

Nature: Collisions with PV panels, associated powerlines and connection lines and fences		
	Without mitigation	**With mitigation**
Extent	Regional ()	Regional (3_
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Probable (3)
Significance	**High**	**Medium**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
» The design of the proposed solar plant must be of a type or similar structure as endorsed by the Eskom-Endangered Wildlife Trust (EWT) Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa. » Infrastructure should be consolidated where possible in order to minimise the amount of ground and air space used. This would involve using existing/approved pylons and associated infrastructure for different lines. » Fencing mitigations: o Top 2 strands must be smooth wire o Routinely retention loose wires o Minimum 30cm between wires o Place markers on fences		
Residual Impacts:		
Some collisions of SCCs might still occur regardless of mitigations		

Nature: *Electrocution with solar plant connections*		
	Without mitigation	**With mitigation**
Extent	Regional (4)	Regional (4)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Improbable (2)
Significance	**High**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
» The design of the proposed solar plant must be of a type or similar structure as endorsed by the Eskom-EWT Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa. » Infrastructure should be consolidated where possible/practical in order to minimise the amount of ground and air space used. This would involve using the existing/approved pylons and associated infrastructure for different lines. » Ensure that monitoring is sufficiently frequent to detect electrocutions reliably and that any areas where electrocutions occurred are repaired as soon as possible. » During the first year of operation quarterly reports, summarizing interim findings should be complied and submitted to BirdLife South Africa. If the findings indicate that electrocutions have not occurred or are minimal with no red-listed species, an annual report can be submitted.		
Residual Impacts:		
Electrocutions might still occur regardless of mitigations		

Nature: *Roadkill during maintenance procedures*		
	Without mitigation	**With mitigation**
Extent	Regional (3)	Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
» All personnel should undergo environmental induction with regards to avifauna and their behaviour on roads. » All vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed. » All vehicles accessing the site should adhere to a low speed limit on site (40 km/h max) to avoid collisions with susceptible avifauna, such as nocturnal and crepuscular species (e.g. nightjars and owls) which sometimes forage or rest on roads, especially at night.		
Residual Impacts: Road collisions can still occur regardless of mitigations		

Nature: *Habitat degradation and displacement of resident, visiting and breeding species (as well as SCCs).*		
	Without mitigation	**With mitigation**

Extent	Regional (4)	Local region (3)
Duration	Long term (4)	Short term (2)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Probable (3)
Significance	**High**	**Medium**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	**No, the footprint has already been disturbed. The area surrounding the development can be mitigated to some extent**	

Mitigation:

» Minimising habitat destruction caused by the maintenance by demarcating the footprint so that it does not increase yearly.

» All areas where maintenance must be for example grass cutting walked through prior to any activity to ensure no nests or fauna species are found in the area. Should any Species of Conservation Concern not move out of the area or their nest be found in the area a suitably qualified specialist must be consulted to advise on the correct actions to be taken.

Residual Impacts:

Migratory routes of avifauna species could change, and the species composition could also change regardless of mitigations

Decommissioning Phase Impacts

This phase is when the scaling down of activities ahead of temporary or permanent closure is initiated. During this phase, the operational phase impacts will persist until of the activity reduces and the rehabilitation measures are implemented.

7.5.3 Implications for Project Implementation

The expected impacts to avifauna are loss of habitat for species of conservation concern, disturbance due to noise and lighting, and collision and electrocution risks. The majority of the impacts during construction and operation can be mitigated to low or medium significance, mitigation of habitat loss is however constrained.

Considering the limited extent of the development area and avoidance of areas of very high avifauna sensitivity (3km Verreaux's Eagle nest buffer, CBAs and ridges) within the project site, habitat remains for sensitive species to move into surrounding area. The residual impact related to habitat loss can therefore still be considered as acceptable, provided that the remaining extent of the project site, where areas of High and Very High Sensitivity are present, be avoided or be subject to compensation strategies for further development.. Based on the total area avoided, the residual impact is acceptable.

7.6. Assessment of Impacts on Heritage (including archaeological and palaeontological resources)

Archaeology

The results of the archaeological field assessment conducted largely aligns with the findings of previous archaeological assessments completed in the vicinity of the proposed development. The archaeological resources identified within the development area are dominated by Later and Middle Stone Age flakes, which corresponds with similar findings of others (Morris, 2011) who note that ephemeral LSA scatters are

the dominant archaeological signature of the area. All of the archaeological resources identified within the area proposed for the development of the Red Sands PV3 have been determined to be not conservation-worthy (refer to **Figure 7.4**).

One archaeological site of significance was identified outside of the areas proposed for the PV cluster development, Red Sands-045 and Red Sands-046 (both sites form part of one continuous scatter of artefacts). Although no impact is anticipated, it is recommended that this site is demarcated on relevant development maps and that a no-go buffer of 100m is implemented around this site (refer to **Figure 7.5**).

Palaeontology

According to Almond's Desktop Palaeontology Impact Assessment for the proposed Eskom Groblershoop Substation & Garona-Groblershoop 132 kV Powerline (2013), the area is "underlain, at or below the surface, by highly metamorphosed Precambrian basement rocks (schists, quartzites, gneisses) of the Namaqua-Natal Province that are entirely unfossiliferous. These are locally mantled by Late Caenozoic superficial sediments including Quaternary aeolian sands of the Gordonia Formation (Kalahari Group), calcrete pedocretes and alluvium of the Orange River and its tributaries. These younger superficial sediments are generally of low palaeontological sensitivity". This study area is right next to the area assessed by Almond and has the same geological context and as such, no impacts to fossil material are anticipated.

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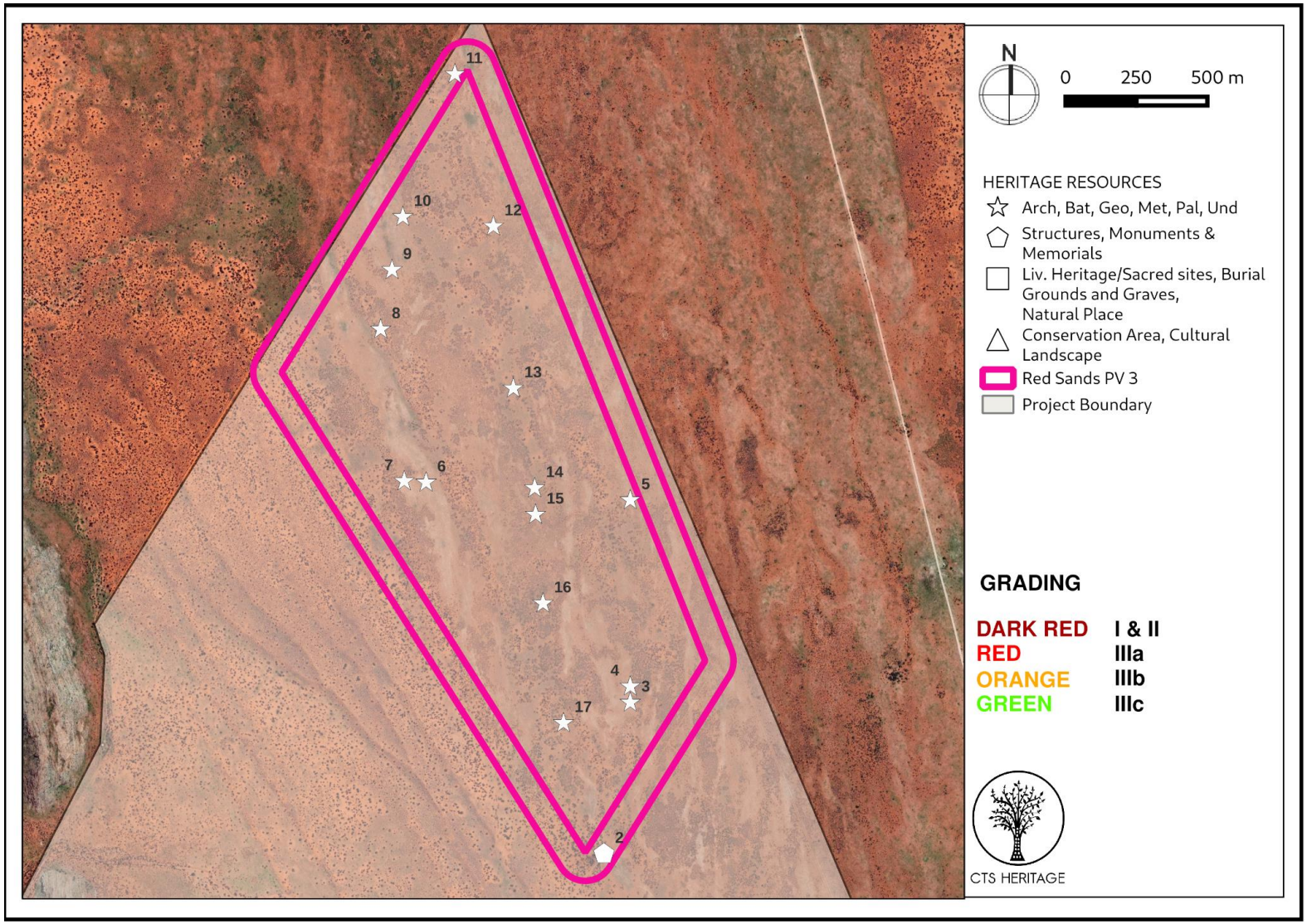

Figure 7.7: Map illustrating the heritage sites identified within the development area of Red Sands PV3. All sites are graded as not being conservation worthy, as a result of their small sample size and lack of archaeological context which offers minimal scientific value.

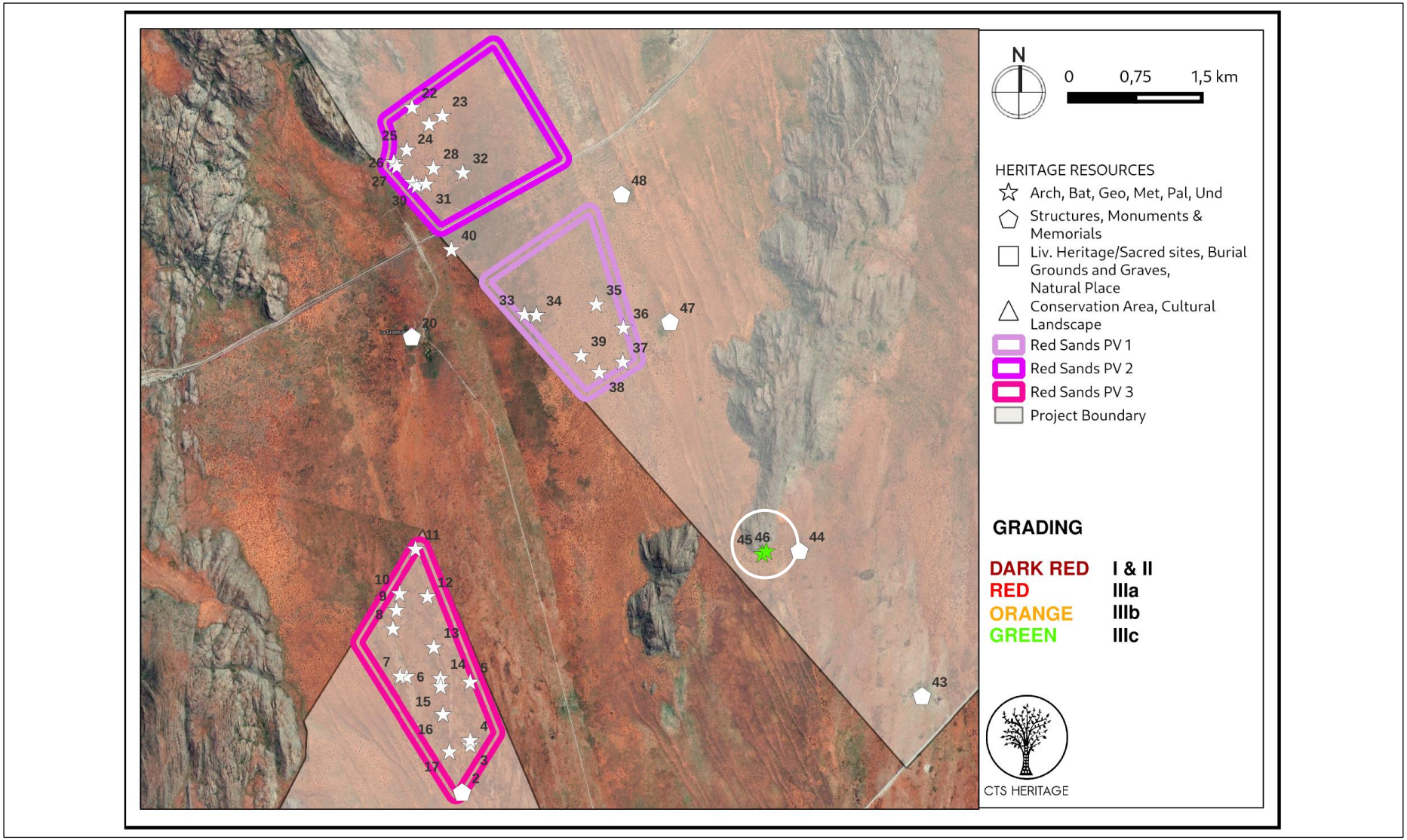

Figure 7.8: Map illustrating the heritage sites of significance (Red Sands-045 and Red Sands-046) identified in relation to the Red Sands PV3 development area.

7.6.1 Description of Heritage Impacts (including archaeology and palaeontology)

The development of Red Sands PV3 will have a negative impact on the heritage resources (including archaeological and palaeontological resources) found within the development area. The identified lithic and historical material identified is of a low significance and although these resources may be destroyed during the construction phase, the impact will not be significant. In addition, it is also extremely unlikely that any fossils would be preserved within the area.

It must be noted that archaeological and palaeontological impacts are only expected to occur during the construction phase when groundworks are undertaken. No impacts are expected during the operation and decommissioning phases of Red Sands PV3.

7.6.2 Impact table summarising the significance of the impact on heritage and palaeontological resources during construction

The impacts assessed below apply to the development area assessed for Red Sands PV3

Nature: *Impact to archaeological resources located within the development area.* 7 archaeological sites of low scientific significance were identified within the area proposed for development		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (5)	Long-term (5)
Magnitude	High (6)	Low (2)
Probability	Probable (3)	Improbable (1)
Significance	**Medium (60)**	**Low (8)**
Status (positive or negative)	Neutral	Neutral
Reversibility	Any impacts to heritage resources that do occur are irreversible.	Any impacts to heritage resources that do occur are irreversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	N/A	
Mitigation: » Should any buried archaeological resources or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward		
Residual Impacts: None		

Nature: *Impact to palaeontological resources located within the development area.* According to the SAHRIS Palaeosensitivity Map, the area proposed for development is underlain by sediments that have moderate palaeontological sensitivity. However, no palaeontological resources of a high significance have been identified		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (5)	Long-term (5)
Magnitude	Low (4)	Minor (2)
Probability	Improbable (1)	Probable (3)

Significance	**Low (10)**	**Low (8)**
Status (positive or negative)	Negative	Negative
Reversibility	Any impacts to heritage resources that do occur are irreversible.	Any impacts to heritage resources that do occur are irreversible.
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: » A Chance Fossil Finds procedure must be implemented during the course of construction activities		
Residual Impacts: None		

7.6.3 Implications on Project Implementation

The development of Red Sands PV3 will not have a negative impact on the heritage resources situated within the development area. The identified lithic and historic material is of a low significance. Although these resources may be destroyed during the construction phase, the impact is inconsequential. Although outside the development area, a no-go buffer area of 100m must be implemented around Site Red Sands-045 and Red Sands-046 to ensure that no indirect impact takes place

Based on the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the Gordonia Formation. It is therefore concluded that the significance of the impacts with the implementation of the recommended mitigation measures is low, which is acceptable from a heritage and palaeontology perspective.

7.7. Assessment of Visual Impacts

Visibility

The proposed PV array and substation for Red Sands PV3 are likely to be visible over similar areas (refer to **Figure 7.9** and **Figure 7.10**). Views of the proposed PV array and the substation will be significantly constrained to the north, east and west by a series of ridgelines that are located well within the limit of visibility of the proposed infrastructure. The surrounding ridgelines are likely to constrain views to the extent that views of the proposed project are only likely to be obvious from within the valley in which it is located.

From the site visit (November 2021) it was noted that natural vegetation that occurs in this area is likely to screen the array from the unsurfaced local road that runs to the south and east of the project. It is possible that higher infrastructure (Substation, bus bars) could be visible over this vegetation, however, this too is likely to be largely screened.

Due to topography, existing vegetation and distance, the proposed project is highly unlikely to be visible from protected areas (Glen Lyon Nature Reserve) and built-up areas (Groblershoop).

Due to topography and existing vegetation, the proposed project is unlikely to be highly obvious from the unsurfaced local road to the south and east of the proposed project. If it is visible it will only be visible from a short section of the road to the south of the proposed project site. Only the higher sections including substation, BESS and bus bars may be visible.

One homesteads could be affected including:

» The project is likely to be visible from a homestead (La Gratitude) that is located approximately 3.0km to the north of the proposed solar plant. Due to distance and vegetation is likely to mean that only the higher sections (bus bars) of the project may be visible.

The proposed project is unlikely to be visible to any other sensitive receptors.

Glare

The closest receptors that could be affected by glare are travellers on the unsurfaced local road to the south and east of the project. The only section of this road that could be affected is approximately 4km directly to the south of the proposed PV array and only approximately 2km of the road is indicated by the zone of theoretical visibility (ZTV) from which views of the array could be possible. Due to distance, existing vegetation and the orientation of the proposed array, this section of the road is highly unlikely to be affected by glare.

7.7.1 Description of the Visual Impacts

Visual impacts associated with the development of Red Sands PV3 include the following:

» The proposed development could change the character and sense of place of the landscape setting.
» The proposed development could change the character of the landscape as seen from the local roads.
» The proposed development could change the character of the landscape as seen from local homesteads.
» The proposed development could change the character of the landscape as seen from nature reserves.
» Glare impacts; and
» Lighting impacts.

These impacts have to be addressed in terms of the proposed solar array and associated infrastructure, including substation, BESS, and O&M building.

It should be noted that the impacts identified will all gradually increase from the current situation to the impact level indicated during the construction phase, be consistent at the impact levels indicated during the operational phase and decrease again from the levels indicated to close to the current situation during the decommissioning phase.

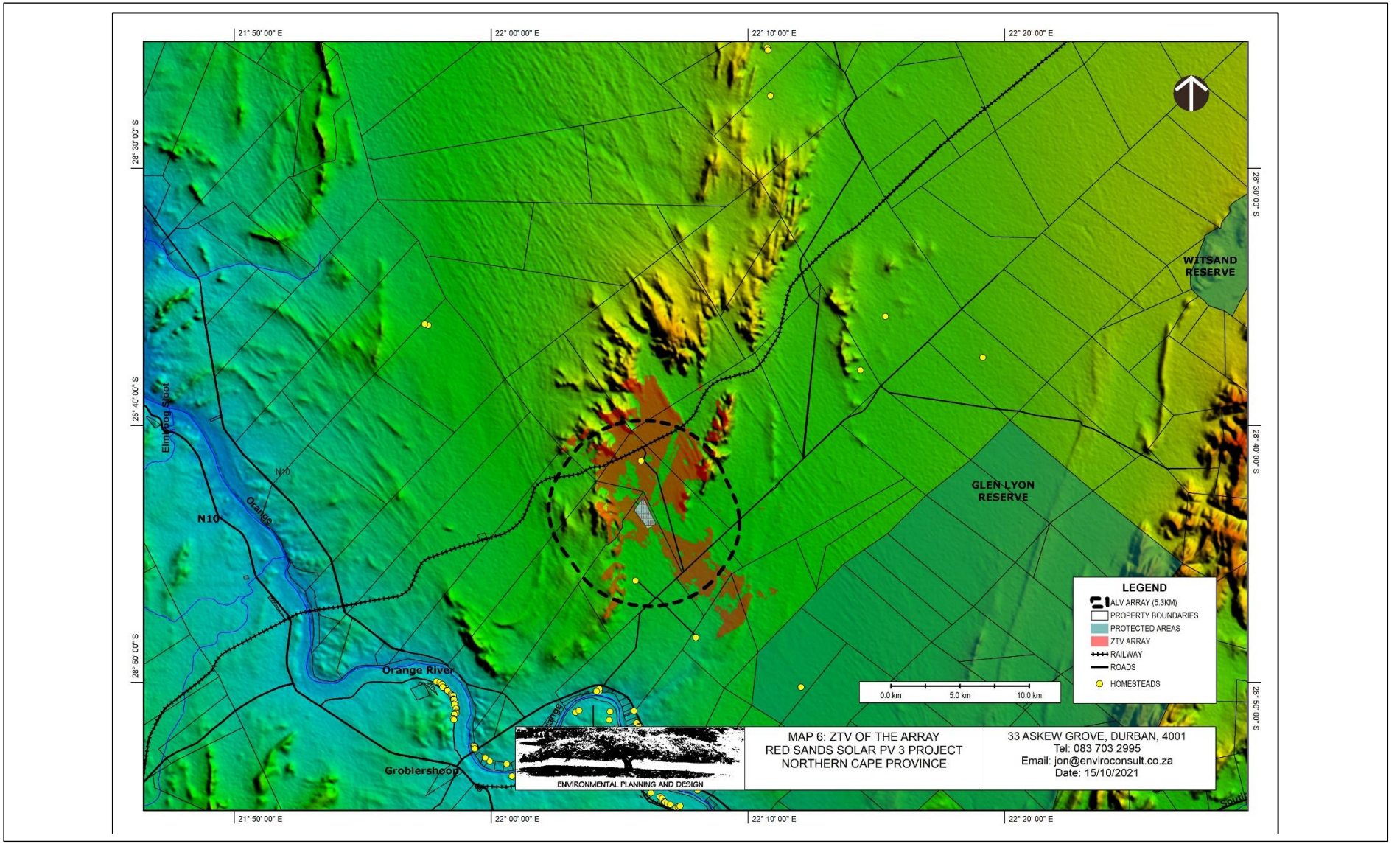

Figure 7.9: Map showing the zone of theoretical visibility (ZTV) for the proposed Red Sands PV3 array and internal infrastructure

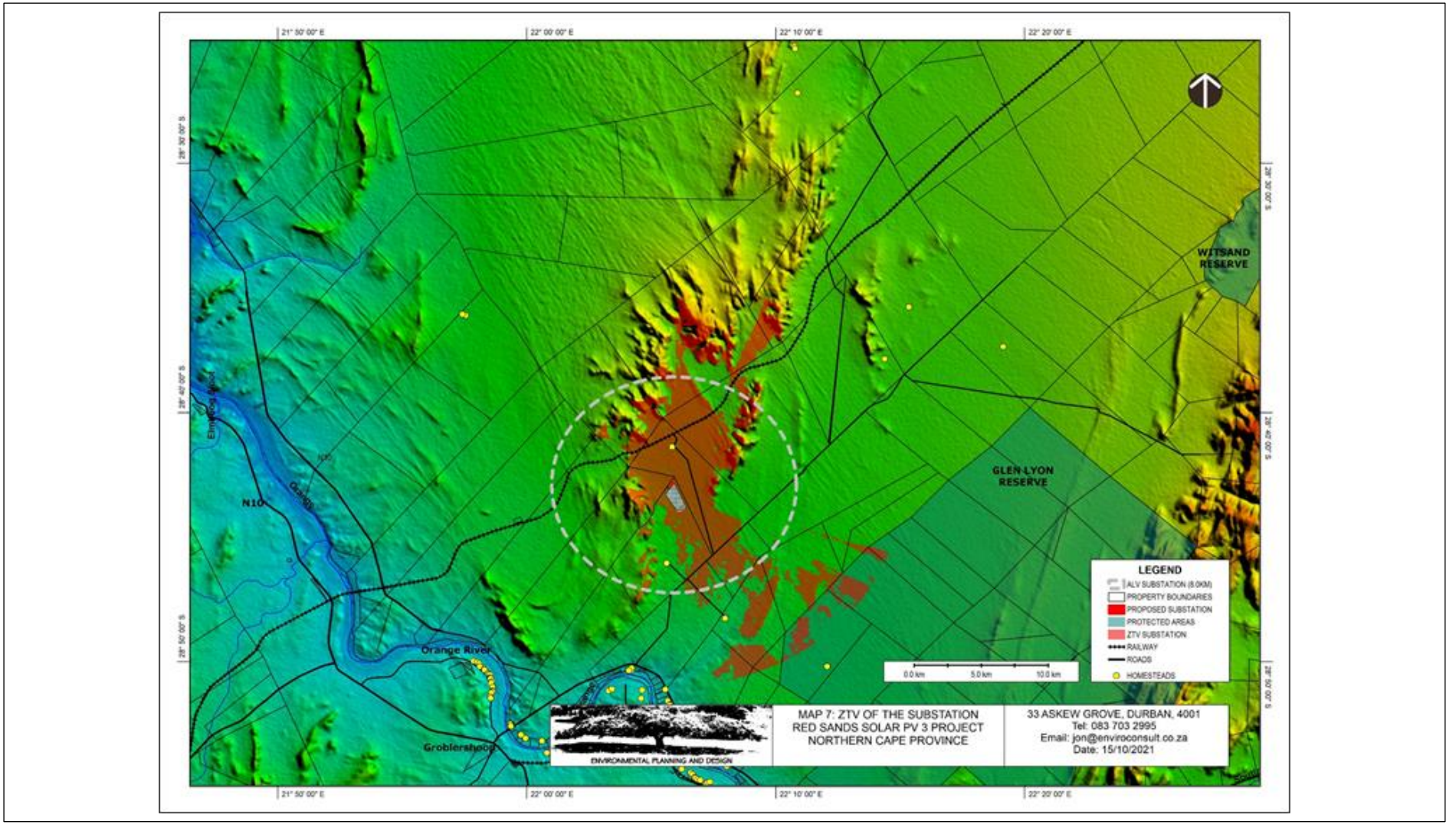

Figure 7.10: Map showing the ZTV assessment of the likely visibility of the solid structures including the substation and BESS and Bus Bars.

7.7.2 Impact tables summarising the significance of the visual impacts during construction, operation and decommissioning (with and without mitigation)

Construction, Operation and Decommissioning Phases

Nature of impact: *The proposed development could change the character and sense of place of the landscape setting (Landscape Change)*
The proposed solar project is located within an arid landscape area with an overriding natural character.
The visual influence of the proposed project will be largely limited to the valley in which it is located.

This natural character of this area has been eroded by the development of major high voltage overhead power lines and the Iron Ore railway line and associated road access.

The proposed project will be viewed in the vicinity of these existing elements. Due to the low height of the proposed array and associated infrastructure, it is unlikely that it will extend the area from which industrialisation of the natural landscape is obvious. It will however intensify the landscape impact. From outside the valley, the impact is unlikely to be visually obvious.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings, **(2)**	Site and immediate surroundings, **(2)**
Duration	Long term, **(4)**	Long term, **(4)**
Magnitude	Low, **(4)**	Minor, **(2)**
Probability	Probable, **(3)**	Probable, **(3)**
Significance	Medium, **(30)**	Low, **(24)**
Status	**Negative**	**Negative**
Reversibility	High	High
Irreplaceable loss	The proposed development can be dismantled and removed at the end of the operational phase. There will therefore be **no irreplaceable loss**. However, given the likely long term nature of the project, it is likely that a proportion of stakeholders will view the loss of view as irreplaceable.	**No irreplaceable loss**
Can impacts be mitigated?	**Yes**	**N/A**

Mitigation / Management:
Planning:
- » Plan site levels to minimise earthworks to ensure that levels are not elevated;
- » Plan to maintain the height of structures as low as possible;
- » Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development;

Operations:
- » Reinstate any areas of vegetation that have been disturbed during construction;
- » Remove all temporary works;
- » Monitor rehabilitated areas for vegetation cover post-construction and implement remedial actions;
- » Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.

Decommissioning:
- » Remove infrastructure not required for the post-decommissioning use of the site;
- » Rehabilitate and monitor areas for vegetation cover post-decommissioning and implement remedial actions.

Residual Impacts:
The residual risk relates to loss of natural vegetation cover being obvious on decommissioning of the proposed project. It is therefore critical that effective rehabilitation is undertaken.

Nature of impact: *The proposed development could change the character of the landscape as seen from local roads*
The proposed project may only be visible from the unsurfaced local road to the south and east. No other roads will be affected.

If it is visible it will only be visible from a short section of the road. Only the higher sections including substation, BESS and Bus Bars may be visible. These elements could be visible over approximately 2.4km of the road. They will be viewed at a distance of approximately 8.0km. They are therefore unlikely to be visually obvious.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings, **(2)**	Site and immediate surroundings, **(2)**
Duration	Long term, **(4)**	Long term, **(4)**
Magnitude	Small to Minor, **(1)**	Small to Minor **(1)**
Probability	Very improbable, **(1)**	Very improbable, **(1)**
Significance	Low, **(7)**	Low, **(7)**
Status	**Neutral**	**Neutral**
Reversibility	High	High
Irreplaceable loss	The proposed development can be dismantled and removed at the end of the operational phase. There will therefore be **no irreplaceable loss**.	**No irreplaceable loss.**
Can impacts be mitigated?	**Yes** but it is unlikely to result in a change in the significance rating.	

Mitigation / Management:
Planning:
- » Design /modify layout to keep PV panels off the higher sections of the site;
- » Plan site levels to minimise earthworks to ensure that levels are not elevated;
- » Plan to maintain the height of structures as low as possible;
- » Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development;

Operations:
- » Reinstate any areas of vegetation that have been disturbed during construction;
- » Remove all temporary works;
- » Monitor rehabilitated areas for vegetation cover post-construction and implement remedial actions;
- » Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.

Decommissioning:
- » Remove infrastructure not required for the post-decommissioning use of the site;
- » Rehabilitate and monitor areas for vegetation cover post-decommissioning and implement remedial actions

Residual Impacts:
No residual risks.

Nature of impact: *The proposed development could change the character of the landscape as seen from homesteads*.
The ZTV analysis indicates that the array could be visible from one homestead within the 3.0km. This farmstead appears to have tourism importance (Safric Safaris / La Gratitude Farm Stay).

Existing landform and vegetation is likely to at largely screen views.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings, **(2)**	Site and immediate surroundings, **(2)**
Duration	Long term, **(4)**	Long term, **(4)**
Magnitude	Minor, **(2)**	Small to Minor, **(1)**
Probability	Probable, **(3)**	Improbable, **(2)**
Significance	Low, **(24)**	Low, **(14)**
Status	The homestead within 3.0km appears to a have tourism use. Views of the project are therefore anticipated to be **Negative**.	**Neutral to Negative**
Reversibility	High	High
Irreplaceable loss	The proposed development can be dismantled and removed at the end of the operational phase. There will therefore be **no irreplaceable loss**.	**No irreplaceable loss.**
Can impacts be mitigated?	**Yes**	

Mitigation / Management:

Planning:

- Design /modify layout to keep development off higher sections of the site;
- Plan site levels to minimise earthworks to ensure that levels are not elevated;
- Plan a 1m high planted berm on the southern edge of the project;
- Plan to maintain the height of structures as low as possible;
- Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development;

Operations:

- Reinstate any areas of vegetation that have been disturbed during construction;
- Remove all temporary works;
- Monitor rehabilitated areas for vegetation cover post-construction and implement remedial actions;
- Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.

Decommissioning:

- Remove infrastructure not required for the post-decommissioning use of the site;
- Rehabilitate and monitor areas for vegetation cover post-decommissioning and implement remedial actions

Residual Impacts:

The residual risk relates to loss of natural vegetation cover being obvious on decommissioning of the proposed project. It is therefore critical that effective rehabilitation is undertaken.

Nature: *The proposed development could change the character of the landscape as seen from Nature Reserves*

The proposed development is highly unlikely to be visible from either the Witsand or the Glen Lyon Nature Reserves.

	Without mitigation	**With mitigation**
Extent	Region, **(3)**	NA
Duration	Long term, **(4)**	NA
Magnitude	Small, **(0)**	NA
Probability	Very Improbable, **(1)**	NA
Significance	Low, **(7)**	NA
Status	**Neutral**	NA
Reversibility	High	NA
Irreplaceable loss	The proposed development can be dismantled and removed at the end of the operational phase.	NA

	There will therefore be **no irreplaceable loss**.	
Can impacts be mitigated?	**No mitigation is necessary**	
Residual Impacts: No residual impacts.		

Nature of impact: *Glare Impacts*

The only area where glare could be problematic is on the unsurfaced local road approximately 7.9km to the south of the proposed array. Due to the fact that the array is unlikely to be visible due to vegetation and because an area due south of the array is unlikely to be affected by glare, this impact is highly unlikely.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings, **(2)**	Site and immediate surroundings, **(2)**
Duration	Long term, **(4)**	Long term, **(4)**
Magnitude	Small, **(0)**	Small, **(0)**
Probability	Very Improbable, **(1)**	Very Improbable, **(1)**
Significance	Low, **(6)**	Low, **(6)**
Status	**Neutral**	**Neutral**
Reversibility	High	High
Irreplaceable loss	**no irreplaceable loss**.	**No irreplaceable loss.**
Can impacts be mitigated?	Yes	

Mitigation / Management:

Operations:

Should glare prove problematic screening might be utilised or should a tracking system be utilised, the trackers can be programmed to prevent reflection towards affected sections of roads.

Residual Impacts:

There are no residual risks.

Nature of impact: *The potential visual impact of operational, safety and security lighting of the facility at night on observers.*

The facility could be lit by security lights to a level sufficient to ensure that security cameras can operate at night. This is likely to result in the array being obvious at night from surrounding areas.

The immediate area is relatively dark during the night.

There is potential therefore for lighting to make the project obvious in the landscape at night.

The most sensitive receptors to this effect are likely to be the Private Nature Reserves. The adjacent property to the south may also be sensitive as it is understood to include tourism accommodation.

	Without mitigation	**With mitigation**
Extent	Region **(3)**	Site **(1)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Low **(4)**	Small to minor **(1)**
Probability	Probable **(3)**	Improbable **(2)**
Significance	Medium **(33)**	Low **(12)**
Status	**Negative**	If the lights are generally not visible then the occasional light is unlikely to be seen as negative. **Neutral**
Irreplaceable loss	It would be possible to change the lighting /	No irreplaceable loss

	camera system so the impact cannot be seen as an irreplaceable loss.	
Reversibility	High	High
Can impacts be mitigated?	Yes	
Mitigation / Management:		
» Use low key lighting around buildings and operational areas that is triggered only when people are present. » Utilise infra-red security systems or motion sensor triggered security lighting; » Ensure that lighting is focused on the development with no light spillage outside the site; and » No tall mast lighting should be used.		
Residual Impacts: No residual risk has been identified.		

7.7.4 Implications for Project Implementation

Due to the surrounding ridgelines and the relatively low nature of the proposed facility, affected receptors are likely to be limited to local homesteads as well as an unsurfaced local road that is located to the south and east of the Red Sands PV3.

Possible landscape change was assessed as having an impact of medium negative significance with and without mitigation. Visual Impact on views from local roads was assessed as having a low neutral significance with and without mitigation. Visual Impact on views from local homesteads was assessed as having a low to medium negative significance without mitigation and a low negative significance with mitigation.

Visual Impact on views from nature reserves was assessed as being very improbable and a low neutral significance without mitigation. No mitigation was deemed necessary. The impact of glare was assessed as being very improbable and a low neutral significance with and without mitigation. The impact of light pollution was assessed as being probable and having medium negative significance without mitigation and allow improbably significance with mitigation.

7.8. Assessment of Social Impacts

7.8.1 Description of the Social Impacts

The majority of social impacts associated with the project are anticipated to occur during the construction phase of the development and are typical of the type of social impacts generally associated with construction activities. These impacts will be temporary and short-term (~12 months) but could have long-term effects on the surrounding social environment if not planned or managed appropriately. It is therefore necessary that the detailed design phase be conducted in such a manner so as not to result in permanent social impacts associated with the ill-placement of project components or associated infrastructure or result in the mis-management of the construction phase activities.

The positive and negative social impacts identified at this stage and will be assessed for the construction phase includes:

- » Direct and indirect employment opportunities
- » Construction workers on local communities
- » Influx of jobseekers and change in population

- » Risk to safety, livestock and damage to farm infrastructure
- » Increased risk of grass fires
- » Impacts associated with construction related activities
- » Visual impacts and sense of place impacts
- » Impacts associated with the loss of agricultural land

It is anticipated that the Red Sands PV3 Facility will operate for approximately 20 years (which is equivalent to the operational lifespan of the project). The potential positive and negative social impacts that could arise as a result of the operation of the proposed project include the following:

- » The establishment of renewable energy infrastructure
- » Direct and indirect employment opportunities
- » Benefits associated with the establishment of a Community Trust
- » Visual impact and sense of place impacts
- » Potential impact on tourism

7.8.2 Impact tables summarising the significance of the social impacts during construction, operation and decommissioning (with and without mitigation)

Construction Phase

Nature: *Direct and indirect employment opportunities*

The construction phase of PV Facility will extend over a period of approximately 18 months and create in the region of 350 employment opportunities. Members from the local communities in the area, specifically Groblershoop, would be able to qualify for most of the low skilled and semi-skilled employment opportunities. Most of these employment opportunities will accrue to Historically Disadvantaged (HD) members of the community. Based on information from similar projects the total wage bill will be in the region of R 31 million (2021 Rand values). A percentage of the wage bill will be spent in the local economy which will also create opportunities for local businesses in the local towns in the area.

Given relatively high local unemployment levels and limited job opportunities in the area, this will represent a significant, if localised, social benefit. The capital expenditure associated with the construction phase will be approximately R 1.5 billion (2021 Rand value). Due the lack of diversification in the local economy the potential for local companies is likely to be limited. Most benefits are therefore likely to accrue to contractors and engineering companies based outside the Tsantsabane Local Municipality. The local service sector will also benefit from the construction phase. The potential opportunities would be linked to accommodation, catering, cleaning, transport, and security, etc. associated with the construction workers on the site.

	Without mitigation	**With mitigation**
Extent	Local - Regional (2)	Local - Regional (3)
Duration	Short term (2)	Short term (2)
Magnitude	Moderate (6)	Moderate (6)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	**Medium (40)**	**Medium (44)**
Status (positive or negative)	Positive	Positive
Reversibility	N/A	N/A
Irreplaceable loss of resources?	N/A	N/A
Can impacts be mitigated?	Yes	

Enhancement:

To enhance the local employment, skills development and business opportunities associated with the construction phase the following measures should be implemented:

- » It is recommended that local employment policy is adopted to maximise the opportunities made available to the local labour force. Red Sands PV3 (Pty) Ltd should make it a requirement for contractors to implement a 'locals first'

policy, especially for semi and low skilled job categories. Enhance employment opportunities for the immediate local area Tsantsabane Local Municipality, if this is not possible, then the broader focus areas should be considered for sourcing workers
- » In the recruitment selection process; consideration must be given to women during recruitment process
- » It is recommended to set realistic local recruitment targets for the construction phase
- » Training and skills development programmes should be initiated prior to the commencement of the construction phase

Cumulative impacts:
Opportunity to upgrade and improve skills levels in the area

Residual Risks:
Improved pool of skills and experience in the local area

Nature: *Potential impacts on family structures and social networks associated with the presence of construction workers*

The presence of construction workers poses a potential risk to family structures and social networks. While the presence of construction workers does not in itself constitute a social impact, the manner in which construction workers conduct themselves can impact on local communities. The most significant negative impact is associated with the disruption of existing family structures and social networks. This risk is linked to potentially risky behaviour, mainly of male construction workers, including:

- » An increase in alcohol and drug use.
- » An increase in crime levels.
- » The loss of girlfriends and/or wives to construction workers.
- » An increase in teenage and unwanted pregnancies.
- » An increase in prostitution.
- » An increase in sexually transmitted diseases (STDs), including HIV.

The objective will be to source as many of the low and semi-skilled workers locally. These workers will be from the local community and form part of the local family and social networks. This will reduce the risk and mitigate the potential impacts on the local community. The potential impact on the local community will therefore be negligible.

	Without mitigation	**With mitigation**
Extent	Local (2)	Local (1)
Duration	Short term (2)	Short term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Medium (40)**	**Low (21)**
Status (positive or negative)	Negative	Negative
Reversibility	No in case of HIV and Aids	No in case of HIV and Aids
Irreplaceable loss of resources?	Yes, if people contract HIV/AIDs. Human capital plays a critical role in communities that rely on farming for their livelihoods	
Can impacts be mitigated?	Yes, to some degree. However, the risk cannot be eliminated.	

Mitigation:
The potential risks associated with construction workers can be mitigated, the detailed mitigation measures should be outlined in the Environmental Management Programme (EMPr) for the Construction Phase. The following aspects should be covered:

- » Where possible, the proponent should make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically for semi and low-skilled job categories
- » The proponent and contractor should implement an HIV/AIDS awareness programme for all constriction workers at

the outset of the construction phase
- » The constriction area should be fenced off before construction comments and no workers should be permitted to leave the fenced off.
- » It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay over-night on the site. However due the location of the site, on-site accommodation for workers may need to be provided.

Residual Risks:

Impacts on family and community relations that may, in some cases, persist for a long period of time. Also in cases where unplanned/unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDs, the impacts may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their families and community

Nature: *Potential impacts on family structures, social networks and community services associated with the influx of job seekers*

	Without mitigation	**With mitigation**
Extent	Local (2)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Minor (2)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	**Low (40)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Reversibility	No in case of HIV and Aids	No in case of HIV and Aids
Irreplaceable loss of resources?	Yes, if people contract HIV/AIDs. Human capital plays a critical role in communities that rely on farming for their livelihoods	
Can impacts be mitigated?	Yes, to some degree. However, the risk cannot be eliminated.	

Mitigation:

The potential risks associated with construction workers can be mitigated, the detailed mitigation measures should be outlined in the Environmental Management Programme (EMPr) for the Construction Phase. The following aspects should be covered:

- » Where possible, the proponent should make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically for semi and low-skilled job categories
- » The proponent and contractor should implement an HIV/AIDS awareness programme for all constriction workers at the outset of the construction phase
- » The construction area should be fenced off before construction comments and no workers should be permitted to leave the fenced off.
- » It is recommended that no constriction workers, with the exception of security personnel, should be permitted to stay over-night on the site, However due the location of the site, on-site accommodation for workers may need to be provided.

Residual Risks:

Impacts on family and community relations that may, in some cases, persist for a long period of time. Also in cases where unplanned/unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDs, the impacts may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their families and community

Nature: *Potential risk to safety of farmers and farm workers, livestock and damage to farm infrastructure associated with the presence of constriction workers on site*

The presence on and movement of construction workers on and off the site poses a potential safety threat to local famers and farm workers in the vicinity of the site. In addition, farm infrastructure, such as fences and gates, may be damaged and stock losses may also result from gates being left open and/or fences being damaged, or stock theft linked either directly or indirectly to the presence of construction workers on the site. The potential risks (safety, livestock, and farm infrastructure) can be effectively mitigated by careful planning and managing the movement of construction workers on and off the site workers during the construction phase.

	Without mitigation	**With mitigation**
Extent	Local (3)	Local (2)
Duration	Short-term (2)	Short-term (2)
Magnitude	Medium (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Medium (33)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Reversibility	Yes, compensation paid for stock losses and damage to farm infrastructure etc	Yes, compensation paid for stock losses and damage to farm infrastructure etc
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes

Mitigation:

- The construction area should be fenced off prior to the commencement of the construction phase, The movement of construction workers on the site should be confined to the fenced off area
- The proponent should enter into an agreement with he local farmers in the area whereby damages to farm property etc, during the construction phase will be compensated for. The agreement should be signed before the construction phase
- Traffic and activities should be strictly contained within the designated areas, including for the construction of the transmission line
- Strict traffic speed limits must be enforced on the farm
- All farm gates must be closed after passing through
- Contractors appointed by the proponent should provide daily transport for low and semi-skilled workers to and from the site,
- The proponent should hold contractors liable for compensating farmers and communities in full for any stock losses and /or damage to farm infrastructure that can be linked to construction workers.
- The Environmental Management Programme (EMPr) must outline procedures for managing and storing waste on site, specifically plastic waste that poses a threat to livestock if ingested.
- Contractors appointed by the proponent must ensure that construction workers who are found guilty stealing livestock and/or damaging farm infrastructure are dismissed and charged.
- It is recommended that no contractors workers, except for security personnel, should be permitted to stay over-night on the site.

Residual Risks:
Losses are not compensated for.

Nature: *Potential loss of livestock, crops and houses, damage to farm infrastructure and threat to human life associated with increased incidence of grass fires*

The presence of construction workers and construction-related activities on the site poses an increased risk of grass fires that could, in turn pose, a threat to livestock, crops, wildlife and farm infrastructure. The potential risk of grass fires will be higher during the dry, windy winter months from May to October. The impacts will be largely local and can be effectively mitigated.

	Without mitigation	**With mitigation**

Extent	Local (4)	Local (2)
Duration	Short-term (2)	Permanent (5)
Magnitude	Moderate (6)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	**Medium (36)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Reversibility	Yes, compensation paid for stock losses and damage to farm infrastructure etc	Yes, compensation paid for stock losses and damage to farm infrastructure etc
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes

Mitigation:

- The proponent should enter into an agreement with the local farmers in the area whereby damages to farm property etc, during the construction phase will be compensated for.
- The option of establishing a fire-break around the perimeter of the site prior to the commencement of the construction phase should be investigated
- Contractor should ensure that open fires on the site for cooking or heating are not allowed expect in designated area
- Smoking on site should be confined to designated area
- Contractor to ensure that construction related activities that pose a potential fire risk, such as welding , are properly managed and are confirmed to areas where the risk of fires has been reduced. Measures to reduce the risk of fires include avoiding working in high wind conditions when the risk of fires is greater. In this regard epical care should be taken during the high risk dry, windy winter months
- Contractor should provide adequate fire-fighting equipment on-site, including a fire fighting vehicle
- Contractor to provide fire-fighting training to selected constriction staff

Residual Risks:
Losses are not compensated for.

Operation Phase

Nature: *Development of infrastructure to improve energy security and support renewable sector*

The primary goal of the proposed project is to improve energy security in South Africa by generating additional energy. The proposed solar PV also reduces the carbon footprint associated with energy generation. The project should therefore be viewed within the context of the South Africa's current reliance on coal powered energy to meet most of its energy needs, and secondly, within the context of the success of the REIPPPP.

	Without mitigation	**With mitigation**
Extent	Local and Regional (1)	Local and Regional (2)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	**Low (21)**	**Low (24)**
Status (positive or negative)	Positive	Positive
Reversibility	N/A	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	

Enhancement:

The mitigated measures listed in 5.2 to enhance local employment and business opportunities during the construction phase, also apply to the operational phase.

Residual Risks:

South Africa's energy crisis, which started in 2007 and is ongoing, has resulted in widespread rolling blackouts (referred to as load shedding) due to supply shortfalls. The load shedding has had a significant impact on all sectors of the economy and on investor confidence. A review of the REIPPPP and establishment of renewable energy facilities not only addresses environmental issues associated with climate change and consumption of scarce water resources, but also create significant socio-economic opportunities and benefits, specifically for historically disadvantaged, rural communities.

Nature: *Potential impact on tourism* Potential impact on renewable energy facility on local tourism. This is usually linked to the visual impact associated with the proposed facility and associated infrastructure and the potential impact on the areas rural sense of place		
	Without mitigation	**With mitigation**
Extent	Local (2)	Local (1)
Duration	Long term (4)	Long term (4)
Magnitude	Low (2)	Low (2)
Probability	Probable (3)	Probable (3)
Significance	**Low (24)**	**Low (21)**
Status (positive or negative)	Negative	Negative
Reversibility	Yes	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	
Mitigation: The recommendation contained in the Visual Impact Assessment should be implemented		
Residual Risks: The proposed renewable energy facility does not have an impact on area's sense of place. For mitigation measures the collection of information on location of existing farming and hospitality operations and activities. Site visit and interviews with local farmers and representatives from local farmers and representatives from local municipality and farming and hospitality associations		

Decommissioning Phase Impacts

Typically, major social impacts associated with the decommissioning phase are linked to the loss of jobs and associated income and will be similar to the impacts during the construction phase. This has implications for the households who are directly affected, the communities within which they live, and the relevant local authorities. However, in the case of Red Sands PV3 it is anticipated that the proposed facility will be refurbished and upgraded to prolong its lifespan, where possible, and decommissioning will only take place once the economic viability of the project has come to an end.

7.8.4 Implication for Project Implementation

No negative impacts with a high significance rating have been identified to be associated with the development of Red Sands PV3, only positive social impacts are considered to be of a high significance. All negative social impacts are within acceptable limits with no impacts considered as unacceptable from a social perspective. The recommendations proposed for the project are considered to be appropriate and suitable for the mitigation of the negative impacts and the enhancement of the positive impacts. Based on the social assessment, the following recommendations are made:

» In terms of employment related impacts, it is important to consider that job opportunities for the unskilled and semi-skilled are scarce commodities in the study area and could create competition among the local unemployed. Introducing an outside workforce will therefore most likely worsen local endeavours to obtain jobs and provoke discontent as well as put pressure on the local services available. Local labour should be utilised to enhance the positive impact of employment creation in the area. Local businesses should be involved with the construction activities where possible. It is imperative that local labour be sourced to ensure that benefits accrue to the local communities. Preference should thus be given to the use of local labour during the construction and operational phases of the project as far as possible.

- Locals should also be allowed an opportunity to be included in a list of possible local suppliers and service providers, enhancing the multiplier effect. This aspect would serve to mitigate other subsequent negative impacts such as those associated with the inflow of outsiders to the area, the increased pressure on the infrastructure and services in the area, as well as the safety and security concerns.
- Impacts associated with the construction period should be carefully mitigated to minimise any possible dust and noise pollution.
- Safety and security concerns should be taken into account during the planning and construction phases of the proposed project.

The proposed project and associated infrastructure will create a number of potential socio-economic opportunities and benefits and is unlikely to result in permanent damaging social impacts. From a social perspective it is concluded that the project is acceptable subject to the implementation of the recommended mitigation and enhancement measures and management actions identified for the project. The project is also considered to be acceptable from a social perspective considering the location of the site within the Upington REDZ. Considering the findings of the report and potential for mitigation it is the reasoned opinion of the specialist that the project can be authorised from a social perspective.

7.8.5 Implications for Project Implementation Related to the Storage and Handling of Dangerous Goods

During the construction and operation phase, the Red Sands PV3 facility will require the storage of materials which may be considered to be dangerous goods.

"Dangerous goods" is defined under the Listing Notices that deal with the storage, or storage and handling, of dangerous goods. "Dangerous goods" are defined in the Listing Notices as:

"*Goods containing any of the substances as contemplated in South African National Standard No. 10234, supplement 2008 1.00: designated "List of classification and labelling of chemicals in accordance with the Globally Harmonized Systems (GHS)" published by Standards South Africa, and where the presence of such goods, regardless of quantity, in a blend or mixture, causes such blend or mixture to have one or more of the characteristics listed in the Hazard Statements in section 4.2.3, namely physical hazards, health hazards or environmental hazards*".

The above definition makes specific reference to SANS 10234. South Africa has implemented the Globally Harmonized System of Classification and Labelling of Chemicals by issuing this national standard.

7.8.6 Risks associated with Battery Energy Storage

A Battery Energy Storage Systems BESS) comprising a solid-state battery system will allow for energy storage for an extended period (of up to 4 hours). The general purpose and utilisation of the BESS will be to save and store excess electrical output from the facility as it is generated, allowing for a timed release to the national grid when the capacity is required. The BESS will be contained within insulated containers and will connect to the on-site facility substation via underground cabling. **Figure 7.10** provides a general illustration of a BESS.

Figure 7.10 Example of battery storage units integrated as part of PV array (Source: nexttracker.com)

The risks associated with battery technologies are generally well understood and researched. The primary risks relate to fire hazards and the potential for a condition known as 'thermal runaway'. Thermal runaway occurs in situations where an increase in temperature changes the conditions in a way that causes a further increase in temperature, often leading to a destructive result. The risks detailed in the table below considers only the risks associated with on-site use of battery energy storage systems for PV facilities.

Possible risks associated with the construction and operation of the BESS from a technical perspective within the development footprint of the Red Sand PV3 facility are limited to health and safety aspects during the project life cycle of the BESS as well as the solar energy facility. The risks identified for the construction and operation of the BESS are detailed below. Mitigation measures have been included within the project EMPr (**refer to Appendix L**).

Nature of Risk	*Likelihood*	*Impact*	*Mitigation / Management of Risk*
1. <u>Mechanical breakdown/ Exposure to high temperatures</u> » Incidents where the batteries are broken or exposed to temperature above room temperature could lead to overheating as well as fires which can affect infrastructure components of the BESS. » Leakages of substances contained within the battery cells (should they not be assembled off-site).	Low	» Fires, electrocutions and spillage of toxic substances into the surrounding environment. » Spillage of hazardous substances into the surrounding environment. » Soil contamination – leachate from spillages which could lead to an impact of the productivity of soil forms in affected areas. » Water Pollution – spillages into groundwater. » Health impacts – on the surrounding communities, particularly those relying on groundwater as a primary source of water.	Operators are trained and competent to operate the BESS. Training should include the discussion of the following: * Potential impact of electrolyte spills on groundwater; * Suitable disposal of waste and effluent; * Key measures in the EMPr relevant to worker's activities; * How incidents and suggestions for improvement can be reported. » Training records should be kept on file and be made available during audits. » Battery supplier user manuals safety specifications and Material Safety Data Sheets (MSDS) are filed on site at all times. » Compile method statements for approval by the Technical/SHEQ Manager for the operation and management and replacement of the battery units / electrolyte for the duration of the project life cycle. Method statements should be kept on site at all times. » Provide signage on site specifying the types of batteries in use and the risk of exposure to hazardous material and electric shock. Signage should also specify how electrical and chemical fires should be dealt with by first responders, and the potential risks to first responders (e.g. the inhalation of toxic fumes, etc.). » Firefighting equipment should readily be available at the BESS area and within the site. » Maintain strict access control to the BESS area. » Ensure all maintenance contractors / staff are familiar with the supplier's specifications. » Undertake daily risk assessment prior to the commencement of daily tasks at the BESS. This should consider any aspects which could result in fire or spillage, and appropriate actions should be taken to prevent these. » Standard Operating Procedures (SOPs) should be made available by the Supplier to ensure that the batteries are handled in accordance with required best practices. » Spill kits must be made available to address any incidents associated with the flow of chemicals from the batteries into the surrounding environment. » The assembly of the batteries on-site should be avoided as far as possible. Activities on-site for the BESS should only be limited to the placement of

Nature of Risk	*Likelihood*	*Impact*	*Mitigation / Management of Risk*
			the container wherein the batteries are placed. » Undertake periodic inspections on the BESS to ensure issues are identified timeously and addressed with the supplier where relevant. » The applicant in consultation with the supplier must compile and implement a Leak and Detection Monitoring Programme during the project life cycle of the BESS. » Batteries must be strictly maintained by the supplier or suitably qualified persons for the duration of the project life cycle. No unauthorised personnel should be allowed to maintain the BESS.
2. <u>Generation of hazardous waste</u> » The incorrect disposal of the batteries and the associated components could have an adverse impact on the environment.	Medium	» Spillage of hazardous substances into the surrounding environment. » Soil contamination – leachate from the disposed batteries into the soil, which could lead to an impact of the productivity of soil forms in affected areas. » Water pollution – leachate from the disposed batteries spilling into groundwater. » Health impacts – on the surrounding communities, particularly those relying on groundwater as a primary source of water.	» Damaged and used batteries must be removed from site by the supplier or any other suitably qualified professional for recycling or appropriate disposal. » The applicant should obtain a cradle to grave battery management plan from the supplier during the planning and design phase of the system. The plan must be kept on site and adhered to.

7.9. Assessment of the 'Do Nothing' Alternative

The do-nothing' alternative (i.e. no-go alternative) is the option of not constructing Red Sands PV3. Should this alternative be selected, there would be no environmental impacts on the site due to the construction and operation activities of a solar PV facility.

a) Land use and agriculture

There are no high potential soils present within the development area and the soils are of low to moderate potential at best as these are shallow with only a limited portion of moderately deep to deep soils which will lead to rapid water infiltration and the soils drying out. In addition, the low rainfall in the area means that there is little potential for rain-fed arable agriculture in the area. Arable production would, therefore, be possible only by irrigation, and no indications of any irrigated areas within, and surrounding the development area, can be identified.

Considering the state of the agricultural potential and the land capability of the study area and development area, the undertaking of productive agricultural activities will not be possible and will be highly restricted if attempted. The property is currently being used for grazing, which is limited due to the current drought in the area. The development of Red Sands PV3 provides an opportunity to undertake an efficient and productive land use activity on a property which is currently restricted in use. Therefore, the proposed use of the property for the development of a solar PV facility is not in conflict to other land uses in the area.

The implementation of the 'do-nothing' alternative would leave the land-use restricted to the current land use (i.e. grazing), losing out on the opportunity to generate renewable energy from solar energy in addition to current land use activities. Therefore, from a land-use perspective, the 'do-nothing' alternative is not preferred as there is a perceived loss of a viable and compatible land use for the broader study area which allows the current land-use activities to continue.

b) Socio-economic impact

Social: The impacts of pursuing the no-go alternative are both positive and negative as follows:

- The benefits would be that there is no disruption from an influx of jobseekers into the Upington area, nuisance impacts (noise and dust during construction), visual impacts and safety and security impacts. The impact is therefore neutral.
- The agricultural potential of the study area is low, with no irrigation infrastructure present; therefore, the no-go option would be a lost opportunity for area to be used for an appropriate alternative land use as a result of the solar resource availability over the area. Should the no-go option be considered, the low agricultural potential of the area will remain due to no irrigation infrastructure being present to warrant for the undertaking of commercial farming practices and the area having a low land capability.
- The main and current land use of the project site is the undertaking of grazing activities to a limited extent, which is not considered to be an effective land use and offers limited benefit and income to the landowners. The 'do nothing' alternative would result in a lost opportunity for the landowner (in terms of implementing a compatible alternative land use option, while still retaining the current land use, as well as a loss in long-term revenue).

» Negative impacts would be associated with an opportunity lost in terms of job creation, skills development and associated economic business opportunities for the local economy, as well as a loss of the opportunity to generate energy from a renewable resource without creating detrimental effects on the environment.

The project has the potential to make a positive contribution towards the identified community needs. In terms of the economic development requirements of the REIPPP Programme, the project will commit benefits to the local community, in the form of job creation, localisation, and community ownership. In accordance with the DoE bidding requirements of the REIPPP Programme, a percentage of the revenue generated per annum during operation will be made available to local communities through a social beneficiation scheme. Therefore, the potential for creation of employment and business opportunities, and the opportunity for skills development for local communities is significant. Secondary social benefits can be expected in terms of additional spend in nearby towns due to the increased demand for goods and services. These socio-economic benefits would include an increase in the standard of living for local residents within the area as well as overall financial and economic upliftment.

Foregoing the proposed development would not necessarily compromise the development of renewable energy facilities in South Africa. However, the socio-economic benefits for local communities at this location and within the surrounding area would be forfeited.

Therefore, from a socio-economic perspective, the 'do-nothing' alternative is not preferred as there is a perceived loss of socio-economic benefits, when considering the current socio-economic conditions of the area.

New Business: Some of the positive spin off effects that are to ensue from the project expenditure will be localised in the communities located near the site, such as the towns of Groblershoop, as well as the smaller settlements located within the surrounding areas of the development area. The local services sector and specifically the trade, transportation, catering and accommodation, renting services, personal services and business services are expected to benefit the most from the project activities during the construction phase. New business sales that will be stimulated as a result of the establishment of the solar PV facility, albeit for a temporary period, will be lost with the implementation of the 'do nothing' alternative. Therefore, from a business perspective, the 'do-nothing' alternative is not preferred as there is a perceived loss of new business opportunities.

Employment: Red Sands PV3 is likely to create approximately ~150 (at its peak) employment opportunities (temporary) for a period of ~12 to 18 months, depending on the final design, during the construction phase. Of this approximately 70% of the opportunities will be available to low skilled workers (construction labourers, security staff, drivers, equipment operators etc.), 25% will be available to semi-skilled personnel (electricians, site managers etc.) and 5% of employment opportunities will be for skilled individuals (engineers, project managers, site managers etc.). The development of Red Sands PV3, will aid in a reduction of the unemployment rate, however if the facility is not developed then the unemployment rate will not be positively influenced by the proposed development. The upliftment and socio-economic benefits for individuals within local communities would be forfeited with the implementation of the 'do nothing' alternative. Therefore, from an employment perspective, the 'do-nothing' alternative is not preferred as there is a perceived loss of employment opportunities.

Skills development: The establishment of Red Sands PV3 will offer numerous opportunities for skills transfer and development. This is relevant for both on-site activities and manufacturing activities. Various PV facilities are proposed to be developed in the area, which is demarcated as a REDZ, and in the Northern Cape Province, which means that the transfer of skills from foreign experts to the local engineers and construction workers will take place, similar to what has taken place where PV facilities have been constructed and operated within the Province and the rest of the country. The skills training and transfer benefits for individuals within local communities would be forfeited with the implementation of the 'do nothing' alternative.

Municipal goals: The implementation of Red Sands PV3 would contribute towards addressing the Local Municipality's key issue regarding high levels of poverty and unemployment, skills shortage, and inequalities, through the creation of employment opportunities, the provision of skills training opportunities, and local economic growth, including growth in personal income levels of those community members who would be employed on the project.

The no-go alternative will therefore result in the above economic benefits not being realised and a subsequent loss of income and opportunities to local people. From this perspective the no-go alternative is not preferred.

c) Regional scale impact

At a broader scale, the benefits of additional capacity to the electricity grid and those associated with the introduction of renewable energy would not be realised. Although the Red Sands PV3 is only proposed to contribute a contracted capacity of up to 75MW to the grid capacity, this would assist in meeting the electricity demand for the relevant private off-takers and would also assist in meeting the government's goal for renewable energy and the energy mix. The generation of electricity from renewable energy resources offers a range of potential socio-economic and environmental benefits for South Africa. These benefits include:

- Increased energy security;
- Resource saving (i.e. fossil fuels and water);
- Exploitation of South Africa's significant renewable energy resource;
- Pollution reduction;
- Climate friendly development;
- Support for international agreements;
- Employment creation;
- Acceptability to society; and
- Support to a new industry sector.

At present, South Africa is some way off from fully exploiting the diverse gains from renewable energy and from achieving a considerable market share in the renewable energy industry. South Africa's electricity supply remains heavily dominated by coal-based power generation, with the country's significant renewable energy potential largely untapped to date.

The Integrated Resource Plan (IRP) (2019) provides for the development of 6 000MW of capacity from large scale solar energy facilities by 2030. The IRP essentially drives the assortment of energy to be

implemented for South Africa which is known as the energy mix of the country, considering various generation technologies.

d) Conclusion

The 'do-nothing' alternative will do little to influence the renewable energy targets set by government due to competition in the sector, and the number of renewable energy projects being bid to the Department of Mineral Resources and Energy. However, as the surrounding area experiences ample solar resource, not developing Red Sands PV3 would see such an opportunity being lost. As current land use activities can continue on the study area once the project is operational, the loss of the land to this project during the operation phase (equivalent to ~2,3% of the larger project site) is not considered significant. In addition, the Northern Cape Province will not benefit from additional generated power being evacuated directly into the Province's grid. Therefore, from a regional perspective, the 'do-nothing' alternative is not preferred as there is a perceived loss of benefits for the regional area.

From the specialist studies undertaken, no environmental fatal flaws were identified to be associated with Red Sands PV3. All impacts associated with the project can be mitigated to acceptable levels. If the solar PV facility is not developed the following positive impacts will not be realised:

- Job creation and skills development from the construction and operation phases.
- Economic benefit to participating landowners due to the revenue that will be gained from leasing the land to the developer.
- Meeting of the energy generation mix in a most economic and rapid manner.
- Provision of clean, renewable energy in an area where the energy resource is optimally available.

As detailed above, the 'do-nothing' alternative will result in a number of lost opportunities. The 'do nothing' alternative is, therefore, not preferred and not proposed to be implemented for the development of Red Sands PV3.

CHAPTER 8: ASSESSMENT OF POTENTIAL CUMULATIVE IMPACTS

As identified and assessed in Chapter 7, a solar PV facility may have impacts (positive and negative) on natural resources, the social environment and on the people living in the area surrounding the project. The preceding impact assessment chapter has reported on the assessment of the impacts associated with Red Sands PV3 largely in isolation (from other similar developments).

As previously stated in this report, the Red Sands PV3 study area and development area is located within the Upington REDZ (REDZ 7). The REDZ areas are zones identified by the DFFE as geographical areas of strategic importance for the development of large-scale solar photovoltaic and wind energy development activities. Therefore, the REDZ areas are considered as nodes for the development of renewable energy developments where a concentration of such development has been undertaken and is expected to be further developed and grow. Prominent renewable energy features and infrastructure has been introduced in the broader area around the Red Sands PV3 site. Therefore, the development of Red Sands PV3 will not introduce renewable energy to an untouched, undeveloped landscape but rather expand such features and developments within the landscape and add to the concentration of such developments within the REDZ.

The DMRE, under the REIPPP Programme, released a request for proposals (RFP) in 2011 to contribute towards Government's renewable energy target and to stimulate the industry in South Africa. The REIPPP Programme has been rolled out in bid windows (rounds) since 2011, in which developers submit planned renewable energy projects for evaluation and selection. The bid selection process considers a number of qualification and evaluation criteria. The proposed tariff and socio-economic development contributions by the project bidder are the main basis for selection after the qualification criteria have been met. Similar programmes could be released in future by government and private off-takers in accordance with the ever-changing policy framework for energy generation in the country,

As a result of the REIPPP Programme and the promulgation of the REDZ zones, there has been a substantial increase in interest in solar PV facility developments in South Africa (largely in the Northern Cape Province), with 23 PV facilities currently operational (Energyblog[15], 2020). It is, therefore, important to follow a precautionary approach in accordance with NEMA to ensure that the potential for cumulative impacts[16] is considered and avoided where possible.

[15] https://www.energy.org.za/data-andtools/projectdatabase?art_title=&programme=&project_type=Solar+Photovoltaic+%28PV%29&province=Northern+Cape&status=Fully+operational&cck=project&scale=Large+Scale+Utility&country=South+Africa&search=project_search&task=search

[16] Cumulative impacts in relation to an activity are defined in the Environmental Impact Assessment Regulations (Government Notice R326) as the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to existing and reasonably foreseeable impacts eventuating from similar or diverse activities.

This chapter assesses the potential for the impacts associated with Red Sands PV3 to become more significant when considered in combination with the other known or proposed solar facility projects within the area. The projects within the area under consideration in this cumulative assessment include both PV and CSP (Concentrated Solar Power) due to the existing and proposed PV and CSP facilities located in the area.

CSP makes use of a different solar power technology (which contains a different suite of infrastructure required to be constructed and operated), but is considered as part of the cumulative impact assessment as there exists an overlap between the cumulative impacts expected with the development of both PV and CSP projects in the surrounding areas of the Red Sands PV3 study area.

8.1 Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This chapter of the Basic Assessment Report includes the following information required in terms of Appendix 1: Content of Basic Assessment Reports:

Requirement	Relevant Section
3(j)(i) an assessment of each identified potentially significant impact and risk, including cumulative impacts.	The cumulative impacts associated with the development of Red Sands PV3 are included and assessed within this chapter.

8.2 Approach taken to Assess Cumulative Impacts

The cumulative impacts that have the potential to be compounded through the development of the solar PV facility and its associated infrastructure in proximity to other similar developments in this area south-east of Upington include impacts such as those listed below:

- Unacceptable loss of habitat or landscape connectivity through clearing, resulting in an impact on the conservation status of such flora, fauna or ecological functioning.
- Unacceptable risk to avifauna through loss of avifaunal habitats, and impacts to nesting areas.
- Unacceptable loss of heritage resources (including palaeontological and archaeological resources).
- Complete or whole-scale change in the sense of place and character of an area and unacceptable visual intrusion.
- Unacceptable impact to social factors and components.

The role of the cumulative assessment is to determine and confirm if such impacts are relevant to Red Sands PV3 within the study area being considered for the development.

It is important to explore the potential for cumulative impacts as this will lead to a better understanding of these impacts and the potential for mitigation that may be required in order to ensure that the concentration of renewable energy developments, specifically solar PV does not lead to detrimental environmental impacts. The scale at which the cumulative impacts are assessed is important. For example, the significance of the cumulative impact on the regional or national economy will be influenced by solar PV facility developments throughout South Africa, while the significance of the cumulative impact on visual amenity and loss of land within a concentrated area may only be influenced by solar PV facility developments that are in closer proximity to each other. For practical purposes a sub-

regional scale of 30km has been selected for this cumulative impact evaluation, in accordance with the requirements of the DFFE.

Figure 8.1 indicates the location of Red Sands PV3 in relation to all other known and viable (i.e. projects with a valid Environmental Authorisation) solar PV and CSP facilities located within a radius of 30km from the development area under assessment. These projects were identified using the DFFE Renewable Energy Database and current knowledge of projects being proposed, operational and developed in the area. In the case of Red Sands PV3, there are several solar PV facilities located within a 30km radius of the development area (refer to **Figure 8.1** and **Table 8.1**), all at various stages of approval[17].

The potential for cumulative impacts is summarised in the sections that follow and has been considered within the specialist studies (refer to **Appendices D – I**).

Table 8.1: Solar facilities (including PV and CSP) located within the surrounding area (within a 50km radius) of the Red Sands PV3 development area

Project Name	DEA Ref. No	Location	Project Status
Bokpoort I 75MW CSP	12/12/20/1920	6km northwest	Operational
Bokpoort II PV Cluster (Venda, Tsonga, Tswana, Sotho, Swati, Afrikaans, Pedi, Zulu PVs)	14/12/16/3/3/1/2142 (Venda) 14/12/16/3/3/1/2143 (Tsonga) 14/12/16/3/3/1/2144 (Tswana) 14/12/16/3/3/1/2145 (Sotho) 14/12/16/3/3/1/2146 (Swati) 14/12/16/3/3/1/2147 (Afrikaans) 14/12/16/3/3/1/2150 (Pedi) 14/12/16/3/3/1/2151 (Zulu)	6km northwest	Authorised (Preferred Bidder under RMIPP)
Solafrica Sand Draai PV	14/12/16/3/3/2/738	7km northwest	Authorised
Kheis Solar Park 1 PV	14/12/16/3/3/2/571	26km northwest	Authorised
Marang Solar PV	14/12/16/3/3/2/906	30km west	Authorised
Red Sands PV1	TBA	1km north	In Process
Red Sands PV2	TBA	1.6km north	In Process

It should be noted that not all the solar facilities (PV and CSP) presently under consideration by various solar energy developers will be built for operation. Not all proposed developments will be granted the relevant permits by the relevant authorities (DFFE, DMRE, NERSA and Eskom) due to any of the following reasons:

- There may be limitations to the capacity of the existing or future Eskom grid.
- Not all applications will receive a positive environmental authorisation.

[17] Applications for Environmental authorisation for numerous CSP and PV facilities have been undertaken within the area, however some of these applications have lapsed and are no longer considered to be valid and are therefore not considered as part of the cumulative impact assessment.

- There are stringent requirements to be met by applicants in terms of the REIPPP or similar programme and a highly bidding competitive process that only selects the most competitive projects.
- Not all proposed solar facilities will be able to reduce the associated negative impacts to acceptable levels or be able to mitigate the impacts to acceptable levels (fatally flawed).
- Not all proposed facilities will eventually be granted a generation license by NERSA and sign a Power Purchase Agreement with Eskom.
- Not all developers will be successful in securing financial support to advance their projects further.

As there is, therefore, a level of uncertainty as to whether all the above-mentioned solar facilities will be implemented, this results in it being difficult to quantitatively assess the potential cumulative impacts. The cumulative impacts of other known PV and CSP facilities in the surrounding area and Red Sands PV3 are therefore qualitatively assessed in this Chapter. The following potential impacts are considered (refer to Appendix D – I for more details):

- Cumulative impacts on ecological processes (including fauna and flora)
- Cumulative impacts on avifauna
- Cumulative impacts on heritage resources (including archaeology and palaeontology)
- Cumulative visual impacts
- Cumulative social impacts

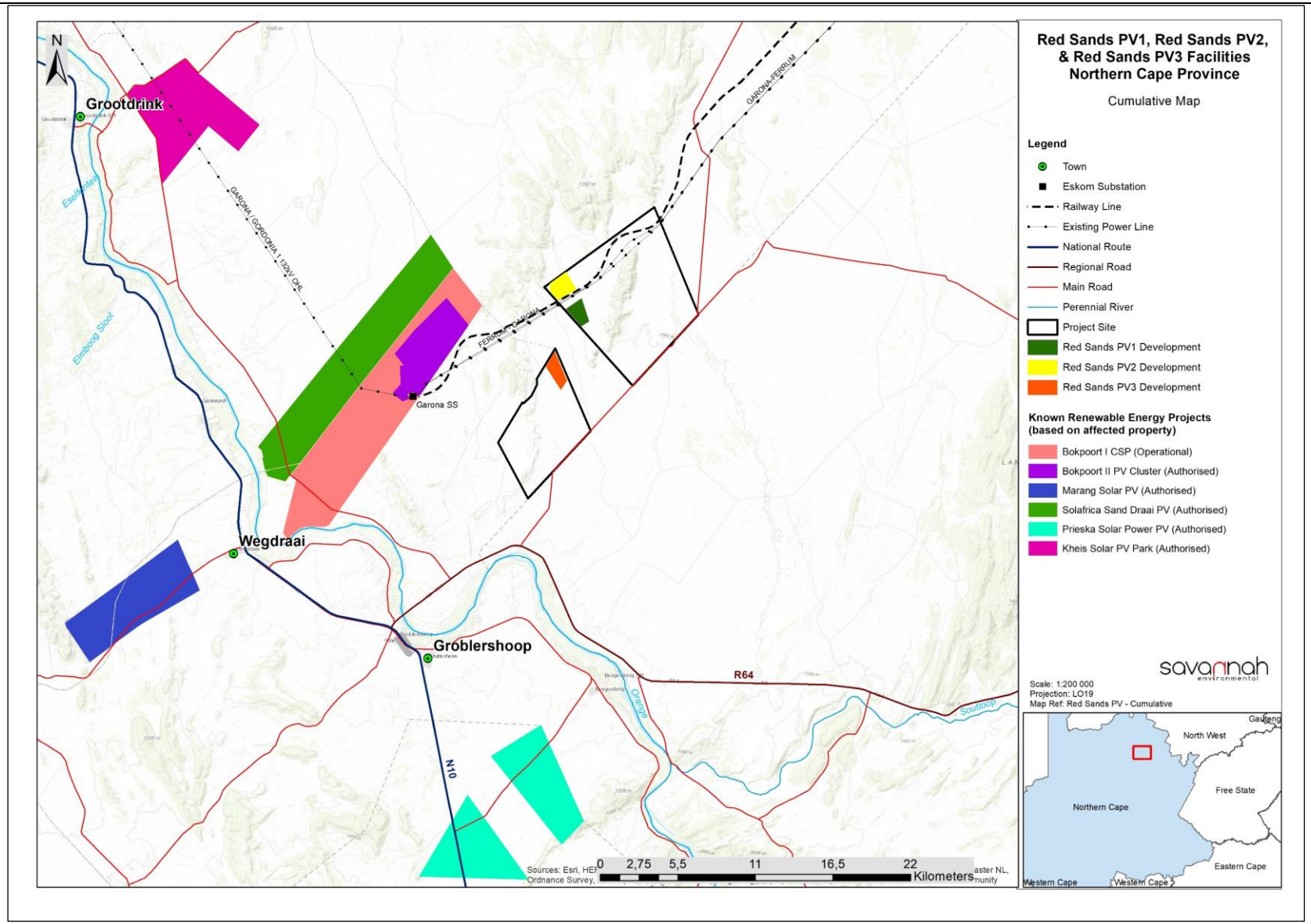

Figure 8.1: Identified solar facility projects (including PV and CSP) located within a 50km radius of the Red Sands PV3 development area that are considered as part of the cumulative impact assessment

8.3 Cumulative Impacts on Ecological Processes

Potential cumulative impacts on ecology include:

- The development of Red Sands PV will potentially contribute to cumulative habitat loss
- Erosion and alien plant invasion would contribute to degradation in the area, but as this can be well-mitigated, the contribution can be minimised.

However, to appreciate the extent of 'avoidance' achieved for the project, the three proposed Red Sands PV facilities have been jointly considered, the following is noteworthy:

- The footprint areas for the three Red Sand PV facilities amounts to 403 ha, with a total area of 164 ha being avoided within the respective project development areas combined.
- The total extent of the entire project sites measures 21,464 ha
- The extent of the two farm portions (PV 1 and PV 2 are located on 2/386, and PV 3 is located on 19/387) with 'High' ecological important habitat directly affected by the project area measures 8,668 ha. However, approximately only 5% of the two farm portions will be developed.

The contribution of the Red Sands PV3 to cumulative impacts is expected to be medium. Although the cumulative impacts of developments within the region are high from an ecological perspective, taking into consideration the extent of 'avoidance' achieved for the project, the cumulative impact may be considered acceptable provided that further developments proposed for the remaining extent of the 'High' and 'Very High' areas within the project site be subjected to compensation strategies.

Impact Nature: *Cumulative habitat loss within the region* The development of the proposed Red Sands PV3 Facility will contribute to cumulative habitat loss within Other Natural Areas (Red Sands PVs) and Ecological Support Areas (other developments) within the landscape.		
	Overall impact of the proposed development considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (2)	Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	High (8)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	**Medium**	**High**
Status	Negative	Negative
Reversibility	High	Moderate
Irreplaceable loss of resources	No	Yes, in certain cases
Can impacts be mitigated	To some degree, but the majority of the impact results from the presence of the various energy facilities cannot be well mitigated.	
Mitigation: Ensure that a rehabilitation plan and IAP management plan be compiled for each development and are effectively implemented.		

8.4 Cumulative Impacts on Avifauna

Potential cumulative impacts on avifauna include:

- The loss of unprotected vegetation types on a cumulative basis from the surrounding environment may impact avifauna, as habitat loss is a major contributor to declines in avifauna (BirdLife International, 2018). The aggregation of numerous solar facilities in a region has the potential to compound environmental impacts.
- Transformation of intact habitat would contribute to the fragmentation of the landscape and would potentially disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations. This is particularly a concern with regards to species and ecosystems with limited geographical distributions (Rudman et al., 2017).

Cumulative impacts associated with the development area may be of concern due to increasing number of solar facility developments proposed for the broader area. Considering that the vegetation and avifauna that occur on the broader study area, portions of the habitat and home range of both the Cape Vulture and the Verreaux's Eagle will be lost (a total of 403ha for Reds Sands PV3, PV3 and PV3). The nests and territories of the NC protected Pygmy Falcon, Northern Black Korhaan and Red-crested Korhaan will be disturbed or lost. However, considering the that these species could move into surrounding areas, and the degree of avoidance applied to proposed developments, the high cumulative impact is not considered unacceptable provided that future developments in 'High' and 'Very High' areas of importance be subject to compensation strategies.

Nature: *Loss of habitat and increase in bird collisions*		
	Overall impact of the proposed development considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local - Regional (3)	Regional (5)
Duration	Long term (4)	Permanent (5)
Magnitude	High (8)	Very high (10)
Probability	Highly probable (4)	Definite (5)
Significance	**Medium**	**High**
Status (positive or negative)	Negative	Negative
Reversibility	Low	None
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	No	
Mitigation: The overall combined habitat loss is extensive and cannot be replaced. Even though collisions can be mitigated to some extent for individual solar plants their combined densities will increase the rate of collisions.		
Residual Impacts: Loss of habitat for SCC. Loss of SCCs due to collisions. However, species could move into surrounding areas, and a degree of avoidance has been applied to proposed developments, the high cumulative impact is not considered unacceptable		

8.5 Cumulative Impacts on Heritage (including archaeology and palaeontology)

The proposed renewable energy facilities are located within a belt of approved renewable energy facilities located along the Orange River from Kakamas, through Upington until Groblershoop. In terms of impacts to heritage resources, it is preferred that this kind of infrastructure development is concentrated in one location and is not sprawled across an otherwise culturally significant landscape. The proposed development is therefore unlikely to result in unacceptable risk or loss, nor will the proposed development result in a complete change to the sense of place of the area or result in an unacceptable increase in impact due to its location as one of many renewable energy facilities in this area.

Nature: *Cumulative Impact to the sense of place* There is the potential for the cumulative impact of proposed solar energy facilities to negatively impact the cultural landscape due to a change in the landscape character from natural wilderness to semi-industrial, however, due to the remoteness of the area the impact on the experience of the cultural landscape is not foreseen to be significant.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Local (1)
Duration	Medium-term (3)	Long term (4)
Magnitude	Low (4)	Moderate (5)
Probability	Improbable (2)	Probable (3)
Significance	**Low (16)**	**Low (30)**
Status (positive or negative)	Neutral	Neutral
Reversibility	High	Low
Irreplaceable loss of resources?	Unlikely	Unlikely
Can impacts be mitigated?	No, no significant impacts are anticipated, therefore no mitigation is required.	
Mitigation: No mitigation is required.		

It must be noted that even if no mitigation is recommended by the specialist, the requirements of the National Heritage Resources Act (Act No. 25 of 1999) would still be relevant to each of the projects proposed to be developed within the area. Should any sites of significance be discovered to be associated with any of the proposed projects, these finds would need to be dealt with accordingly.

8.6 Cumulative Visual Impacts

The location of the Red Sands PV3 (as part of the Red Sands PV cluster) within the Upington REDZ will contribute to the consolidation of infrastructure to this locality and avoid a potentially scattered proliferation of solar energy generation structures throughout the region.

In terms of general landscape change the cumulative impact associated with other renewable energy and infrastructure projects was assessed as having a medium significance. The proposed project was also assessed as likely to have an impact of medium significance. Cumulative visual impacts on local roads and homesteads were also assessed as having a medium negative significance. Cumulative visual impacts on Protected Areas were assessed as having a low negative significance. Cumulative glare and lighting impacts were also assessed as having a low significance.

Nature: *General cumulative change the in the character and sense of place of the landscape setting (Landscape Change).*

In terms of the cumulative landscape change impacts, two major developments currently affect the natural character of the valley in which the development is proposed, these include:

- The Transnet's Iron Ore Rail Line that runs through to Saldanha. From a distance and when there are no trains, the rail line is not highly obvious. However, trains are regular and are long; and
- HV power lines that run through the length of the valley
- Operational Bokpoort CSP.

In addition, there are two additional solar energy projects that are proposed in close proximity (Red Sands 2 and 3).

The landscape is therefore already affected by large scale infrastructure, its character is however still dominated by natural aspects. This is possibly due to the natural ridgelines that provide enclosure and are the dominant visual

elements.

The proposed solar developments are likely to further transform the landscape. The relatively low height of the project and because of this the relative ease with which the main impacts can be mitigated is likely to mean that from outside the immediate vicinity of the projects, it is likely that the viewer will discern and significant change.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site and immediate surroundings, **(2)**	Site and immediate surroundings, **(2)**
Duration	Long term, **(4)**	Long term **(4)**
Magnitude	Low **(4)**	Moderate **(6)**
Probability	Probable, **(3)**	Definite **(5)**
Significance	**Medium, (30)**	**Medium (60)**
Status (positive or negative)	**Negative**	**Negative**
Reversibility	Medium	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	**Yes,** Possible mitigation will not change the level of significance	Unknown

Mitigation:

Planning:

» Plan levels to minimise earthworks to ensure that levels are not elevated;
» Plan to maintain the height of structures as low as possible;
» Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development;

Operations:

» Reinstate any areas of vegetation that have been disturbed during construction;
» Remove all temporary works;
» Monitor rehabilitated areas post-construction and implement remedial actions;
» Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.

Decommissioning:

» Remove infrastructure not required for the post-decommissioning use of the site;
» Rehabilitate and monitor areas post-decommissioning and implement remedial actions.

Nature: *The cumulative impact on views from local roads.*

Currently, views of major infrastructure including Transnet's Iron Ore Rail Link and HV overhead power lines are obvious from roads in the vicinity. There are no other solar projects that are visible from public roads.

Neither the Red Sands PV3 nor the other two proposed Red Sands 2 and 3 solar projects will change this situation as they are all likely to be largely screened from public roads by landform and vegetation.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site and immediate surroundings **(2)**	Region, **(3)**
Duration	Long term **(4)**	Long term, **(4)**
Magnitude	Small to minor **(1)**	Low to moderate, **(5)**
Probability	Very improbable **(1)**	Definite, **(5)**
Significance	Low **(7)**	Medium, **(60)**
Status (positive or negative)	Neutral	Negative
Reversibility	High	Low

Irreplaceable loss of resources?	No irreplaceable loss.	No irreplaceable loss.
Can impacts be mitigated?	**Yes** Possible mitigation will not change the level of significance.	Unknown

Mitigation:

Planning:

» Plan levels to minimise earthworks to ensure that levels are not elevated;
» Plan to maintain the height of structures as low as possible;
» Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development;

Operations:

» Reinstate any areas of vegetation that have been disturbed during construction;
» Remove all temporary works;
» Monitor rehabilitated areas post-construction and implement remedial actions;
» Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.
» Control the height of stored materials and the use of large equipment particularly within Laydown Area 3.

Decommissioning:

» Remove infrastructure not required for the post-decommissioning use of the site;
» Rehabilitate and monitor areas post-decommissioning and implement remedial actions

Nature: *Cumulative impact on local homesteads*

Generally, there are few homesteads in the area. From the site visit, it appears that views from the majority of homesteads are unaffected by solar projects. It is likely however that some are affected by views of major infrastructure.

The proposed project as well as the two additional Red Sands solar projects could impact on views from two homesteads. From one of these the project could be highly visible, but views may be largely mitigated. From the other, the proposed projects are unlikely to be obvious.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site and immediate surroundings **(2)**	Region **(3)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	**Homestead within 1.1km** Minor with mitigation **(2)** **Homestead within 8.5km** Small, **(0)**	Low to moderate **(5)**
Probability	**Homestead within 1.1km** Improbable with mitigation **(2)** **Homestead within 8.5km** Very improbable, **(1)**	Definite **(5)**
Significance	**Homestead within 1.1km** Low with mitigation **(12)** **Homestead within 8.5km** Low, **(6)**	Medium **(60)**
Status (positive or negative)	Neutral to Negative	Negative
Reversibility	High	Low
Irreplaceable loss of resources?	No irreplaceable loss	No irreplaceable loss

Can impacts be mitigated?	Yes	Unknown
Mitigation: Planning: » Plan levels to minimise earthworks to ensure that levels are not elevated; » Plan to maintain the height of structures as low as possible; » Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development; Operations: » Reinstate any areas of vegetation that have been disturbed during construction; » Remove all temporary works; » Monitor rehabilitated areas post-construction and implement remedial actions; » Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area. » Control the height of stored materials and the use of large equipment particularly within Laydown Area 3. Decommissioning: » Remove infrastructure not required for the post-decommissioning use of the site; Rehabilitate and monitor areas post-decommissioning and implement remedial actions.		

Nature: *Cumulative glare impacts*

The impact of glare arising from the proposed project is highly unlikely.

It is possible that glare associated with other proposed projects could impact on the roads. Given that mitigation of possible impacts should be relatively simple to achieve, it is assumed that levels of impact from other projects will also be minor.

The overall cumulative impact is assessed as having a low significance. The contribution of the proposed project to this cumulative impact is assessed as low.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site and immediate surroundings, **(2)**	Region **(3)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Small, **(0)**	Small **(0)**
Probability	Very Improbable, **(1)**	Improbable **(2)**
Significance	Low **(6)**	Low **(14)**
Status (positive or negative)	neutral	negative
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss	No irreplaceable loss
Can impacts be mitigated?	Yes	Unknown

Mitigation:

Should glare prove problematic screening might be utilised or should a tracking system, the trackers can be programmed to prevent reflection towards affected sections of roads.

8.7 Cumulative Social Impacts

The potential for social cumulative impacts is likely and includes both positive and negative impacts. The significance of the negative cumulative impacts of Red Sands PV3 and other projects in the area is low, and the significance of the positive cumulative impacts of the proposed development and other projects in the area is medium. This is based on the location of the Red Sands PV3 within the Upington REDZ.

Considering the concentration of solar energy developments within the surrounding area of Red Sands PV3 the potential for cumulative impacts to occur is likely. Potential cumulative impacts identified for the project include positive impacts on the economy, business development, and employment, as well as negative impacts such as an influx of jobseekers and change in the area's sense of place.

Cumulative benefits associated with the development of multiple renewable energy facilities within the area will be experienced including employment opportunities, skills development, community upliftment, business opportunities and the generation of clean energy.

Nature: *An increase in employment opportunities, skills development and business opportunities with the establishment of more than one solar power facility.*

Red Sands PV3 and the establishment of other solar power projects within the area has the potential to result in significant positive cumulative impacts, specifically with regards to the creation of a number of socio-economic opportunities for the region, which in turn, can result in positive social benefits. The positive cumulative impacts include creation of employment, skills development and training opportunities, and downstream/spin-off business opportunities. The cumulative benefits to the local, regional, and national economy through employment and procurement of services are more considerable than that of Red Sands PV3 alone.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Regional- (4)	Regional (4)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Highly Probable (4)
Significance	**Medium (36)**	**Medium (56)**
Status (positive or negative)	Positive	Positive
Reversibility	N/A	N/A
Irreplaceable loss of resources?	N/A	N/A
Can impacts be mitigated?	Yes (enhanced)	

Mitigation/Enhancement:

- The establishment of a number of solar power projects in the area has the potential to have a positive cumulative impact on the area in the form of employment opportunities, skills development and business opportunities, where these opportunities are localised. The positive benefits will be enhanced if local employment policies are adopted and local services providers are utilised by the developers to maximise the project opportunities available to the local community.

Residual Impacts:

- Improved pool of skills and experience in the local area.
- Improved standard of living through the creation of employment opportunities.
- Economic growth for small-scale entrepreneurs.

Nature: *Negative impacts and change to the local economy with an in-migration of labourers, businesses and jobseekers to the area*

While the development of a single solar power project may not result in a major influx of people into the area, the development of several projects at the same time may have a cumulative impact on the in-migration and movement of people. In addition, the fact that the project is proposed within REDZ 7, which has specifically been earmarked for the development of large scale solar PV energy facilities, implies that the surrounding area is likely to be subject to considerable future applications and expansion of solar energy facilities. Levels of unemployment, and the low level of earning potential may attract individuals to the area in search of better employment opportunities and standards of living.

It is very difficult to control an influx of people into an area, especially in a country where unemployment rates are high. It is therefore important that the project proponent implement and maintain strict adherence with a local employment policy in order to reduce the potential of such an impact occurring.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (2)	Local-Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Low (4)
Probability	Very Improbable (1)	Improbable (2)
Significance	**Low (8)**	**Low (22)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

» Develop a recruitment policy / process (to be implemented by contractors), which will source labour locally.
» Work together with government agencies to ensure that service provision is in line with the development needs of the local area.
» Form joint ventures with community organisations, through Trusts, which can provide local communities with benefits, such as employment opportunities and services.
» Develop and implement a recruitment protocol in consultation with the municipality and local community leaders. Ensure that the procedures for applications for employment are clearly communicated.

Residual Impacts:

» Possibility of outside workers remaining in the area after the construction is completed and the subsequent potential pressures on local infrastructure, services and poverty problems.

8.8 Contribution of the Project to Climate Change Mitigation

South Africa is a country with an economy dependent on coal for the majority of its electricity, an energy-intensive industrial sector and an energy sector responsible for 82% of total GHG emissions, making it the 12th highest world emitter of GHG[18]. The Energy sector is the largest contributor (80.1% in 2017) to emissions and is responsible for 96.6% of the increase over the 17-year period from 2000 to 2017[19].

It has been reported internationally that the move towards renewable energy for electricity generation needs has resulted in decreased greenhouse gas emissions. The International Energy Agency announced in March 2015 that 2014 carbon dioxide emissions from the energy sector levelled off for the first time in 40 years. This has happened without being linked to an economic downturn. This was attributed to the increase in the use of renewable energy sources by China and OECD countries[20]. As GHG emissions associated with the provision of energy services are a major cause of climate change, this move to

[18] Greenhouse Gas Inventory for South Africa: 2000-2010
[19] Greenhouse Gas Inventory for South Africa: 2010-2017
[20] http://ecowatch.com/2015/03/23/renewables-mitigate-climate-change/

renewable energy and subsequent reduction in CO_2 emissions is considered as a positive contribution towards climate change mitigation.

The South African Government recognises the need to diversify the mix of energy generation technologies within the country and to reduce the country's reliance on fossil fuels which contribute towards climate change and are therefore not environmentally friendly. This is in accordance with the prescriptions of the United Nations Convention on Climate Change 1994 (UNFCCC) and its associated Kyoto protocol of 1997.

Consequently, the South African Government has recognised the need to move towards cleaner energy as part of the energy mix and has therefore set targets for cleaner energy technologies (including of 6000MW solar PV contribution to new power generation capacity) by 2030 (IRP, 2019). Renewable energy plays a key role in mitigating global greenhouse gas emissions by radically lowering the emissions profile of the global energy system (International Renewable Energy Agency (IRENA), 2015). The proposed PV facility will assist in reducing the country's CO_2 emissions associated with energy supply relative to fossil fuels (e.g. coal). Development of numerous such facilities will have a cumulative positive impact on CO_2 emissions as this will reduce reliance on power generation from fossil fuels. This will aid the country in meeting the commitments made under the COP 21 Agreement, to which the Government is a signatory.

This is considered to be a significant positive impact for the environment and society at an international level.

8.9 Conclusion regarding Cumulative Impacts

Cumulative impacts and benefits on various environmental and social receptors will occur to varying degrees with the development of several renewable energy facilities in South Africa. The most significant of these will be the contribution towards a reduction in greenhouse gas emissions and consequent assistance with climate change mitigation.

The alignment of renewable energy developments with the IRP and the global drive to move away from the use of non-renewable energy resources and to reduce greenhouse gas emissions is undoubtedly positive. The social and economic benefits of renewable energy developments at a local, regional and national level have the potential to be significant. However, there is a lack of understanding of the cumulative impacts on other environmental and social receptors such as birds, visual amenity and landscape character of the affected areas largely due to limited information of impacts from existing facilities within the country. This assessment is therefore qualitative.

The assessment of the cumulative impacts was undertaken through the consideration of the Red Sands PV3 impacts in isolation and compared to the cumulative impacts of Red Sands PV3 and other solar facilities (CSP & PV facilities) including the proposed Red Sands Solar Park within a 30km radius from the development area. Cumulative impacts are expected to occur with the development of Red Sands PV3 throughout all phases of the project life cycle and within all areas of study considered as part of this BA Report. The main aim for the assessment of cumulative impacts considering Red Sands PV3 is to determine whether the cumulative impact will be acceptable within the landscape proposed for the development, and whether the cumulative loss, from an environmental and social perspective, will be acceptable without whole-scale change.

The significance of the cumulative impacts associated with the development of Red Sands PV3 are predominately low to medium, depending on the impacts being considered, with the exception of biodiversity and avifauna impacts. A summary of the cumulative impacts is included in **Table 8.3**.

Table 8.3: Summary of the cumulative impact significance for Red Sands PV3 within the development area

Specialist assessment	Overall significance of impact of the proposed project considered in isolation	Cumulative significance of impact of the project and other projects in the area
Ecology	Medium	High
Avifauna	Medium	High
Heritage (archaeology and palaeontology)	Low	Low
Visual	Low	Medium
Social	Medium (positive impacts) Low (negative impacts)	Medium (positive impacts) Low (negative impacts)

Considering the findings of the cumulative specialist assessments undertaken for the project the following can be concluded considering the Red Sands PV3 Facility:

- There will be no unacceptable loss of biodiversity (vegetation, species types, and ecological processes) due to the degree of avoidance of the development area in relation to remaining high and very high areas of ecological importance within the broader project site and the region.
- The moderate risk to avifauna through loss of habitat, infringement on breeding areas, or risk to collision-prone species is expected. In terms of potential losses to landscape connectivity, the development area has considered a degree of avoidance and avifauna can move to remaining areas, provided those future developments applied compensatory strategies, the overall cumulative impact of the development is considered acceptable.
- The construction of the project will not result in the complete or whole-scale change in sense of place and character of the area nor will the project result in unacceptable visual intrusion. A number of solar projects have been constructed in the area, creating an existing impact and alteration to the current sense of place.
- The construction of the project will not result in unacceptable loss of or impact to heritage resources.
- The project will not significantly increase the negative impact on the social environment. However, an increase in positive impacts, specifically as a result of job creation and socio-economic benefits, can be expected.
- The project will contribute towards a reduction in greenhouse gas emissions from energy generation and will aid the country in meeting the commitments made under the COP 21 Agreement, to which the Government has committed to become a signatory.

Based on a detailed evaluation, the cumulative impacts associated with the construction and operation of the proposed Red Sands PV3 and other proposed renewable energy facilities in the region are considered to be acceptable. The location of this project within the Upington REDZ is considered a desirable location for further consideration provided that environmental impacts are mitigated to suitable standards as recommended within this BA Report.

CHAPTER 9: CONCLUSIONS AND RECOMMENDATIONS

AGV Projects (Pty) Ltd proposes the development of Red Sands PV3, a 75MW$_{AC}$ photovoltaic (PV) solar energy facility, and associated infrastructure on a site located ~22km north-east of the town of Groblershoop in the Northern Cape Province. The project site, Portion 19 of the Farm Rooi Sand 387, is located within the Kheis Local Municipality and the greater ZF Mgcawu District Municipality.

Red Sands PV3 will have a contracted capacity of up to 75MW$_{AC}$ and will include specific infrastructure, namely:

- Solar PV array comprising PV modules and mounting structures.
- Inverters and transformers.
- Low voltage cabling between the PV modules to the inverters
- A fence around the project development area
- Camera surveillance
- Internet connection
- 33kV cabling between the project components and the facility substation
- 33/132kV onsite facility substation[21].
- Battery Energy Storage System (BESS).
- Site offices and maintenance buildings, including workshop areas for maintenance and storage.
- Laydown areas.
- Access roads (up to 6m) and internal distribution roads (up to 4m).

A development area of 184ha has been identified within the project site by the proponent for the development of the Red Sands PV3 facility and associated infrastructure. The identification of this development area considered technical and environmental constraints in the larger property in line with a typical mitigation hierarchy. The development area has been fully considered within this BA process and assessed in terms of its suitability from an environmental and social perspective.

AGV Projects (Pty) Ltd has confirmed that the development area is suitable for the development of a solar energy facility from a technical perspective due to the available solar resource, access to the electricity grid, current land use, land availability, site-specific characteristics such as topography and accessibility, the location within the Upington REDZ, as well as the proximity of the area to authorised and constructed solar energy facilities (as discussed in Chapter 8). The development area is regarded as being of a sufficient extent to provide opportunity for the avoidance of major environmental sensitivities.

A summary of the recommendations and conclusions for the proposed development as determined through the BA process is provided in this Chapter.

[21] A 132kV power line will be assessed through a separate Basic Assessment Process

9.1. Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This chapter of the BA Report includes the following information required in terms of Appendix 1: Content of the BA Report:

Requirement	Relevant Section
3(k) where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report	A summary of the findings of the specialist studies undertaken for Red Sands PV3 has been included in **section 9.2**.
3(l) an environmental impact statement which contains (i) a summary of the key findings of the environmental impact assessment, (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives.	An environmental impact statement containing the key findings of the environmental impacts of Red Sands PV3 has been included as section 10.6. Sensitive environmental features located within the Red SandsPV3 study area and development area, overlain with the proposed development footprint have been identified and are shown in **Figure 9.1.** A summary of the positive and negative impacts associated with Red Sands PV3 has been included in section 9.4.
h (xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity.	A concluding statement indicating the preferred alternatives and the preferred location of the activity is included in **section 9.5**.
3(n) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation.	All conditions required to be included in the Environmental Authorisation of Red Sands PV3 have been included in **section 9.6**.
3(p) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation.	A reasoned opinion as to whether Red Sands PV3 should be authorised has been included in **section 9.6**.

9.2. Evaluation of Red Sands PV3

The preceding chapters of this BA Report together with the specialist studies contained within **Appendices D-I** provide a detailed assessment of the potential impacts that may result from the development of Red Sands PV3. This chapter concludes the environmental assessment of the solar PV facility by providing a summary of the results and conclusions of the assessment of the development footprint proposed for Red Sands PV3. In doing so, it draws on the information gathered as part of the BA process, the knowledge gained by the environmental specialists and the Environmental Assessment Practitioner (EAP) and presents a combined and informed opinion of the environmental impacts associated with the development.

The Ecological Importance of the development area is regarded as High, specifically from an avian biodiversity and habitat perspective. However, the location of the development area has achieved an acceptable extent of avoidance within the project site, which will not result in unacceptable residual impacts. No environmental fatal flaws were identified in the detailed specialist studies conducted, and no impacts of unacceptable significance are expected to occur with the implementation of the

recommended mitigation measures. These measures include, amongst others, the avoidance of sensitive features and the undertaking of monitoring, as specified by the specialists.

From the specialist studies undertaken it was determined that soils and agricultural aspects did not require any further assessment (refer to **Appendix F**). The Red Sands PV3 development area is not associated with any arable soils, due to the type of soil as well as the climate, which limits crop production significantly. The land capabilities associated with the development area are only suitable for grazing, which corresponds with the current land use. It is the specialist's opinion that the proposed developments will have no impacts on the agricultural production ability of the land. Therefore, the proposed development may be favourably considered for a soils and agricultural perspective.

The potential environmental impacts associated with Red Sands PV3 identified and assessed through the BA process include:

» Impacts on ecology, flora and fauna.
» Impacts on avifauna.
» Impacts on heritage resources, including archaeology and palaeontology.
» Visual impacts on the landscape as a result of the facility.
» Positive and negative social impacts.

9.2.1 Impacts on Ecology

The development area is located within an area classified as "Other natural areas" and has not been classified as a Critical Biodiversity Area (CBA) or an Ecological Support Area (ESA). The habitat present within the development area is not diverse and considered to be homogenous. However, based on the ecological condition and the diversity of mesocarnivores, the area possesses biodiversity value. Sensitivity in terms of terrestrial flora and fauna is considered to be low to moderate. The site ecological importance (SEI) was determined to be 'High' based on the potential for occurrence of a globally VU species, the extent of the area considered and its connectivity to natural areas within the landscape (**Appendix D**). However, the project development is considered as acceptable given the extent of avoidance achieved in relation to the remaining High and Very High areas within the project site, and the medium residual impacts remaining after mitigation.

9.2.2 Impacts on Avifauna

A total of eighty-five (85) bird species have been recorded within the broader project site and surrounds (**Appendix E**). Two of the species recorded were species of conservation concern, on a national or international scale namely the Cape Vulture and Verreaux's Eagle. A number of species recorded are protected under the NC Conservation Act of 2009 (schedule 2), however three species are being highlighted here, the Pygmy Falcon (due to the nest found) as well as the Northern Black Korhaan and the Red Crested Korhaan (due to their small territories). A Pygmy Falcon nest were found at the water trough, just to the east of the project footprint.

The main expected impact of the proposed Red Sands PV3 will be the loss of habitat, loss of nesting sites and emigration of avifauna. Based on the outcomes of the site ecological importance (SEI) determination, the project possesses a 'High' SEI. However, the location of the development area has achieved an acceptable extent of avoidance within the project site, which will not result in unacceptable residual

impacts. The development is therefore considered to be acceptable. It is recommended that should any future developments be proposed for the remaining extent of the 'High' and 'Very High' areas within the project site, that compensation strategies be required for these authorisations.

9.2.5 Impacts on Heritage (including archaeology and palaeontology)

No significant heritage resources were identified within the development area for Red Sands PV3 (**Appendix G**). All of the archaeological resources (Middle and Late Stone Age) identified within the areas proposed for the development of the Red Sands PV3 have been determined to be not conservation worthy. As such, these resources have been sufficiently recorded and there is no objection to the development of the proposed PV facility in these locations from an archaeological perspective.

One archaeological site of significance was identified, Red Sands-045 and Red Sands-046 (both sites form part of one continuous scatter of artefacts), outside the development area. Although no impact is anticipated, it is recommended that this site is demarcated on relevant development maps and that a no-go buffer of 100m is implemented around this site.

Based on the nature of the heritage resources identified and the lack of any fossils recorded or expected in the area, the significance of the impacts on heritage and palaeontological resources will be low, with the implementation of the recommended mitigation measures. As such, the development of Red Sands PV3 is not associated with any fatal flaws from a heritage, archaeological and palaeontological perspective, and it is for this reason that the project is considered to be acceptable.

9.2.6 Visual Impacts

The proposed Red Sands PV3 will generally result in a relatively limited level of visual impact within an area that is already impacted by major electrical and railway infrastructure as well as other solar facilities. In general terms visual impacts will be largely limited by the relatively low height of the majority of the project and by landform.

Potential visual impacts identified within the Visual Impact Assessment (**Appendix H**) include construction activities in close proximity to the PV plant, visual impacts to observers travelling along the roads and residents at homesteads within close proximity of the proposed PV facility, impact of lighting at night on sensitive visual receptors in close proximity to the proposed facility, and impact of solar glint and glare as a visual distraction and possible air travel hazard, impact of the ancillary infrastructure during the operation phase on observers in close proximity to the structures and potential impact on the sense of place of the region.

The duration of the impacts is expected to be long-term for majority of the visual impacts and with a magnitude ranging from moderate to low. The significance of the impacts will be medium and low with the implementation of mitigation, depending on the impact being considered. No impacts of a high significance are expected to occur. The development of Red Sands PV3 is therefore considered to be acceptable from a visual perspective.

9.2.7 Social Impacts

The Social Impact Assessment (**Appendix I**) identified that most social impacts associated with the development of Red Sands PV3 will have a short-term duration associated with the construction phase and long-term duration during the operation phase of the project. The magnitude of the impacts ranges from high to small depending on the impact being considered and the status thereof. Impacts on the social environment are expected during both the construction and operation phases. The construction phase of a PV solar development is associated with the majority of social impacts. Many of the social impacts are unavoidable and will take place to some extent but can be managed through the careful planning and implementation of appropriate mitigation measures.

During the construction phase, negative impacts include: nuisance impacts (including noise and dust); an influx of construction workers and job seekers to the area and a change in population; safety and security impacts; impacts on daily living and movement patterns; and visual and a sense of place impacts. The significance of the negative construction phase impacts will be low with the implementation of the recommended mitigation measures. The positive social impacts associated with the construction phase of Red Sands PV3 include, an economic multiplier effect, and direct and indirect employment and skills development opportunities. The significance of the positive impacts will be medium with the implementation of the recommended enhancement measures.

Impacts associated with the operation of Red Sands PV3 will be both positive and negative. The negative impacts are related to the change in the sense of place. The significance of the negative impacts will be low with the implementation of the recommended mitigation measures. The positive impacts associated with the operation of the facility relate to the development of non-polluting renewable energy infrastructure, a contribution to Local Economic Development (LED) and social upliftment, and the creation of employment and skill development opportunities for the local economy and the country. The local infrastructure (roads and grid) will be reinforced which can be seen as a positive impact. The significance of the positive impacts will be low and medium with the implementation of the recommended enhancement measures.

Red Sands PV3 is unlikely to result in permanent damaging social impacts and will result in a number of positive impacts. From a social perspective it is concluded that the project is acceptable subject to the implementation of the recommended mitigation and enhancement measures and management actions identified for the project. Considering the findings of the report and potential for mitigation it is the reasoned opinion of the specialist that Red Sands PV3 can be authorised from a social perspective.

9.2.9 Assessment of Cumulative Impacts

Cumulative impacts and benefits on various environmental and social receptors will occur to varying degrees with the development of several renewable energy facilities in South Africa. The most significant of these will be the contribution towards a reduction in greenhouse gas emissions and consequent assistance with climate change mitigation.

The alignment of renewable energy developments with the IRP and the global drive to move away from the use of non-renewable energy resources and to reduce greenhouse gas emissions is undoubtedly positive. The social and economic benefits of renewable energy developments at a local, regional and national level have the potential to be significant. However, there is a lack of understanding of the cumulative impacts on other environmental and social receptors such as birds, visual amenity and

landscape character of the affected areas largely due to limited information of impacts from existing facilities within the country. This assessment is therefore qualitative.

The significance of the cumulative impacts associated with the development of Red Sands PV3 are predominately low to medium, depending on the impacts being considered, except for biodiversity and avifauna impacts which are high cumulative impacts, although were found to be acceptable due to appropriate placement of infrastructure outside remaining high and very sensitive areas within the project site. A summary of the cumulative impacts is included in **Table 8.3**.

Table 8.3: Summary of the cumulative impact significance for Red Sands PV3 within the development area

Specialist assessment	Overall significance of impact of the proposed project considered in isolation	Cumulative significance of impact of the project and other projects in the area
Ecology	Medium	High
Avifauna	Medium	High
Heritage (archaeology and palaeontology)	Low	Low
Visual	Low	Medium
Social	Medium (positive impacts) Low (negative impacts)	Medium (positive impacts) Low (negative impacts)

Considering the findings of the cumulative specialist assessments undertaken for the project the following can be concluded considering the Red Sands PV3 Facility:

- There will be no unacceptable loss of biodiversity (vegetation, species types, and ecological processes) due to the degree of avoidance of the development area in relation to remaining high and very high areas of ecological importance within the broader project site and the region.
- The moderate risk to avifauna through loss of habitat, infringement on breeding areas, or risk to collision-prone species is expected. In terms of potential losses to landscape connectivity, the development area has considered a degree of avoidance and avifauna can move to remaining areas, provided those future developments applied compensatory strategies, the overall cumulative impact of the development is considered acceptable.
- The construction of the project will not result in the complete or whole-scale change in sense of place and character of the area nor will the project result in unacceptable visual intrusion. A number of solar projects have been constructed in the area, creating an existing impact and alteration to the current sense of place.
- The construction of the project will not result in unacceptable loss of or impact to heritage resources.
- The project will not significantly increase the negative impact on the social environment. However, an increase in positive impacts, specifically as a result of job creation and socio-economic benefits, can be expected.
- The project will contribute towards a reduction in greenhouse gas emissions from energy generation and will aid the country in meeting the commitments made under the COP 21 Agreement, to which the Government has committed to become a signatory.

Based on a detailed evaluation, the cumulative impacts associated with the construction and operation of the proposed Red Sands PV3 and other proposed renewable energy facilities in the region are

considered to be acceptable. The location of this project within the Upington REDZ is considered to be a desirable location for further consideration provided that environmental impacts are mitigated to suitable standards as recommended within this BA Report.

9.3. Environmental Sensitivity

As part of the specialist investigations undertaken within the development area of Red Sands PV3, specific environmental features were identified which will be impacted by the placement of the development footprint (i.e. project infrastructure) associated with the facility. The current condition of the features identified (i.e. intact or disturbed) informed the sensitivity of the environmental features and the capacity for disturbance and change associated with the proposed development.

The environmental features identified within and directly adjacent to the development area and development footprint are illustrated in **Figure 9.1**. The features identified specifically relate to ecological and avifauna habitats. The following points provide a description of the features present within the development area, as well as the surrounding area:

- The development area is recognised as an Other Natural Area (ONA) as per the Northern Cape CBAs. Ecological Support Areas within the project site have been avoided.
- Two National Forest Act (Act No. 84 of 1998) of 1998 (NFA) protected tree species occur at the site; i.e. *Vachellia haematoxylon* and *Boscia albitrunca.*
- The habitat condition within the development area can be regarded as degraded due to the dense stands of *Rhigozum trichotomum* and *Senegalia mellifera* subsp. *detinens* in certain areas. Terrestrial flora and fauna sensitivity is low to moderate. The Site Ecological Importance (SEI), based on the Species Protocols (2020), was determined to 'High' based on the high likelihood of occurrence for a globally VU species, the extent of the area considered and its connectivity to natural areas within the landscape.
- Although largely outside of the development area the following avifauna features have been identified:
  - Breeding pair of Verreaux's Eagle (VU) recorded in the project site and have a nest nearby. A 3 km Buffer was placed around the nest;
  - Thirteen Cape Vultures (EN) were found in the project site, an additional 30 vultures were recorded nearby;
  - Two korhaan species (Red-Crested and Northern Black, NC Conservation Act of 2009 (schedule 2)) having territories in the project site and to some extent within the development area; and
  - A Pygmy Falcon Nest was found on the edge of the project site (NC Conservation Act of 2009 (schedule 2)), a 500m buffer was placed around the nest.
-

Considering the features identified within the project site and development area, the specialists have provided an indication of the acceptability of the proposed development. Given the degree of avoidance of the development area of High and Very High areas of ecological importance within the project site as well as avoidance of the avifauna buffers referred to above, the development may be considered acceptable as the residual impacts are expected to be of medium significance.

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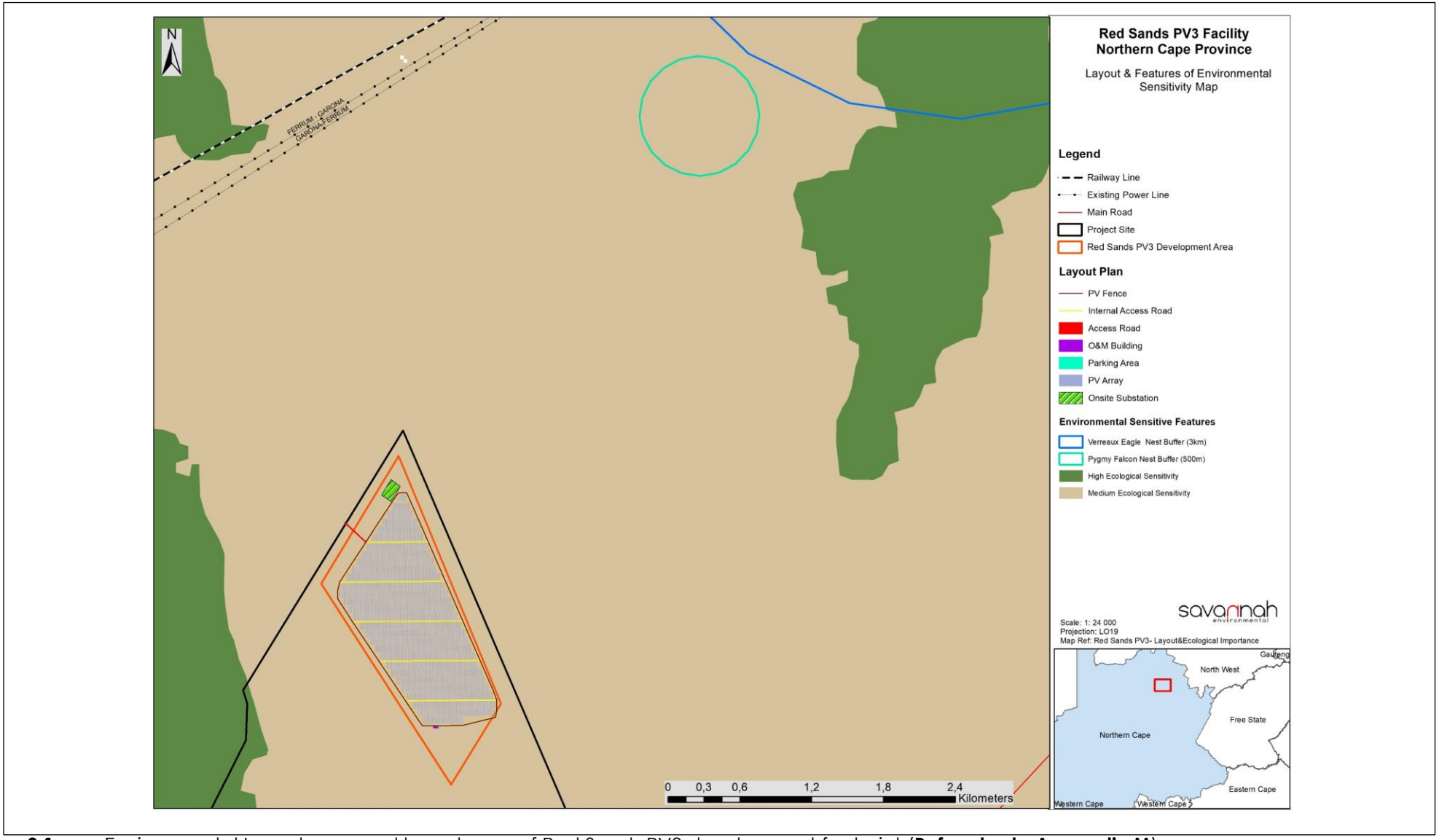

Figure 9.1: Environmental Importance and layout map of Red Sands PV3 development footprint (**Refer also to Appendix M**).

9.4. Environmental Costs of the solar PV Facility versus Benefits of the solar PV Facility

Environmental costs (including those to the natural environment, economic and social environment) can be anticipated at a local and site-specific level and are considered acceptable provided the mitigation measures, as outlined in the BA Report and the EMPr, are implemented and adhered to. No fatal flaws have been identified. These environmental costs could include:

- *A loss of biodiversity, flora and fauna due to the clearing of land for the construction and utilisation of land for the solar PV facility* - The cost of loss of protected species is considered to be acceptable due to the limited number of individuals of these species and the degree of avoidance of the development area in relation to remaining high and very high areas of ecological importance within the broader project site and the region.
- *Loss of avifauna habitat* – Although outside the development footprint, several red-listed species do occur in the broader area primarily for foraging within their normally large home ranges. However, given the degree of avoidance of the development area in relation to the remaining high and very high areas of ecological importance within the project site and the avoidance of recommended avifaunal buffer zones, the project will not present a fatal flaw as the residual impact is expected to be Medium.
- *Visual impacts associated with the solar PV Facility* - The visibility of Red Sands PV3 will be significantly constrained to the north, east and west by a series of ridgelines. In general terms visual impacts will be largely limited by the relatively low height of the majority of the project and by landform.
- *Loss of land available for agricultural activities within the development footprint - The* environmental cost is anticipated to be very limited due the limited agricultural potential of the soils on the site.
- *The irreplaceable loss of heritage resources.* The archaeological resources identified within the areas proposed for the development of the Red Sands PV 1 development area have been determined to be not conservation worthy. No heritage or palaeontological resources will be impacted by the development.

Benefits of Red Sands PV3 and associated infrastructure include the following:

- The project will result in important economic benefits at the local and regional scale through job creation, income and other associated downstream economic development. These will persist during the pre-construction, construction, operation and decommissioning phases of the project.
- The project contributes towards the Provincial and Local goals for the development of renewable energy as outlined in the respective IDPs.
- The project serves to diversify the economy and electricity generation mix of South Africa through the addition of solar energy development.
- The project contributes to the development and growth of the Upington REDZ and the associated benefits in terms of the concentration of solar facilities within a node.
- The water requirement for a solar PV facility is negligible compared to the levels of water used by coal-based technologies and Concentrated Solar Power (CSP). This generation technology is therefore supported in dry climatic areas.
- South Africa's per capita greenhouse gas emissions are amongst the highest in the world due to the reliance on fossil fuels. Red Sands PV3 will contribute to achieving goals for implementation of renewable energy and sustaining a 'green' economy within South Africa.

The benefits of Red Sands PV3 are expected to occur at a national, regional and local level. As the costs to the environment at a site-specific level have been largely limited through the appropriate placement of infrastructure in the development area within areas considered to be acceptable for the proposed development, the benefits of the project are expected to outweigh the environmental costs of the solar PV facility.

9.5. Overall Conclusion (Impact Statement)

The construction and operation of a solar PV facility with a contracted capacity of up to 75MW$_{AC}$ on project site located near Groblershoop in the Tsantsabane Local Municipality, of the greater ZF Mgcawu District Municipality has been proposed by AGV Projects (Pty) Ltd. A technically viable development area and development footprint was proposed by the proponent following a pre-feasibility analysis which considered both technical and environmental factors and is assessed as part of the BA process. The assessment of the development footprint within the development area was undertaken by independent specialists and their findings have informed the results of this BA Report.

From a review of the relevant policy and planning framework, it was concluded that the project is well aligned with the policy framework, and a clear need for the project is seen from a policy perspective at a local, provincial and national level. The project development area is located outside of any protected area and outside of any Critical Biodiversity Areas (CBAs) as defined in the Provincial Conservation Plan. When considering biodiversity and socio-economic benefits and impacts on the affected and surrounding areas, the specialist findings have indicated that there are no identified environmental fatal flaws associated with the implementation of Red Sands PV3 and its associated infrastructure within the development area.

From a biodiversity perspective, the site is not located within a protected area. The site is located within an area defined as Other Natural Areas. The habitat present within the development area is not diverse and considered to be homogenous. However, based on the ecological condition and the diversity of mesocarnivores, the area possesses biodiversity value. Sensitivity in terms of terrestrial flora and fauna is considered to be low to moderate. The site ecological importance (SEI) was determined to be 'High' based on the potential for occurrence of a globally VU species, the extent of the area considered and its connectivity to natural areas within the landscape. However, the project development is considered as acceptable given the extent of avoidance achieved in relation to the remaining High and Very High areas within the project site as well as the avoidance of recommended avifaunal buffers, and the medium residual impacts remaining after mitigation.

No impacts on heritage, archaeological or palaeontological resources are expected as a result of the absence of sites of significance within the development area. The visibility of development of Red Sands PV3 will be significantly constrained to the north, east and west by a series of ridgelines. In general terms visual impacts will be largely limited by the relatively low height of the majority of the project and by landform.

The Socio-economic Impact Assessment has identified positive and negative short-term (construction related) impacts and positive and negative operational related socio-economic impacts. Red Sands PV3 is unlikely to result in permanent damaging social impacts and will result in a number of positive impacts. From a social

perspective it is concluded that the project is acceptable subject to the implementation of the recommended mitigation and enhancement measures and management actions identified for the project.

As detailed in the cost-benefit analysis, the benefits of Red Sands PV3 are expected to occur at a national, regional and local level. As the costs to the environment at a site-specific level have been largely limited through the appropriate placement of infrastructure on the project site within lower sensitive areas through the avoidance of features and areas considered to be sensitive, the benefits of the project are expected to outweigh the environmental costs of the solar PV facility.

The facility layout assessed through this BA process is considered as the most appropriate development footprint for Red Sands PV3 and considered to be acceptable within all fields of specialist studies undertaken for the project and no environmental fatal flaws have been identified. The acceptability of the development is based on the avoidance of environmental features considered to be of a very high sensitivity and not appropriate for development and disturbance within the project site. All impacts associated with the layout can be mitigated to acceptable levels or enhanced through the implementation of the recommended mitigation or enhancement measures.

Through the assessment of the development of Red Sands PV3 within the study area and development area, it can be concluded that the development of the solar PV facility is environmentally acceptable (subject to the implementation of the recommended mitigation measures).

9.6. Overall Recommendation

Considering the findings of the independent specialist studies, the impacts identified, the development footprint proposed by the proponent, the avoidance of the sensitive environmental features within project site as well as the potential to further minimise the impacts to acceptable levels through mitigation, it is the reasoned opinion of the Environmental Assessment Practitioner (EAP) that the development of Red Sands PV3 is acceptable within the landscape and can reasonably be authorised (**Figure 9.5**). The development of Red Sands PV3 within the Upington REDZ is also supported by the Strategic Environmental Assessment (SEA) undertaken by the CSIR on behalf of DFFE for the determination of the REDZ focus areas.

The following infrastructure would be included within an authorisation issued for the project:

- Solar PV array comprising PV modules and mounting structures.
- Inverters and transformers.
- Low voltage cabling between the PV modules to the inverters.
- A fence around the project development area.
- Camera surveillance.
- Internet connection.
- 33kV cabling between the project components and the facility substation.
- 33/132kV onsite facility substation.
- Battery Energy Storage System (BESS).
- Site offices and maintenance buildings, including workshop areas for maintenance and storage.
- Laydown areas.

» Access roads (up to 6m) and internal distribution roads (up to 4m).
»

The following key conditions would be required to be included within the authorisation issued for Red Sands PV3:

» All mitigation measures detailed within this BA Report, as well as the specialist reports contained within **Appendices D to I**, are to be implemented.
» The EMPr as contained within **Appendix J** of this BA Report should form part of the contract with the Contractors appointed to construct and maintain the solar PV facility in order to ensure compliance with environmental specifications and management measures. The implementation of this EMPr for all life cycle phases of Red Sands PV3 is considered key in achieving the appropriate environmental management standards as detailed for this project.
» Following the final design of Red Sands PV3, a final layout must be submitted to DFFE for review and approval prior to commencing with construction.
» A pre-construction walk-through of the final development footprint for species of conservation concern that would be affected and that can be translocated must be undertaken prior to the commencement of the construction phase. Permits from the relevant national and provincial authorities, i.e., the Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform must be obtained before the individuals are disturbed.
» The project footprint must remain within the assessed development area.
» A follow-up assessment on avian biodiversity and species abundance within the project site and surrounding areas must be conducted within one year after the facility has been in operation and should be repeated every 3-5 years.
» Chance Fossil Finds Procedure should be implemented for the duration of construction activities.
» The environmental authorisation required for Red Sands PV3 is for a 10-year period as facility would need to be selected as Preferred Bidder by the Department of Mineral Resource and Energy (DMRE) in the REIPPP Programmes or similar procurement programme released in future by government and private off-takers.