BASIC ASSESSMENT REPORT

PROPOSED RED SANDS SOLAR EAST SOLAR ENERGY FACILITY (SEF) AND ASSOCIATED INFRASTRUCTURE ON THE REMAINING EXTENT OF THE FARM DONKERDUISPRAAT 95, NORTHERN CAPE

November 2022

NAME OF APPLICANT: FE Red Sands (Pty) Ltd

PREPARED BY: Enviro-Insight CC

PROJECT DETAILS

REPORT TITLE:	PROPOSED RED SANDS SOLAR EAST SOLAR ENERGY FACILITY (SEF) AND ASSOCIATED INFRASTRUCTURE ON THE REMAINING EXTENT OF THE FARM DONKERDUISPRAAT 95, NORTHERN CAPE
REPORT STATUS:	DRAFT BASIC ASSESSMENT REPORT
DEA REFERENCE NO.:	14/12/16/3/3/1/2632
APPLICANT:	FE RED SANDS (PTY) LTD
ENVIRONMENTAL ASSESSMENT PRACTITIONER:	ENVIRO-INSIGHT CC MARVIN GRIMITT
ENVIRONMENTAL CONSULTANT:	ENVIRO-INSIGHT CC RONELL KUPPEN BSC (HONORS) GEOGRAPHY IAIASA MEMEBER
DATE	NOVEMBER 2022

When referenced this report should be cited as: Enviro-Insight CC. (2022). Draft Basic Assessment Report for the proposed Red Sands Solar East Solar Energy Facility (SEF) and associated infrastructure on the Remaining Extent of the Farm Donkerduispraat 95, Northern Cape.

EXECUTIVE SUMMARY

Details of the proposed Red Sands Solar East Solar Energy Facility

Component	Description / Dimensions
Project Name	Red Sands Solar East Solar Energy Facility
Province	Northern Cape
Farm portion	Remaining Extent of the Farm Donkerduispraat 95
Extent (ha)	490.2 hectares
21-digit Surveyor General code	C05300000000009500000
Contracted capacity of the facility (MW)	240 MW (Maximum)
Cabling	Underground up to 1m deep
Capacity of onsite substation	33/132kV (100mX100M)
Grid connection	Aggeneys Substation
Width of internal roads	up to 10 m
Proximity to grid connection	500m approximately
Laydown areas	Construction period laydown footprint (temporary): ± 6 ha Temporary hardstand area (boom erection, storage and assembly area): ± 15 ha O&M Area: 1.1ha

Introduction and Background

Background

FE Red Sands (Pty) Ltd (hereafter the Applicant) proposes the development of four (4) wind energy facility (WEF) and two Solar Energy Facilities (SEF) and its associated infrastructure on a site located approximately 77 km southwest of Pofadder and 81 km east of Springbok. The sites are located in the within the Nama-Khoi Local Municipality, in the Northern Cape Province of South Africa.

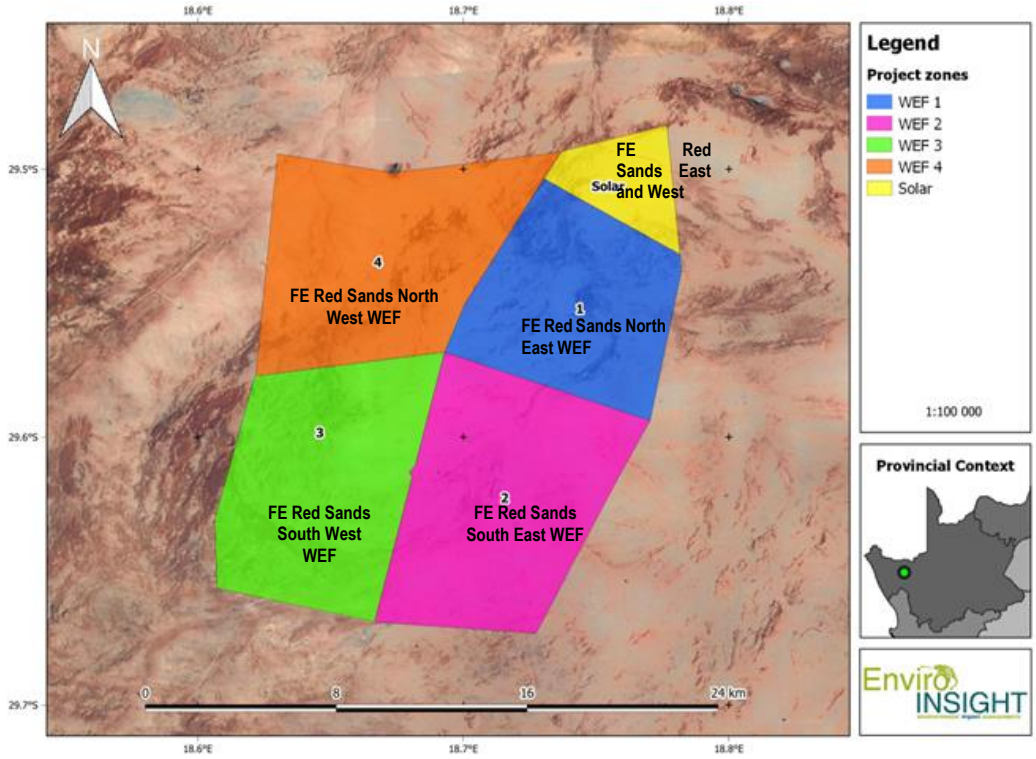
The proposed developments, to be known as Red Sands, will generate electricity which will feed into the National Grid. Enviro-Insight CC (hereafter Enviro-Insight) has been appointed as the independent consultancy to undertake the requisite environmental impact assessment (EIA) process for the SEF as required in terms of the National Environmental Management Act (No. 107 of 1998) (NEMA), as amended, on behalf of the Applicant.

A total of six (6) EAs applications for BAs will be lodged for the four (4) WEFs and two (2) SEFs, however, an integrated public participation process for the projects will be undertaken as they are located within the same geographical area and comprise the same type of activities.

The FE Red Sands WEFs & SEFs project areas are located on the Remaining Extent of the Farm Donkerduispraat 95 (Portion of this will be for solar), Remaining Extent of the Farm Rooi Duin 100, Remaining Extent of the Farm Kliphakskeen 98, Portion 1 of the Farm Kliphakskeen 98, Remaining Extent of the Farm Kraalbosch Vlei 99, Portion 1 of the Farm Kraalbosch Vlei 99, within the Nama-Khoi Local Municipality. The site can be reached via a gravel road from the N14 (GPS: 29°34'44.11"S, 18°41'20.29"E). All six projects are located within Zone 8 (Springbok) of the Renewable Energy Development Zones (REDZ).

The proposed renewable energy facilities are separated as follows:

- FE Red Sands Solar East
- FE Red Sands Solar West
- FE Red Sands North East WEF
- FE Red Sands South East WEF
- FE Red Sands South West WEF
- FE Red Sands North West WEF



This report is the Environmental Impact Assessment for **Red Sand Solar East**.

Introduction

FE Red Sands (Pty) Ltd (hereafter the Applicant) is proposing the development of a solar energy facility (SEF) and associated infrastructure on a site located approximately 77 km southwest of Pofadder and 81 km east of Springbok within the Nama-Khoi Local Municipality, in the Northern Cape Province, South Africa. The proposed development, to be known as the Red Sands Solar East SEF, will have a generation capacity of up to 240MW which will feed into the National Grid.

The proposed study area for the SEF development is located approximately 77 km southwest of Pofadder and 81 km east of Springbok within the Nama-Khoi Local Municipality, in the Northern Cape Province. The site can be reached via unnamed which branches off the N14. The Red Sands Solar East SEF footprint is approximately 490.2 hectares (ha) and will be located on the Remaining Extent of the Farm Donkerduispraat 95 (21-digit Surveyor General code: C05300000000009500000).

The Red Sands Solar East SEF will consist of PV panels, with a generation capacity of 240MW, depending on the available technology at the time. Additional ancillary infrastructure to the SEF would include underground and above-ground cabling

between project components, onsite substation/s, Battery Energy Storage Systems (BESS), mounting systems to support the PV panels, internal/ access roads (up to 10 m in width) linking the PV panels and other infrastructure on the site, and permanent workshop area and office for control, maintenance and storage. As far as possible, existing roads will be utilised and upgraded (where needed) with the relevant stormwater infrastructure and gates constructed as required. The perimeter of the proposed SEF may be enclosed with suitable fencing. A formal laydown area for the construction period, containing a temporary maintenance and storage building along with a guard cabin will also be established.

The specific GPS coordinates for Layout 1 (Preferred Layout) is shown below.

Coordinates for Preferred Layout for the proposed Red Sands Solar East SEF.

Layout	Latitude (S)	Longitude (E)
PV Area 1	29°29'24.81"S	18°46'20.17"E
PV Area 6	29°30'51.89"S	18°46'7.83"E
PV Area 7	29°30'53.98"S	18°46'34.35"E
PV Area 10	29°30'21.34"S	29°30'21.34"S
PV Area 9	29°29'59.57"S	18°46'1.11"E
PV Area 11	29°29'40.61"S	18°45'30.54"E
PV Area Split	29°31'33.43"S	18°46'35.11"E
BESS	29°29'46.79"S	18°45'43.17"E
Laydown Area	29°30'0.92"S	18°45'28.26"E
O&M Area	29°29'52.38"S	18°45'35.29"E

Specialist studies were undertaken to address the key issues that require further investigation to address the impacts of the development on the receiving environment. The specialist studies involve the gathering of data relevant to identifying and assessing impacts that may occur as a result of the proposed project. The specialists will also recommend appropriate mitigation or optimisation measures to minimise potential negative impacts or enhance potential benefits, respectively.

Enviro-Insight has selected a team of highly experienced specialists in order to execute this in a professional and impartial manner. The project team, specifically the sub-consultants, is indicated below:

Specialist Assessment	Company	Professional Specialist
Terrestrial Biodiversity	Enviro-Insight CC	Sam Laurence Alex Rebelo
Sensitive Animal Species	Enviro-Insight CC	Sam Laurence Alex Rebelo
Sensitive Plant Species	Enviro-Insight CC	Corné Niemandt
Heritage Impact Assessment and Palaeontological Impact Assessment	Beyond Heritage	Jaco van der Walt Ruan van der Merwe Lara Krajevic
Site Sensitivity verification and Agricultural Compliance Statement	Johann Lanz Soil Scientist	Johann Lanz
Freshwater Biodiversity and Watercourse Delineation	TESS	Russell Tate
Social Impact Assessment	Tony Barbour	Tony Barbour
Transport Impact Assessment	Innovative Transport Solutions (ITS)	Christoff Krogscheepers, Pr. Eng Pieter Arangie Riyaaz Ebrahim
Avifauna Assessment	Enviro-Insight CC	Samuel Laurence AE van Wyk

Neither Enviro-Insight nor any of its sub-consultants are subsidiaries of *FE Red Sands Pty Ltd,* nor is *FE Red Sands Pty Ltd* a subsidiary to Enviro-Insight. Enviro-Insight, its sub-consulting specialists, do not have any interests in secondary or downstream developments that may arise out of the authorisation of the proposed project.

The potential impacts associated with the proposed Red Sands Solar East SEF and associated infrastructure are summarised below in Table 8-1. Should the mitigation provided in the tables in Section 7 and detailed in the Environmental Management Programme (EMPr) be implemented, post-migration impacts are anticipated to range between very low to medium negative significance, and up to highly positive.

Summary of Impact Assessment

Aspect	Impact	Post Mitigation
	Planning and Construction	
Terrestrial Biodiversity	Habitat Loss and Fragmentation	Low – Medium
	Loss of species of conservation concern	Low - Medium
	Alien and invasive plant species	Low
	Increased risk of erosion and flash floods.	Low
	Disturbances or displacement impacts on fauna including traffic, noise and dust.	Low
Avifauna	Habitat destruction	Low
	Destruction or disturbance of bird roosts	Low
Aquatic	Operation of equipment and machinery	Low
	Clearing vegetation	Low
	Stockpiling of and placement construction materials	Low
	Excavating/shaping landscape	Low
	Final landscaping, backfilling and postconstruction rehabilitation	Low
Agricultural	Loss of agricultural potential by occupation of land	Medium
	Loss of agricultural potential by soil degradation	Low
	Dust impact	Low
	Enhanced agricultural potential through increased financial security for farming operations	High Positive
	Improved security against stock theft and other crime	High Positive
Heritage	Disturbance of isolated finds (AG001, AG002, AG003, AG006, AG007, AG008, AG011, AG012, AG013, AG015, AG016, AG017, AG018, AG020, AG021, AG022, AG023, AG025, AG026, AG029)	Low
	Disturbance of cemeteries (AG010, AG014)	Low
	Disturbance of high significance Stone Age Sites (AG009, AG019, AG024, AG027, AG028	Low
	Disturbance Historical kraal (AG005) and medium significance Stone Age Site (AG004)	Low
Social	Employment, business opportunities and skills development impact rating	High Positive
	Construction workers on site and in local area impact rating	Low
	Risk to safety, livestock, and damage to farm infrastructure	Low
	Increased risk of grass fires	Low
	Nuisance impacts associated with construction related activities	Low
Traffic	Increase in traffic volumes on the surrounding road network as a result of construction traffic	Low
General	Stormwater Management	Low

	Hunting / Fishing by construction workers.	Low
	Degradation and contamination of the surrounding environment by construction activities, cement, hydrocarbons and other hazardous materials.	Low
	Potential disturbance or unearthing of graves or disturbance to other heritage resources during the construction phase.	Low
	Improper storage and disposal of solid waste.	Low
	Littering around the site.	Low
	Improper disposal of rubble i.e.: burying or neglecting building rubble resulting in direct mechanical damage to surrounding vegetation and untidiness of the site.	Low
	Lack of toilet facilities resulting in unsanitary conditions.	Low
	Improper disposal of toilet waste from chemical toilets resulting in contamination of the surrounding environment	Low
	Increase waste to landfill site.	Low
	Risk of spills from construction equipment (oils, fuels, cement etc.) contaminating soil and the watercourse.	Low
	Dust Generation and control	Low
	Degradation of existing service infrastructure, e.g. roads, electricity.	Low
	Operation	
Terrestrial Biodiversity	Direct faunal impacts due to operation.	Low
	Alien and invasive plant species	Low
Avifauna	Bird mortalities	Medium
	Disruption of bird migratory pathways	Low
	Collision and electrocution with above-ground power transmission lines. In some cases, collision can be associated with polarised light pollution and waterbird species mistaking large PV panels areas as wetlands or other waterbodies, a case known as the “lake effect” (as per Jenkins et al. 2017).	Low
	The attraction of some novel bird species due to the development of a solar farm with associated infrastructure such as lake effect, perches, nest and shade opportunities	Low
	Chemical pollution: Chemicals being used to keep the PV panels clean from dust (suppressants) etc.	Low
Aquatic	Alteration of drainage	Low
	Alteration of surface water flow dynamics	Low
	Establishment of alien plants on disturbed areas	Low
Agriculture	Protection of soil resources	Low
Social	Renewable energy infrastructure and clean renewable energy	High Positive
	Creation of employment and business opportunities	Medium Positive

	Generation of income for landowner	Medium Positive
	Social Economic Development and Enterprise Development	High Positive
	Visual impacts and associated impact on sense of place	Low Medium
	Impact on property values	Low
	Impact on tourism	Low
	Decommissioning	
Terrestrial Biodiversity	The ecological impacts associated with the decommissioning phase will be similar to those listed in the construction phase and the associated mitigations measures must be updated and implemented to reduce potential adverse impacts	
Agriculture	Protection of soil resources	Low
Social	Deconstruction of the infrastructure and recycling	Moderate
	Loss of jobs and associated income	Moderate

Summary of specialist opinions and recommendations

Summary of Specialist Recommendations.

Specialist	Recommendation	Opinion
Terrestrial Biodiversity	Large sections of the affected area are not considered sensitive and there are no specific features of the affected area which would indicate that it is of broad-scale significance for faunal movement or landscape connectivity. For other provincially listed species which are affected by the proposed development, a permit application for their removal must be applied for with the provincial authority prior to the commencement of construction activities.	Project can proceed with the implementation of the recommended buffers and mitigation measures.
Avifauna	The presence of nesting Red Lark within the PAOI is of particular concern. Avoidance mitigation must be implemented in conjunction with the aforementioned micro sighting. Thus, the author sees no reason why an Environmental Authorisation (EA) should not be granted on the following conditions; • All recommended buffering (200m and 100m habitat dependent) be strictly adhered to. • Micro sighting of turbine placement must occur preconstruction supervised by a specialist zoologist in order to mitigate habitat loss for Red Lark.	Project can proceed with the implementation of the recommended mitigation measures and associated buffers

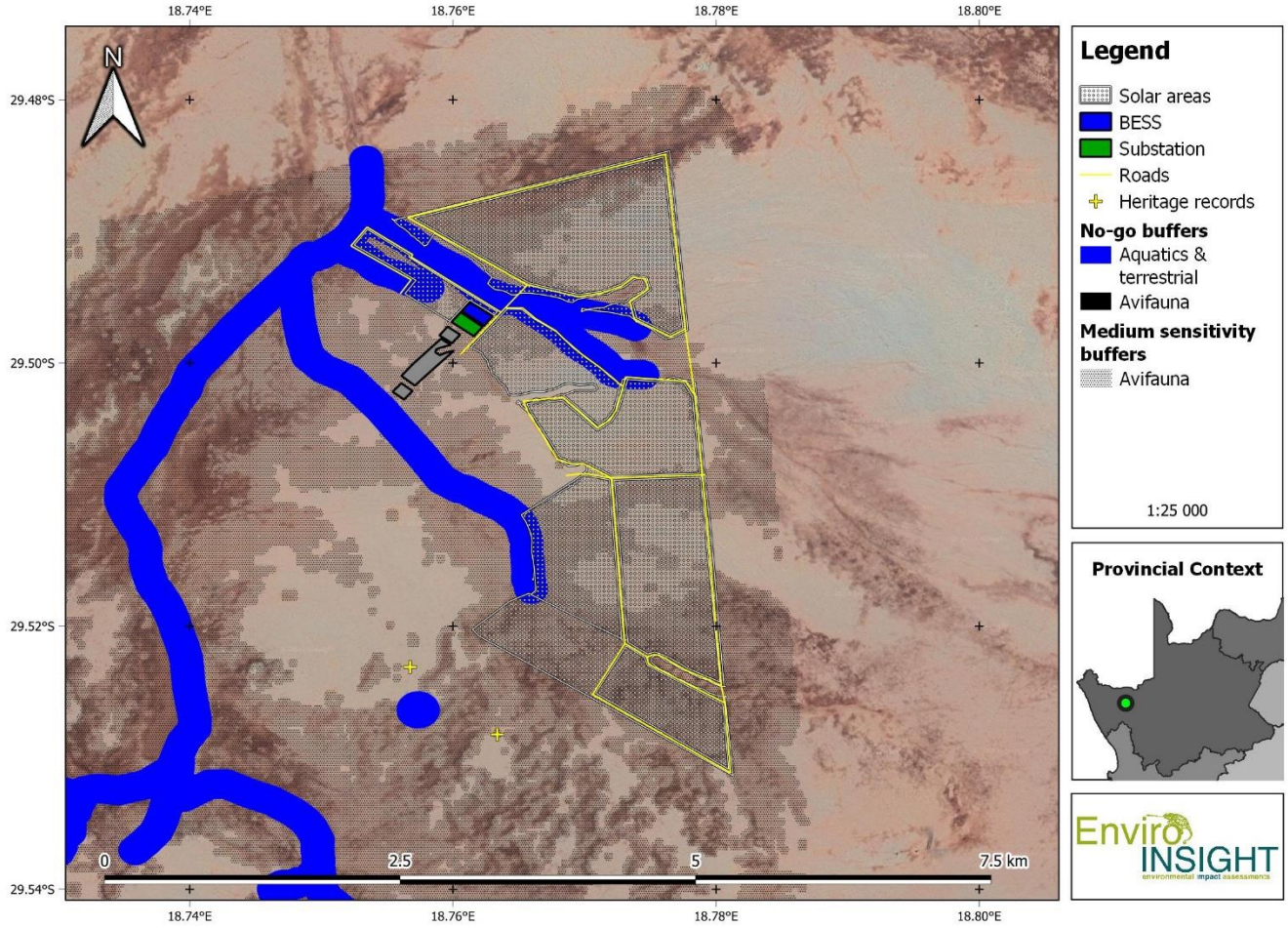
	• All recommended mitigation measures be applied preconstruction, post construction and operations. • The EMPr be updated every three years in order to revaluate the potential distributional population changes of species such as Martial Eagles and Vultures. Thus, retrofitted mitigations such as AI, radar and camera technology may have to be applied.	
Aquatic Biodiversity	Considering the type of development proposed, a SEF, and the implementation of the recommendations and mitigation measures, the development is not likely to have a high impact on the FEPA catchment classification associate with the study area. Impacts area rated as low.	Project can proceed with the implementation of the recommended mitigation measures and associated buffers
Agriculture	The proposed development will not have substantial negative impact on the agricultural production capability of the site and is therefore acceptable. This is substantiated by the facts that the land is of very low agricultural potential, the amount of agricultural land loss is within the allowable development limits, as the development is located within a REDZ which is prioritised for renewable energy development, and that the proposed development poses a low risk in terms of causing soil degradation, if the recommended mitigation measures are implemented.	Project can proceed with the implementation of the recommended mitigation measures
Heritage	Stone Age sites of high significance and will not be directly impacted on by the proposed development. All of these sites are located within environmental no-go areas with a minimum buffer zone of ~ 250 meters that will facilitate their protection in situ. The only significant site located outside a no-go area is site AG009 but no tower or infrastructure is located closer than 200 meters from this site and no impact is expected on this site. The overall impact of the project is considered to be low and residual impacts can be managed to an acceptable level through implementation of the recommendations.	Project can proceed with the implementation of the recommended mitigation measures
Social	The development of the proposed SEF will create employment and business opportunities during both the construction and operation phases of the project. It will also contribute to local economic development though socio-economic development (SED) contributions. The potential negative impacts	Project can proceed with the implementation of the recommended mitigation measures

	associated with the construction phase can be mitigated. The proposed SEF will improve energy security and reduce the carbon footprint associated with energy generation. The site is also located within the Springbok REDZ. The area has therefore been identified for the development of renewable energy projects. The establishment of the proposed FF Red Sands Solar East SEF is therefore supported by the findings of the SIA	
Traffic	The existing road network has sufficient spare capacity to accommodate the proposed Red Sand Solar East SEF, without any road upgrades required to the existing road infrastructure. It is recommended that the proposed Red Sand Solar East SEF be approved from a transport impact perspective.	Project can proceed with the implementation of the recommended mitigation measures

The combined sensitivity map was based on the findings from all specialist assessments and inputs from all stakeholders. The following relevant features were included, which are considered “no-go” areas (i.e. no development make occur in these areas):

- Avifauna: 100, 200 m buffer sensitive areas (habitat dependent).
- Watercourses: 100m for washes and 150m for depressions
- Plants: 50m buffer for watercourse.

This report is based on a project description and site plan, provided to by the applicant, which has not been approved by DFFE at this stage of the project. The project description and site plan may undergo refinements before being regarded as final. A project description based on the final design will be concluded once all stakeholders have provided feedback on the layout provided in this report.



It was determined during the EIA that the proposed project will result in limited potential negative impacts and certain positive impacts. A preferred site layout has been identified which is less environmentally sensitive and will result in the least environmental impact.

A detailed public participation process was followed during the EIA process which conforms to the public consultation requirements as stipulated in the EIA Regulations. In addition, all issues raised by I&APs will be captured in the FBAR and where possible, mitigation measures provided in the EMPr to address these concerns.

The 2 proposed site alternatives were assessed based on the viability and impact to the environment. Alternative 1 and Alternative 2 were under consideration, however taking into consideration the recommendations, buffers and no-go areas by the specialist a Preferred Layout was designed to account for the site sensitives. Kindly refer to Figure 8-1 and Figure 8-2 for the sensitivity analysis in regard to the various alternatives.

It is the opinion of the EAP that the information and data provided in this Basic Assessment Report (BAR) is sufficient to enable the DFFE to consider all identified potentially significant impacts and to make an informed decision on the application. Furthermore, once the layout has considered all sensitive features by avoiding no-go areas, and based on the findings of the impact assessment, the proposed project should be granted an EA and allowed to proceed provided the conditions are adhered to and appropriate mitigation measures as suggested by each specialist are addressed.

TABLE OF CONTENTS

APPENDICES

LIST OF FIGURES

LIST OF TABLES

ABBREVIATIONS

BID	Background Information Document
CARA	Conservation of Agricultural Resources Act
CBA	Critical Biodiversity Area
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIR	Environmental Impact Report
EMFs	Environmental Management Framework
EMPr	Environmental Management Programme
ESA	Ecological Support Area
GIS	Geographical Information System
GNR	Government Notice Regulation
ha	Hectare

HIA	Heritage Impact Assessment
I&APs	Interested and Affected Parties
IUCN	International Union for Conservation of Nature
NEM: BA	National Environment Management: Biodiversity Act (Act 10 of 2004)
NEM: WMA	National Environmental Management: Waste Management Act (Act No. 59 of 2008)
NEMA	National Environmental Management Act (Act 107 of 1998) (as amended)
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NWA	National Water Act
PPP	Public Participation Process
SACNASP	South African Council for Natural Scientific Professions
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SDF	Spatial Development Framework
SDP	Spatial Development Plan
SCC	Species of Conservation Concern

DEFINITIONS AND TERMINOLOGY

Activity: means an activity identified in any notice published by the Minister or MEC in terms of section 24D(1)(a) of the NEMA as a listed activity or specified activity

Alternatives: in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to the—

(a) property on which or location where the activity is proposed to be undertaken;

(b) type of activity to be undertaken;

(c) design or layout of the activity;

(d) technology to be used in the activity; or

(e) operational aspects of the activity;

and includes the option of not implementing the activity;

Application: an application for an environmental authorisation in terms of Chapter 4 of the EIA Regulations (2014 as amended).

Biodiversity: Variability among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part and also includes diversity within species, between species, and of ecosystems.

Cumulative impact: in relation to an activity, means 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 the existing and reasonably foreseeable impacts eventuating from similar or diverse activities.

Development: the building, erection, construction or establishment of a facility, structure or infrastructure, including associated earthworks or borrow pits, that is necessary for the undertaking of a listed or specified activity, but excludes any modification, alteration or expansion of such a facility, structure or infrastructure, including associated earthworks or borrow pits, and excluding the redevelopment of the same facility in the same location, with the same capacity and footprint.

Development footprint: any evidence of physical alteration as a result of the undertaking of any activity.

Environmental authorisation: The Competent Authority's grant or denial of permission to undertake the proposed activity. Previously referred to as the Record of Decision (RoD).

EAP: an environmental assessment practitioner as defined in section 1 of the NEMA.

EMPr: an environmental management programme contemplated in regulation 23 of the EIA Regulations (2014 as amended).

Environmental Impact Assessment: a systematic process of identifying, assessing and reporting environmental impacts associated with an activity and includes basic assessment and S&EIR.

Mitigation: to anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible.

Registered interested and affected party: in relation to an application, means an interested and affected party whose name is recorded in the register opened for that application in terms of regulation 42 of the EIA Regulations (2014 as amended).

Significant Impact: an impact that may have a notable effect on one or more aspects of the environment or may result in noncompliance with accepted environmental quality standards, thresholds or targets and is determined through rating the positive and negative effects of an impact on the environment based on criteria such as duration, magnitude, intensity and probability of occurrence.

Specialist*:* a person that is generally recognised within the scientific community as having the capability of undertaking, in conformance with generally recognised scientific principles, specialist studies or preparing specialist reports, including due diligence studies and socio-economic studies. A specialist needs to be professionally registered (e.g. with the South African Council for Natural Scientific Professions).

1 INTRODUCTION

FE Red Sands (Pty) Ltd (hereafter the Applicant) is proposing the development of a solar energy facility (SEF) and associated infrastructure on a site located approximately 77 km southwest of Pofadder and 81 km east of Springbok in the Northern Cape province of South Africa. The proposed development, to be known as Red Sands Solar East SEF, will have a generation capacity of up to 240MW which will feed into the National Grid. Enviro-Insight CC (hereafter Enviro-Insight) has been appointed to undertake the requisite environmental impact assessment (EIA) process for the SEF as required in terms of the National Environmental Management Act (No. 107 of 1998) (NEMA), as amended, on behalf of the Applicant.

The proposed study area for the SEF development is located approximately 77 km southwest of Pofadder and 81 km east of Springbok in the Northern Cape. The site can be reached via unnamed road, which branches off the N14. The Red Sands Solar East SEF extent is approximately 490.2 hectares (ha) and will be located on the Remaining Extent of the Farm Donkerduispraat 95 (21-digit Surveyor General code: C05300000000009500000). The only land use in the area is sheep farming due to the lack of rainfall and nearby permanent water sources, and several farm smallholdings are present within the study area, but many have been abandoned.

The Red Sands Solar East SEF will consist of PV panels, with a generation capacity of 240MW, depending on the available technology at the time. Additional ancillary infrastructure to the SEF would include underground and above-ground cabling between project components, onsite substation/s, Battery Energy Storage Systems (BESS), mounting systems to support the PV panels, internal/ access roads (up to 10 m in width) linking the PV panels and other infrastructure on the site, and permanent workshop area and office for control, maintenance and storage. As far as possible, existing roads will be utilised and upgraded (where needed) with the relevant stormwater infrastructure and gates constructed as required. The perimeter of the proposed SEF may be enclosed with suitable fencing. A formal laydown area for the construction period, containing a temporary maintenance and storage building along with a guard cabin will also be established.

Additionally, a power line with a capacity of up to 132kV is required. At this stage, options are still being considered for either the construction of a new line to feed into the Aggeneys substation or connect with existing lines. This associated electrical infrastructure will require a separate Environmental Authorisation and is being conducted as a part of a separate Basic Assessment (BA) process.

1.1 APPLICANT DETAILS

Table 1-1: Applicant Contact Details.

Applicant	FE Red Sands (Pty) Ltd
Contact Person	Thomas Condesse
Address	60 Hennie Winterbach Street Panorama Western Cape 7500
Telephone	+33622665932 / 0845484264
Email	thomas.condesse@energyteam.co.za / millard.kotze@energyteam.co.za

1.2 THE ENVIRONMENTAL IMPACT ASSESSMENT PROJECT TEAM

1.2.1 Environmental Assessment Practitioner (EAP)

Client has appointed Enviro-Insight CC as an independent Environmental Assessment Practitioner (EAP) to undertake an environmental authorisation process for the proposed Red Sands Solar East SEF. Enviro-Insight CC has no vested interest in the proposed project and hereby declares its independence as required by the EIA Regulations (2014, as amended). For purposes of this report, the following person may be contacted at Enviro-Insight CC:

Table 1-2: Enviro-Insight contact details.

Company	Enviro-Insight CC
Contact Person	Marvin Ryan Grimett /Ronell Kuppen
Purpose	Project consultant and Environmental Consultants
Address:	Unit 8 Oppidraai Office Park, 862 Wapadrand Road, Wapadrand Security Village, Pretoria, 0081
Telephone:	012 807 0637
Email:	info@enviro-insight.co.za

1.2.1.1 Qualifications and Memberships (Appendix F)

Mr. Grimett holds a Bachelor of Social Science (Honours)- Geography and Environmental Management and is registered as an EAP (2019/1713.) with EPASA. He has more than 7 years' experience as an environmental assessment practitioner.

Ms. Kuppen has an BSc (Honours) degree in Geography, with approximately 10 years' experience in the environmental consulting field, ranging from EIA's, WULAS and Public Participation.

1.2.1.2 Summary of past experience (Appendix F)

Mr. Grimett has over seven years' experience as an environmental consultant, compiling and managing several environmental authorisation reports, including Environmental Management Programmes (EMPr), rehabilitation plans and environmental auditing. This included fieldwork, data collection, preparation of permits and licensing studies, compliance monitoring and community engagement, and project managing interdisciplinary teams and contractors.

Ms. Kuppen has approximately 10 years' experience in the environmental consulting field, ranging from EIA's, WULAS and Public Participation and ECO's

1.2.2 Specialists

Specialist studies is being undertaken to address the key issues that require further investigation to address the impacts of the development on the receiving environment. The specialist studies involve the gathering of data relevant to identifying and assessing impacts that may occur as a result of the proposed project. The specialists will also recommend appropriate mitigation or optimisation measures to minimise potential negative impacts or enhance potential benefits, respectively.

Enviro-Insight has selected a team of highly experienced specialists in order to execute this in a professional and impartial manner. The project team, specifically the sub-consultants, is indicated in

Table 1-3: EIA Project Team.

Specialist Assessment	Company	Professional Specialist
Terrestrial Biodiversity	Enviro-Insight CC	Sam Laurence Alex Rebelo
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1.3 ASSUMPTIONS AND LIMITATIONS

Certain assumptions, limitations, and uncertainties are associated with the Basic Assessment. This report is based on information that is currently available and, as a result, the following limitations and assumptions are applicable:

- In order to obtain definitive data regarding the biodiversity, hydrology and functioning of particular wetlands, studies should ideally be conducted over a number of seasons and over a number of years. The current study relied on information gained during a single field survey conducted during a single season, desktop information for the area, as well as professional judgment and experience;
- The spatial extent of the watercourses provided in this study should be reconsidered within at least 5-10 years from the publishing of this study.
- The results of this study were derived from rapid ecological assessments.
- The area was extensive, and depression pan systems very small. It is therefore probable that minor pan systems would have been missed during the survey.
- Areas directly affected by the project were surveyed, whilst within the 500m screening area, desktop information was also utilised.
- No closure or decommissioning phases were considered.
- The layout of the proposed transmission and grid connection infrastructure was not considered in this study.
- The risk assessment was completed with the assumption that avoidance and mitigations actions are implemented.
- The core study area for the visual assessment can be defined as an area with a radius of not more than 10 km from the structures and a total study area with a radius of 15 km from the structures. This is because the visual impact of structures beyond a distance of 10 km would be so reduced that it can be considered negligible even if there is direct line of sight.
- The author reserves the right to change impact ratings and mitigation measures as information surfaces.

2 DESCRIPTION OF THE PROPOSED PROJECT

2.1 NATURE AND EXTENT OF PROPOSED PROJECT

The proposed study area for the SEF development is located approximately 30 km southwest of Aggeneys in the Northern Cape. The site can be reached via the N14, which is ~11 km to the northwest of the project area.

The site can be accessed via an unnamed road, which branches off the N14 (Figure 2-1). The Red Sands Solar East SEF footprint is approximately 490.2 hectares (ha) and will be located on Remaining Extent of the Farm Donkerduispraat 95 (21-digit Surveyor General code: C05300000000009500000). The only land use in the area is sheep farming due to the lack of rainfall and nearby permanent water sources, and several farm smallholdings are present within the study area, but many have been abandoned.

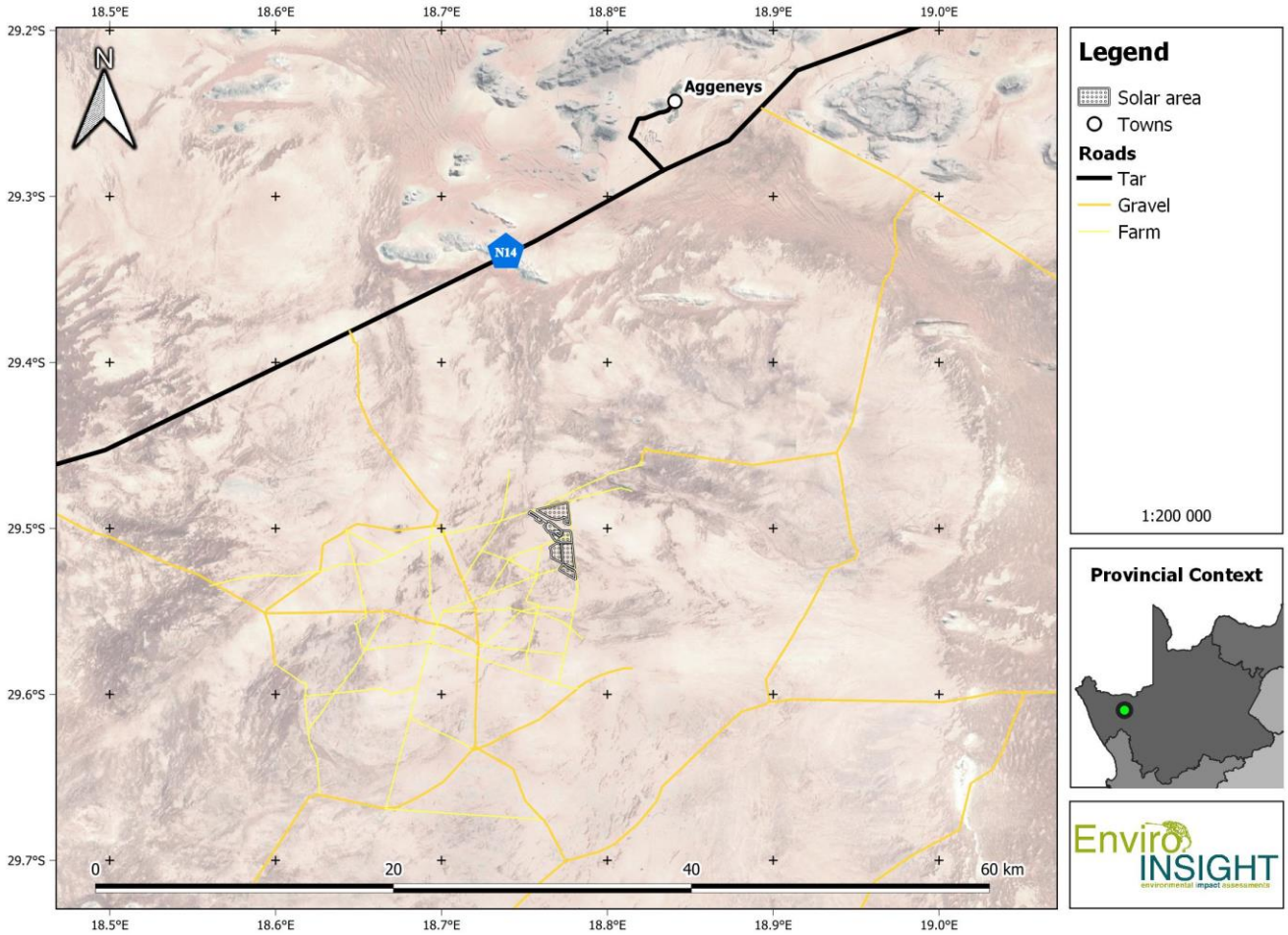

Figure 2-1: Topographical Map of the study area.

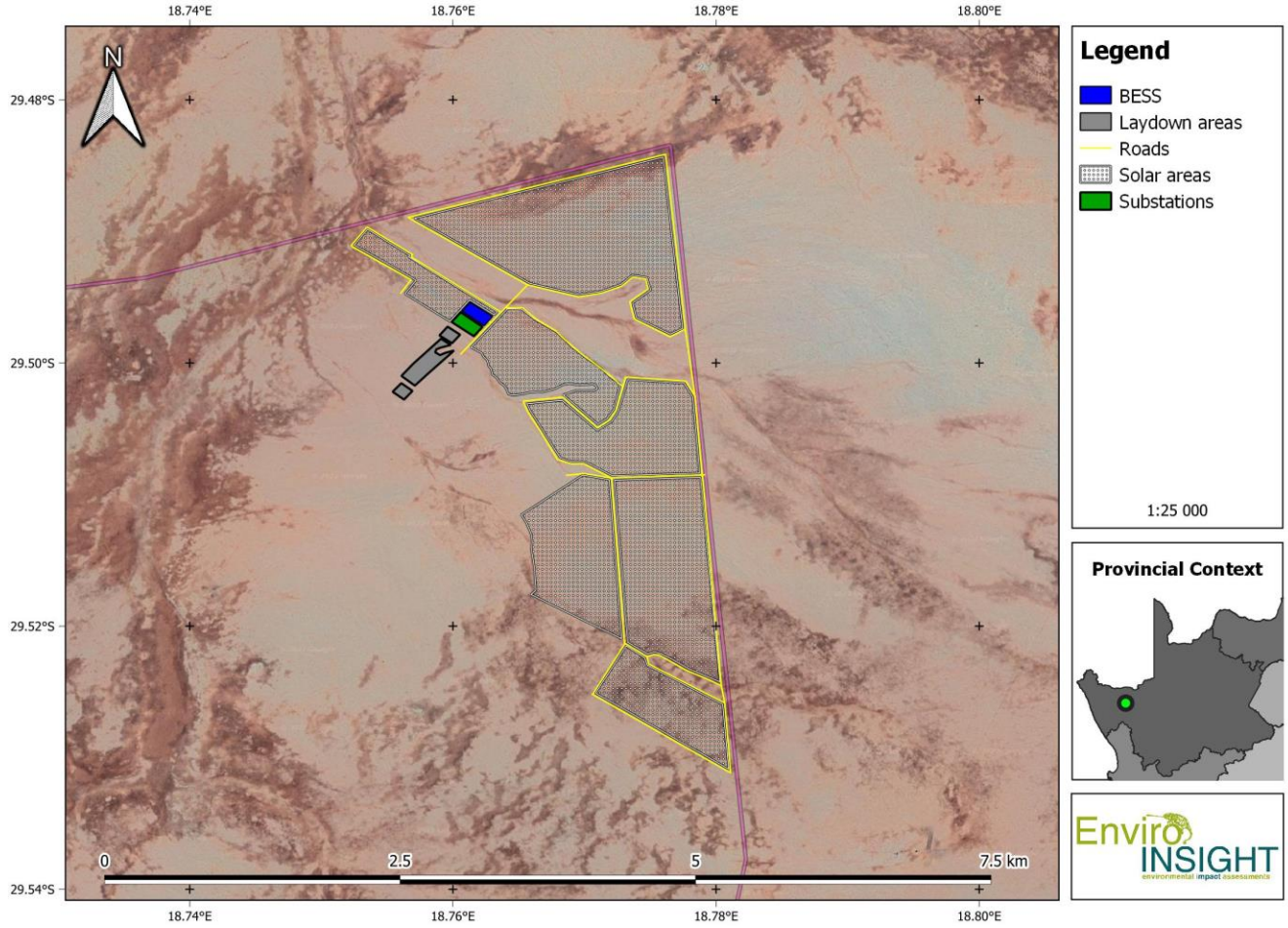

Figure 2-2: Aerial Map of the site.

Table 2-1: Project Location Details.

FE Red Sands Solar East SEF		
Farm name(s)/ Erf No	Remaining Extent of the Farm Donkerduispraat 95	
21-digit Surveyor General code	C05300000000009500000	
Ward	Ward 4	
Local Municipality	Nama-Khoi Local Municipality	
District Municipality	Namakwa District Municipality	
Co-ordinates of the proposed site/s (DDMMSS)	Latitude (S)	Longitude (E)
PV Area 1	29°29'24.81"S	18°46'20.17"E
PV Area 6	29°30'51.89"S	18°46'7.83"E

PV Area 7	29°30'53.98"S	18°46'34.35"E
PV Area 10	29°30'21.34"S	29°30'21.34"S
PV Area 9	29°29'59.57"S	18°46'1.11"E
PV Area 11	29°29'40.61"S	18°45'30.54"E
PV Area Split	29°31'33.43"S	18°46'35.11"E
State the extent of proposed development	490.2 ha	
What is the current zoning and current land use of the site(s)?	Agricultural	

2.2 PROJECT DESCRIPTION

The Applicant is responding to the growing electricity demand within South Africa, the current infrastructure failure which disrupts sufficient electricity supply, and the increasing pressure on countries to reduce their reliance on fossil fuels, by addressing the need for sustainable renewable energy in the country. Accordingly, the Applicant is proposing the development of a commercial SEF and associated infrastructure on the Remaining Extent of the Farm Donkerduispraat 95, to add new capacity to the national electricity grid.

The proposed study area for the SEF development is located approximately 30 km southwest of Aggeneys in the Northern Cape. The site can be reached via an unnamed road, which branches off the N14 (Figure 1-1). The Red Sands Solar East SEF extent is approximately 490.2 hectares (ha) and will be located on a Portion of the Remaining Extent of the Farm Donkerduispraat 95 (Figure 1-2).

The components of the SEF and associated infrastructure are as follows:

- PV panels will have a generation capacity of up to 240 MW (depending on the available technology at the time),
- PV Panel Mounting System,
- onsite substation/s of 100mX100m (33/132kV) to facilitate the connection between the SEF and Aggeneys substation,
- a Battery Energy Storage System (BESS),
- cabling between PV panels, to be laid underground,
- internal/ access roads (up to 10 m in width) linking the PV panels rows and other infrastructure on the site,
- permanent workshop area and office for control, maintenance and storage, and
- temporary laydown areas during the construction phase (which will be rehabilitated).

The final PV Panel model to be utilised will only be determined closer to the time of construction, depending on the technology available at the time. The optimal positioning (taking into account the energy generating potential) for each turbine will be

determined once all the environmental sensitivities have been determined in the EIA phase. The preferred layout design and development footprint is included in this BAR report.

The components of a typical PV Solar Panel subsystem are depicted by Figure 2-1 and Figure 2-2, which entails:

- Photovoltaic Cells: Solar cells can be arranged into large groupings called arrays. These arrays, composed of many thousands of individual cells, can function as central electric power stations, converting sunlight into electrical energy for distribution to industrial, commercial, and residential users.
- Support Structures (Solar Panel Mounts)– The PV Panels will require a supportive structure. These can either be a fixed structure, where the panels are placed at an angel to obtain maximum solar irradiation, or it could be axis tracking support structure that will track the movement of the sun throughout the day to maximise solar irradiation. The preferred layout will be determined during construction.

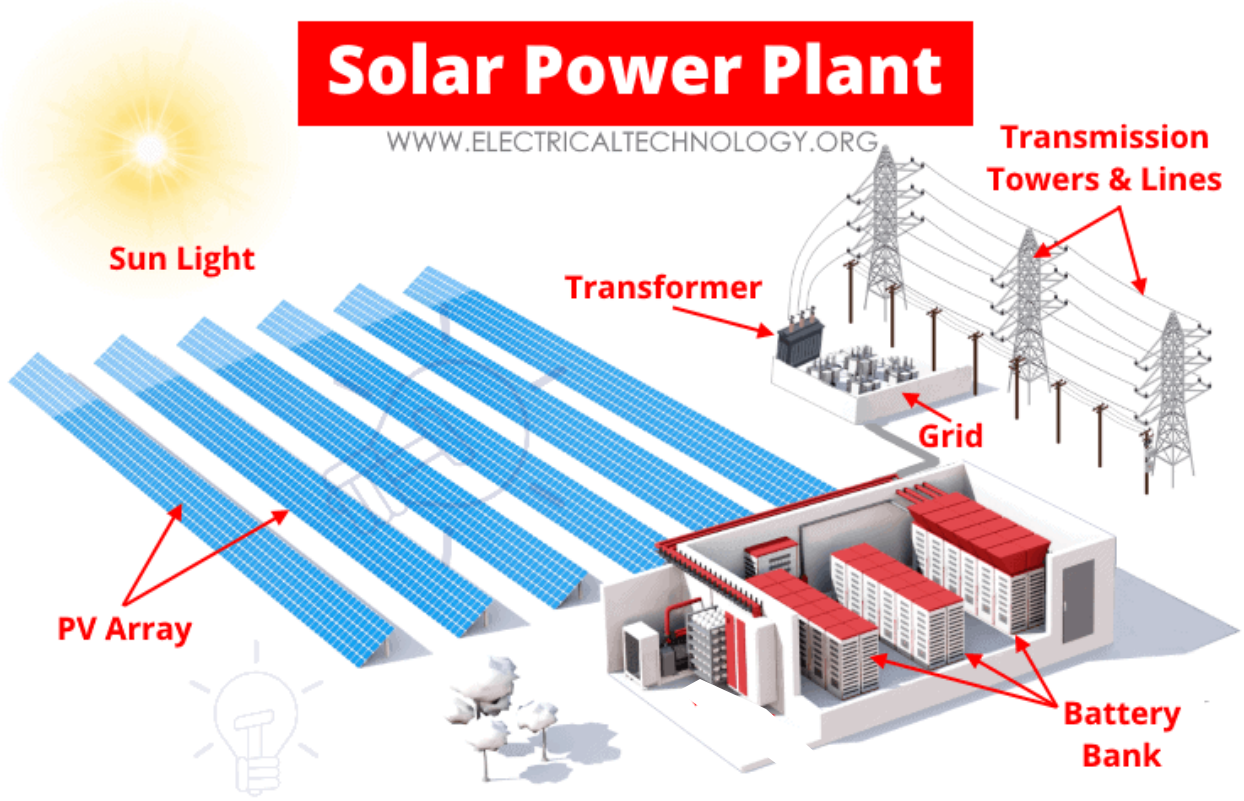

Figure 2-3: Simplified diagram of the main components of a Solar Facility. (Source: https://www.electricaltechnology.org).

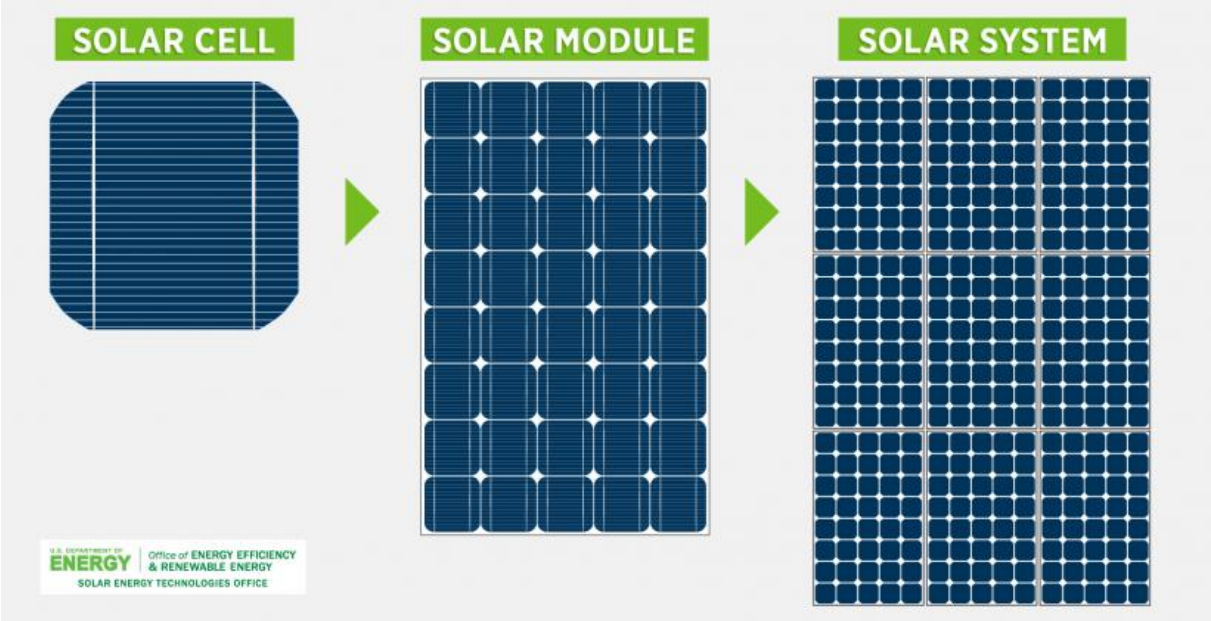

Figure 2-4: Simplified diagram of the PV System from PV cell to module to PV Array. Source: www.energy.gov

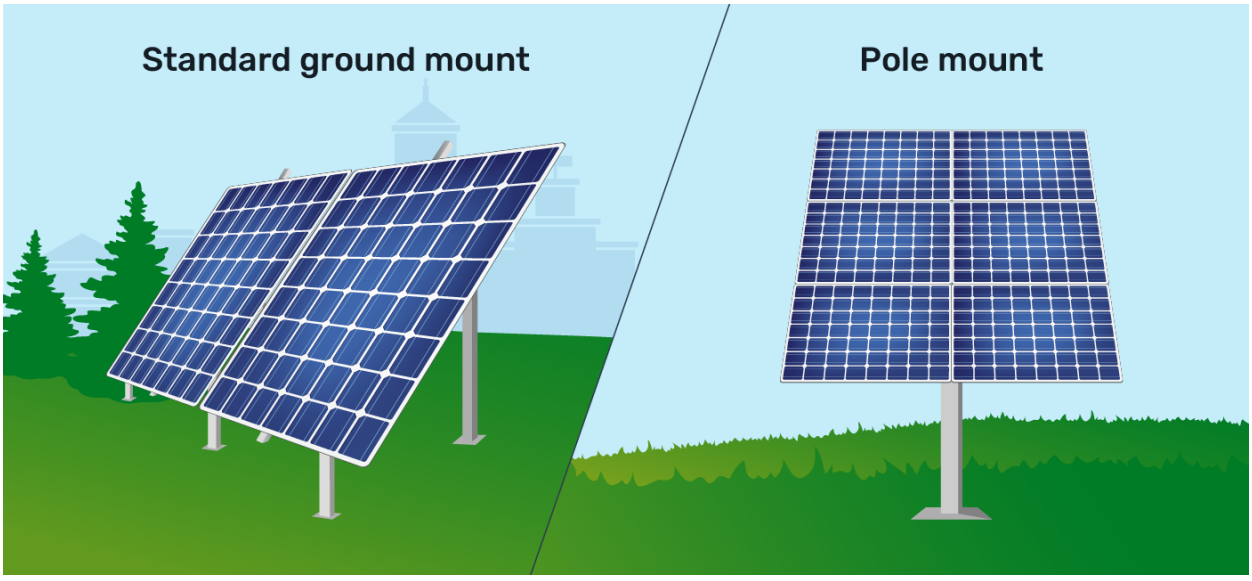

Figure 2-5:PV Solar Panel Mounts. Source: www.solarreviews.com.

2.3 PROJECT DEVELOPMENT PHASES

The following section describes the details the different phases of the proposed Red Sands Solar East SEF:

- Pre-construction;
- Construction;

- Operation; and
- Decommission.

Pre-construction

Prior to the commencement of the main construction works, the Contractor will undertake vegetation clearance and site establishment works.

This phase ensures that all design layouts are finalised, that risks associated with the construction phase is discussed and mitigated prior to commencement, to do a final walkdown of the study area and to apply and secure the necessary permits. The 'search and rescue' procedure with regards to plants, animals and heritage features must be done, and all sensitive areas with their buffers must be demarcated prior to commencement with construction activities.

Construction

The construction phase is temporary in nature (usually between 12-18 months) with a development footprint for the construction of:

- compounds and laydown areas;
- platforms, or "crane pads", required to construct the PV panels;
- establishment and laying of foundations for PV panels Mounting system;
- new or upgraded access and internal roads (some roads may be temporary during the construction phase);
- storage areas and site office;
- substation and BESS;
- underground cables to connect the PV panels to the on-site substation;

Even though not a physical construction activity, the construction phase includes the transport of components and equipment to and within the site.

After the construction phase is completed, rehabilitation of temporary construction areas will commence. Any area that does not form part of the operational phase of the project (this can include internal roads and access points) must be rehabilitated as per the rehabilitation plan.

Table 2-2: Project Dimensions

Facility Component	Red sands Solar East
PV area (m2)	461000
BESS footprint (m^2)	22000
Temporary laydown areas (m^2)	10000
Switchgear / transformer (m^2)	20000
Internal roads (m^2)	257897,94
Rehabilitation - 4m of road (m^2)	85965,98
Total Development Footprint (m^2)	770897,94
Total Development Footprint (ha)	**770,89794**
Rehabilitation post-construction (m^2)	115965,98
Rehabilitation post-construction (ha)	**115,96598**

Operational phase

The operational phase of the SEF has an approximate lifespan of 20 years, and mainly consists of operation and maintenance. All the PV panels will be operational except under circumstances of mechanical breakdown, inclement weather conditions or for maintenance purposes.

Decommissioning

SEF components have an expected end of life, whereby the components need to be dismantled and transported off site, or by replacing the existing infrastructure with the latest technology based on the relevant legislation at the time. Decommissioning requires a temporary laydown area and associated access to accommodate the required equipment and lifting cranes. Prior to the transportation off site, the components need to be evaluated based on reuse, recycle or permanent disposal in accordance with regulatory requirements at that time. The area needs to be rehabilitated based on the rehabilitation plan, by returning the soil, landscape features and vegetation back to its original state prior to the construction phase in order for the land to be used for agricultural purposes again, or as determined by the landowner and competent authorities.

Figure 2-6: Photographs depicting the construction phase of a solar farm similar to Red Sands Solar East SEF. Source: www.power-technology.com, renewablesnow.com

2.4 ALTERNATIVES

2.4.1 Types of Alternatives

The NEMA requires that alternatives are considered during the EIA process. An alternative can be defined as a possible course of action, in place of another, that would meet the same purpose and need (DEAT, 2004).

The 2014 EIA Regulations (as amended) provide the following definition:

> ***"alternatives"***, in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to the—
>
> (a) property on which or location where the activity is proposed to be undertaken;
>
> (b) type of activity to be undertaken;

(c) design or layout of the activity;

(d) technology to be used in the activity; or

(e) operational aspects of the activity;

and includes the option of not implementing the activity;

The following types of alternatives are most pertinent to the proposed project and are detailed further below:

- Location alternatives;
- Layout alternatives;
- Technology alternatives; and
- The "no-go" alternative.

2.4.2 Location Alternatives

The location for the Red Sands Solar East SEF was considered based on the following:

- Good solar resource.
- Close proximity to an Eskom substation, Aggeneys Substation which has the potential to support the proposed SEF project generation capacity.
- Relatively flat site, which makes construction easier and less expensive than on an undulating site.
- Distance from existing towns or populated areas (anticipated lower visual, noise and dust impacts).
- Landowner support and favour for the proposed SEF.
- Existing transport routes can be utilised;
- The land has a low agricultural potential, lease of the site contributes to landowner and potentially to other profitable agricultural endeavours;

Based on the above, the location of the Red Sands Solar East SEF site was selected due to the favourable factors listed above.

2.4.3 Layout Alternatives

An initial site layout has been compiled based on *inter alia* the following criteria:

- Spatial orientation requirements of PV panels and associated infrastructure (e.g. roads);
- Layout relative to other existing infrastructure, such as powerlines, houses and substations;
- Solar resource profile (this could have significant technical constraints);
- Topographical constraints, including surface water and steep slopes of hills; and
- Required setbacks from property boundaries.

Two (2) layout alternatives were considered for the project.

- Alternative 1 (Preferred Alternative).

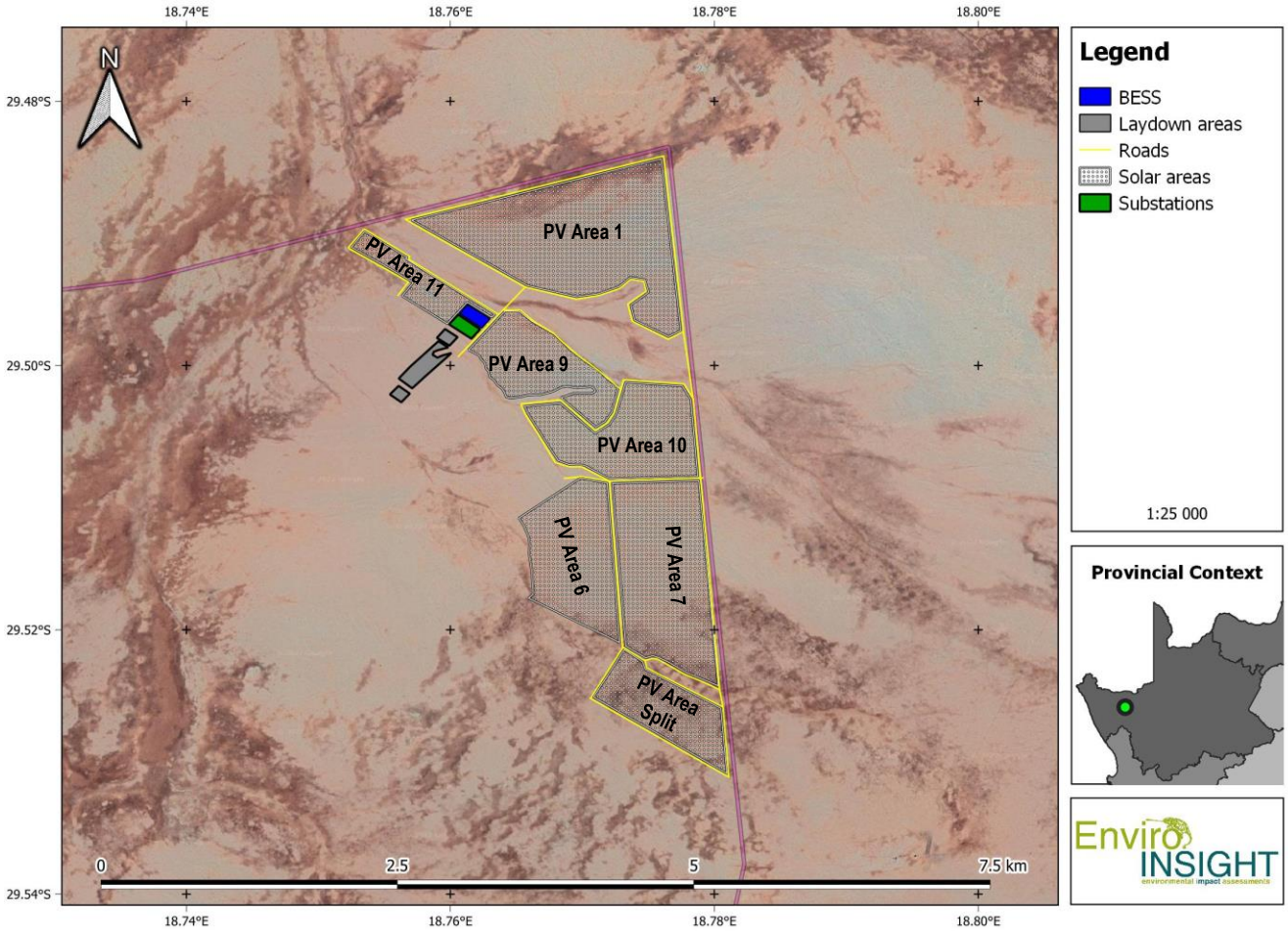

Figure 2-7: Alternative 1.

Table 2-3: Layout Alternative 1 for the proposed Red Sands Solar East SEF.

Layout	Latitude (S)	Longitude (E)
PV Area 1	29°29'24.81"S	18°46'20.17"E
PV Area 6	29°30'51.89"S	18°46'7.83"E
PV Area 7	29°30'53.98"S	18°46'34.35"E
PV Area 10	29°30'21.34"S	29°30'21.34"S
PV Area 9	29°29'59.57"S	18°46'1.11"E
PV Area 11	29°29'40.61"S	18°45'30.54"E
PV Area Split	29°31'33.43"S	18°46'35.11"E

BESS	29°29'46.79"S	18°45'43.17"E
Laydown Area	29°30'0.92"S	18°45'28.26"E
O&M Area	29°29'52.38"S	18°45'35.29"E

- Alternative 2

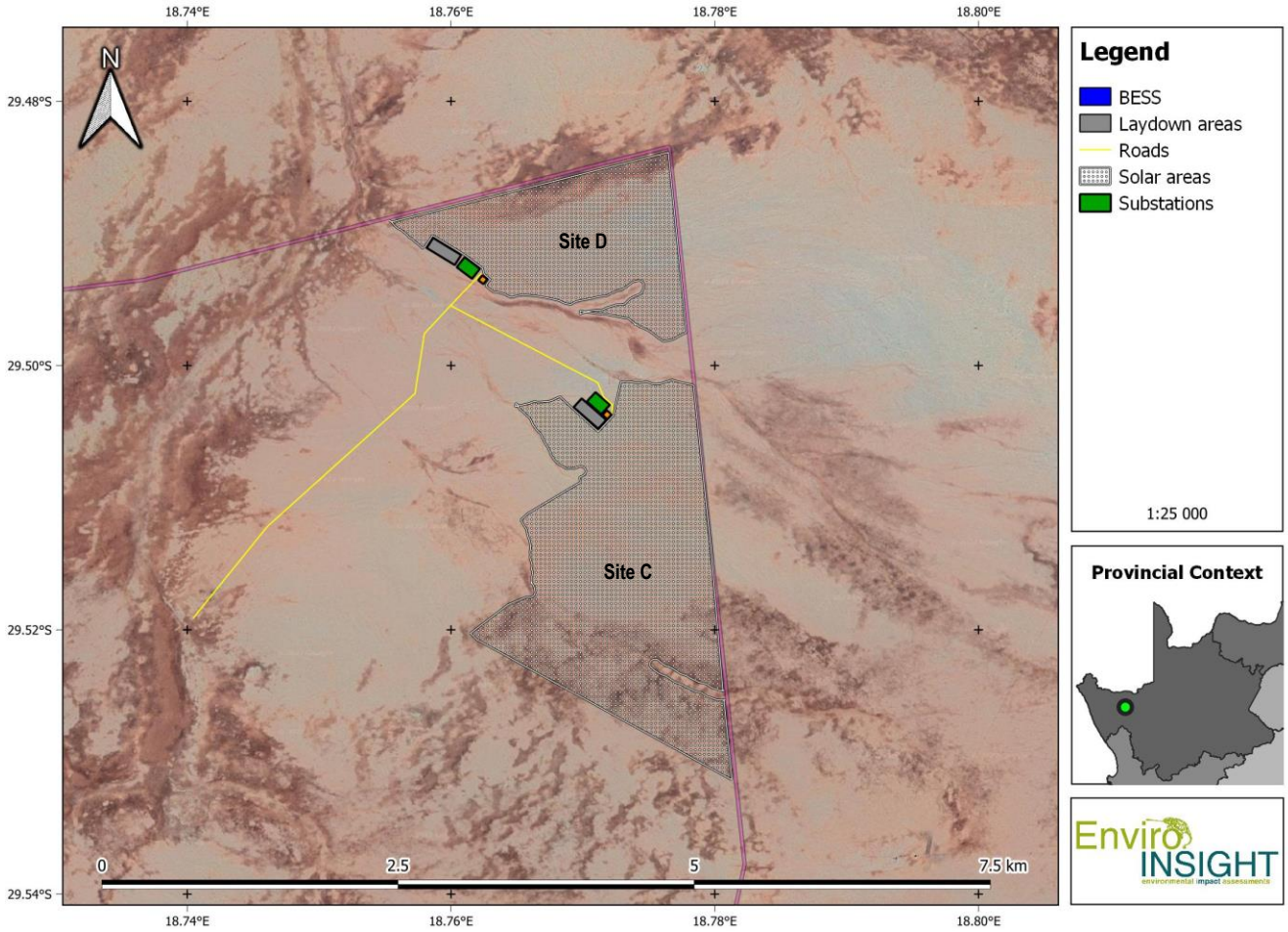

Figure 2-8: Alternative 2

Table 2-4: Layout Alternative 2 for the proposed Red Sands Solar East SEF.

Layout	Latitude (S)	Longitude (E)
PV Area Site D	29°29'26.10"S	18°46'15.76"E
PV Area Site C	29°30'57.43"S	18°46'24.60"E
Laydown Area Site D	29°29'30.03"S	18°45'34.40"E

Laydown Area Site C	29°30'13.87"S	18°46'14.64"E
O&M Area Site D	29°29'34.08"S	18°45'40.90"E
O&M Area Site C	29°30'10.49"S	18°46'16.80"E

2.4.4 Technology Alternatives

The most important factors that are considered when selecting the PV Panel and mounting system for any site, are the annual average solar exposure. The ongoing monitoring of the solar exposure on site will be used to inform the final layout.

Other determining factors when selecting the infrastructure is efficiency, full load hours and the capacity factor. The pricing of relevant technology at the time of construction is also a key factor, as well as the exchange rate for imported components.

2.4.5 The "No-Go" Alternatives

It is required to consider the "no-go" option in the EIA process. The "no-go" alternative refers to the current status quo and the risks and impacts associated with it. Some existing activities may carry risks and may be undesirable (e.g. an existing contaminated site earmarked for a development). The no-go is the continuation of the existing land use, i.e. maintain the status quo.

The no-go option has various positive and negative impacts associated with this alternative. All baseline information provided in this report relates to the current situation on site and can be considered the no-go alternative. Impacts are limited to the status quo. Positive and negative impacts are as follows:

Positive:

- Potential livestock activities will remain undisturbed. Currently, there are no livestock on the property but it has been utilised in the past for this purpose;
- Ecological processes will continue as is;
- The potential impact on sensitive features will not occur;
- The opportunity for the proposed project to contribute significantly to greenhouse gas emission reductions and climate change mitigation, will be lost;
- All negative impacts, specifically related to the development of the SEF, discussed in this report will not materialise.

Negative:

- The economic impact of the local community will not be achieved;
- The country will not have an opportunity to expand on renewable energy sources, which it is in dire need of achieving within the short and medium terms;
- All positive impacts, specifically related to the development of the SEF, discussed in this report will not materialise.

2.5 NEED AND DESIRABILITY

As part of the EIA process, the need and desirability for the development of the proposed Red Sands Solar East SEF needs to be considered and discussed in order to provide context regarding the realistic economical and social benefits the proposed development will add on all spheres of government (local, provincial and national).

Reference is made to the Department of Environmental Affairs (DEA) 2017 Guideline on Need and Desirability which states that while the "concept of need and desirability relates to the type of development being proposed, essentially, the concept of need and desirability can be explained in terms of the general meaning of its two components in which need refers to time and desirability to place – i.e. is this the right time and is it the right place for locating the type of land-use/activity being proposed? Need and desirability can be equated to wise use of land – i.e. the question of what is the most sustainable use of land."

Table 2-5: Need and Desirability

Question		Answer
"securing ecological sustainable development and use of natural resources"		
1. How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?		The ecological specialist study states: Impact Statement
1.1. How were the following ecological integrity considerations taken into account?:	1.1.1. Threatened Ecosystems	
	1.1.2. Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure	Various specialist studies were compiled for the proposed project. Refer to Section 6.6-Section 6.12 and Appendix D for the specialist studies undertaken. These specialists have taken inconsideration all impacts relating to the proposed development and provided the appropriate mitigation measures, which the applicant is committed to following.
	1.1.3. Critical Biodiversity Areas ("CBAs") and Ecological Support Areas ("ESAs")	Refer to Section 6.4
	1.1.4. Conservation targets	Refer to Section 6.4
	1.1.5. Ecological drivers of the ecosystem	Refer to Section 6.4
	1.1.6. Environmental Management Framework	Refer to Section 6.4

	1.1.7. Spatial Development Framework	Refer to Section 6.4
	1.1.1. Threatened Ecosystems	Refer to Section 6.4
	1.1.8. Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate Change, etc.)	All global responsibilities to which South Africa is signatory or party to were considered, the proposed development complies with all international responsibilities.
1.2. How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?		The proposed SEF can disturb plant and species and vegetation from clearing of the development footprint, soil erosion and alien plant invasion. Increased levels of pollution, noise, disturbance and human presence can impact negatively on faunal communities. As part of the EIA process specialist studies were conducted to identify areas most environmentally suitable for development within the proposed development site boundary. As a result of these studies a development layout has been produced that avoids sensitive areas and identified constraints. The specialists have proposed mitigation measures to further reduce risks or enhance opportunities during construction, operation and decommissioning phases of the development. With implementation of these mitigation measures, all identified negative impacts are expected to be reduced to acceptable levels of medium or low negative significance. All mitigation measures proposed by the specialists are included in the EMPr for the project.
1.3. How will this development pollute and/or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?		On a national level the development will lessen the country's dependency on coal, and contribute to lowering water consumption, pollution and environmental degradation per kW of electricity produced.
1.4. What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided altogether, what measures were explored to minimise, reuse and/or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?		The generation of waste will largely be restricted to the construction phase of the project and consist of normal construction phase solid waste streams. The EMPr will detail specific mitigation measures that must be implemented for the appropriate management and minimisation of waste, during all phases of the project. Registered service providers will be utilised to transport solid waste to registered landfills.

1.5. How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?		Visual buffers are applied to cultural landscapes / heritage sites. The development layout is produced by avoiding turbine placement within these visual buffers. A Heritage Impact Assessment was conducted to assess the proposed layout. SAHRA will provide comment on the BAR.
1.6. How will this development use and/or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?		Solar (Sunlight) is a renewable resource and will be the 'fuel' for the SEF to generate electricity. Therefore, the development will have a minimal impact on non-renewable resources.
1.7. How will this development use and/or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds?	The SEF will use the renewable energy resource of sunlight to generate power. Construction of the SEF will require use of water, a renewable natural resource. Operation of the SEF will consume relatively small quantities of water when compared to alternative energy technologies such as coal. Impacts on the ecosystem caused by use of these renewable energy resources has been evaluated.	
	1.7.1. Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)? (note: sustainability requires that settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life)	The proposed SEF will reduce South Africa's dependency on non-renewable resources, particularly coal, as an energy source. Sunlight as an energy source is not dependant on water, as compared to the massive water requirements of conventional power stations, has a limited footprint and does not impact on large tracts of land, and poses limited pollution and health risks, specifically when compared to coal and nuclear energy plants.
	1.7.2. Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when	The current land use is low-intensity grazing and the land is not suitable for other agricultural uses.

What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts?	considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used (i.e. what are the opportunity costs of using these resources this the proposed development alternative?)	The proposed development will increase yield as the landowners will be paid for the use of their land. This will improve cash flow and financial sustainability of farming enterprises on site. The proposed development itself will not cause a significant change in land use, as the development site is primarily low intensity agriculture (grazing), which can still proceed once the development is constructed. Solar is a renewable resource, and a SEF is the best use thereof. The SEF site would also be suitable for a wind facility, however the current land use would not be able to continue.
	1.7.3. Do the proposed location, type and scale of development promote a reduced dependency on resources?	The proposed SEF is predicted to reduce dependency on coal as an energy source. Solar as an energy source is not dependant on water, as compared to the massive water requirements of conventional coal fired power stations, has a limited footprint and does not impact on large tracts of land, and poses limited pollution and health risks, specifically when compared to coal and nuclear energy plants.
1.8. How were a risk-averse and cautious approach applied in terms of ecological impacts?	1.8.1. What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	This report is based on a project description and site plan, provided to by the applicant, which has not been approved by DFFE at this stage of the project. The project description and site plan may undergo refinements before being regarded as final. A project description based on the final design will be concluded once DFFE has provided feedback on the layout provided in this report. Descriptions of the natural and social environments are based on limited fieldwork and available literature. It should be emphasised that information, as presented in this document, only has reference to the study area as indicated on the accompanying maps. Therefore, this information cannot be applied to any other area without a detailed investigation being undertaken.
	1.8.2. What is the level of risk associated with the limits of current knowledge?	The risk associated with assumptions and limits of current knowledge is the potential for information being assessed to be incorrect. This would translate to erroneous impact identification and mitigation measures. However, due to the amount of site work conducted the risk associated with this is considered to be low.
	1.8.3. Based on the limits of knowledge and the level of risk, how and to what	The project description and site plan may undergo refinements before being regarded as final. A project description based on the final design

	extent was a risk-averse and cautious approach applied to the development?	will be concluded once DFFE has provided feedback on the layout provided in this report.
1.9. How will the ecological impacts resulting from this development impact on people's environmental right in terms following	1.9.1. Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	Social impacts have been identified and assessed by the social specialist. The potential negative health risks posed by the SEF (noise, shadow flicker, electromagnetic radiation) is expected to be low. The operational impact on the sense of place is expected to be of medium negative significance with or without mitigation.
	1.9.2. Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?	Renewable energy has fewer negative health effects than other forms of non-renewable energy generation and will have overall positive health benefits.
1.10. Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?		The findings of this SIA conducted for the proposed SEF indicates that during the construction and the operational phase of the proposed development project, various employment opportunities, with different levels of skills will be created. In addition this will also create local business opportunities benefitting the socioeconomic development of the local communities. The proposed SEF also represents an investment in clean, renewable energy infrastructure, which, given the negative environmental and socio-economic impacts associated with a coal based energy economy and the challenges created by climate change, represents a significant positive social benefit for society as a whole.
1.11. Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives/targets/considerations of the area?		The ecology, avifauna and aquatic specialists have all concluded that the development does not have unacceptable negative impacts that cannot be mitigated to a low or medium level of significance.
1.12. Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?		Specialist recommendations, buffers and no-go areas, influenced mapping. These identified the most suitable areas for development for which a development layout was then produced for assessment. The results of the specialist's studies further informed the development of the updated site layout.

1.13. Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?		The cumulative impacts have been assessed, kindly refer to Section 6-4 to Section 6-10 of this report.
"promoting justifiable economic and social development"		
2.1. What is the socio-economic context of the area, based on, amongst other considerations, the following considerations?	2.1.1. The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks of policies applicable to the area	Namakwa District municipality Integrated Development Plan (IDP): The 2020/2021 IDP indicates that it aligns with the 17 United Nations development goals, ranging from alleviating poverty and reducing inequality through job creation and economic growth, as well as ensuring access to affordable, reliable, sustainable and modern energy for all. The IDP states that local economic development will include the construction of renewable energy projects in the area. Nama-Khoi Local Municipality Integrated Development Plan (IDP) 2021/2022: The IDP indicates the municipalities commitment to providing basic services and infrastructure to the community, of which electricity is a major component, as access to reliable electricity was a concern for residents. In summary the proposed Red Sands Solar East SEF is in congruence with national provincial and local policies and frameworks and is supported by policy.
	2.1.2. Spatial priorities and desired spatial patterns (e.g. need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.),	Northern Cape Spatial Development Framework, 2018 The interior parts of the Province and the Namaqualand coast have been identified as having potential for renewable energy production and targets have been put in place for 25% of the provinces' energy generation capacity to be acquired from renewable energy projects such as wind, solar, thermal, biomass and hydroelectricity by the year 2020.
	2.1.3. Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.)	The current zoning of the property is agricultural. An application will be submitted to the municipality for approval. The proposed SEF will fit into the current landscape as this is evolving to accommodate renewable energy project potentially proposed for the area.
	2.1.4. Municipal Economic Development Strategy ("LED Strategy")	Nama-Khoi Local Municipality Integrated Development Plan (IDP) 2021/2022: The IDP indicates the municipalities commitment to providing basic services and infrastructure to the community, of which electricity is a major component, as access to reliable electricity was a concern for residents.

2.2. Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area?	2.2.1. Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?	The proposed development will contribute towards local economic development and skills development programs of the two local and two district municipalities through the support and co-operation between public and private sectors, creation of employment and business opportunities, and the opportunity for skills development and on-site training during both construction and operation phases.
2.3. How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities		The proposed development will contribute towards the local economic development strategies of the municipalities through the creation of employment and business opportunities, and the opportunity for skills development and on-site training during both construction and operation phases. In addition, the proposed development will also create local business opportunities benefitting the socio-economic development of the local communities.
2.4. Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long-term?29 Will the impact be socially and economically sustainable in the short- and long-term?		SEFs are socially and economically sustainable in the short and long term. Social economic development contributions are concentrated in the immediate vicinity of the SEF benefiting the local community.
2.5. In terms of location, describe how the placement of the proposed development will:	2.5.1. result in the creation of residential and employment opportunities in close proximity to or integrated with each other	During the construction phase of the proposed SEF, employment opportunities will be created, for low-skilled workers, semi-skilled and for skilled personnel. Members from the local communities are likely to be in a position to qualify for the majority of the low skilled and a proportion of the semi-skilled positions. The typical lifespan of SEFs is 20 to 25 years. During the operational phase there will be a significant decrease in employment opportunities. It should be noted that the majority of the semi- and low skilled employment opportunities are likely to be available to the local communities, which will present a positive social benefit to these communities due to the low availability of employment opportunities

		in these areas. The recruitment process and the requirements for each skill level and each employment opportunity need to be clearly communicated to local communities to ensure that no unrealistic expectations are created.
	2.5.2. reduce the need for transport of people and goods	The need for transport of people and goods will be increased during the construction phase. Most staff employed will live within the local community or surrounding areas thereby lowering carbon footprints are predicted due to the commercial forms of transport that will be employed to move the workforce (e.g. public transport, contractor buses).
	2.5.3. result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport)	N/A
	2.5.4. compliment other uses in the area	Local communities and their service providers will benefit from the socio-economic development provided by the SEF and current land use will be able to continue.
	2.5.5. be in line with the planning for the area	The proposed SEF is in line with applicable international, national, provincial and local planning strategies.
	2.5.6. for urban related development, make use of underutilised land available with the urban edge	The proposed development occurs away from the urban edge and within rural portion of the geographical area.
	2.5.7. optimise the use of existing resources and infrastructure	Solar energy is a renewable, clean resource and reduces pollution and the reliance on non-renewable fossil fuels and water for electricity generation. Existing access roads will be utilised wherever possible. The existing Eskom substation has the capacity to support this development. It is expected that any construction water required will be delivered by tankers. Waste removal will be in accordance with best practice by qualified waste removal contractors to the nearest registered landfill. Portable sanitation facilities will be utilised during construction, so that no connection to the local sewerage system will be required.

		Any additional infrastructure required will be constructed by the developer.
	2.5.8. opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement)	Solar energy is a renewable, clean resource and reduces pollution and the reliance on non-renewable fossil fuels and water for electricity generation, this will contribute to the electrical bulk services for the region.
	2.5.9. discourage "urban sprawl" and contribute to compaction/densification	Not applicable as the proposed development site lies within rural areas.
	2.5.10. contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs	The existing Eskom substation has capacity for additional energy generation. The proposed development will utilise this existing capacity. The project will contribute to economic and infrastructure development in the Northern Cape Province, in line with the Provincial Development and Resource Management Plan.
	2.5.11. encourage environmentally sustainable land development practices and processes	Construction of the renewable energy SEF project will assist South Africa in transitioning from a carbon-intensive resource use economy to a sustainable low carbon footprint economy. Sustainable land development is an overarching aspect of the proposed project development.
	2.5.12. take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.)	Feasibility of access for solar panels and mounting infrastructure, the site is easily accessible from the main roads; Close proximity to the Eskom grid with available evacuation capacity; Viable solar resource, therefore suited to solar farm development; The proposed site is agricultural land with low agricultural potential and willingness of landowners to host a solar farm on their properties.
	2.5.13. the investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential)	The proposed development will create jobs and contribute towards socio-economic development in an area that does not have high economic potential. The SEF is likely to result in significant positive socio-economic opportunities.
	2.5.14. impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area	Impacts to the cultural landscape are unavoidable but only of a medium significance and no other aspects of heritage are expected to be impacted significantly. The area is currently being developed to accommodate various solar farms, therefore the sense of place is

		currently changing and the proposed SEF will fit into the change in sense of place.
	2.5.15. in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?	The proposed development is predicted to support the creation of a more integrated settlement.
2.6. How were a risk-averse and cautious approach applied in terms of socio-economic impacts?	2.6.1. What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	Please refer to section 1.3 for a detailed list of Assumptions and Limitations. This report is based on a project description and site plan, provided by the applicant, which has not been approved by DFFE at the current stage of the project. The project description and site plan may undergo refinements before being regarded as final. A project description based on the final design will be concluded once DFFE has provided feedback on the layout provided in this report. Descriptions of the natural and social environments are based on fieldwork, available literature and desktop analysis. It should be emphasised that information, as presented in this document, only has reference to the study area as indicated on the accompanying maps. Therefore, this information cannot be applied to any other area without a detailed investigation being undertaken.
	2.6.2. What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?	The risk due to limits of current knowledge is considered to be low due to the positive socioeconomic impact expected from the proposed SEF.
	2.6.3. Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	A risk-averse and cautious approach was utilised throughout the impact assessment process by all specialists.
2.7. How will the socio-economic impacts resulting from this development impact on people's	2.7.1. Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	Negative social impacts relating to the proposed SEF has been assessed by the specialist. Appropriate mitigation measures were provided. Please refer to Section 6.9.

environmental right in terms following:	2.7.2. Positive impacts. What measures were taken to enhance positive impacts?	Positive impacts were identified by the Social Specialist, refer to Section 6.9
2.8. Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socio-economic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?		There is a potential that the proposed SEF will place a strain on services and the ecological environment. The relevant specialist have accounted for these impacts and provided mitigation measures.
2.9. What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?		The site sensitivity map identified the most suitable areas for development for which a development layout was then produced for assessment. The results of the specialist's studies, including interviews by the Social Specialist, and PPP, further informed the development of the updated site layout.
2.10. What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)?34 Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?		The proposed development aligns with a variety of planning policies that consider environmental and spatial justice.
2.11. What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?		The proposed development will contribute to equitable access by supplying electricity to the national grid, and by providing local and regional socioeconomic benefits in terms of the REIPPPP Economic Development requirements, which includes a BBBEE scorecard on which solar projects are evaluated.
2.12. What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?		Construction, operation and decommissioning of the proposed development will be done according to environmental health and safety legislative requirements and applicable guidelines.
2.13. What measures were taken to:	2.13.1. ensure the participation of all interested and affected parties	Public participation is being undertaken according to NEMA: EIA Regulations (2014) as amended and DEA (2017) Public Participation Guidelines.

	2.13.2. provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation	The PPP is being undertaken in terms of legislative requirements and best practise guidelines. All notifications are provided in English.
	2.13.3. ensure participation by vulnerable and disadvantaged persons,	The PPP is being undertaken according to best practise guidelines; Notification of initiation of the PPP was provided in all required channels, i.e. newspaper adverts, site notices, local posters and written notifications.
	2.13.4. promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means,	The proposed development fits into the various planning policies
	2.13.5. ensure openness and transparency, and access to information in terms of the process	Legislative requirements and best practise guidelines are followed throughout the process. The PPP is being undertaken in terms of legislative requirements and best practise guidelines.
	2.13.6. ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge	A PPP is being undertaken in terms of legislative requirements and best practise guidelines. A Social Impact Assessment forms part of the process.
	2.13.7. ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein were be promoted	The PPP that are conducted according to legislation and guidelines ensure that women and youth are recognised and involved in the process.
2.14. Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g.. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?		The proposed SEF has a good planning fit with all applicable policies and will result in substantial local socio-economic opportunities. The key challenges facing the region are poverty and inequality and a shortage of skills.

		As such the proposed development will be of benefit to the local area by creating job and business opportunities, particularly for unskilled and semi-skilled local workers.
2.15. What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?		Future workers on the proposed development will be educated on their rights to refuse work.
2.16. Describe how the development will impact on job creation in terms of, amongst other aspects:	2.16.1. the number of temporary versus permanent jobs that will be created,	Temporary employment opportunities will be created during the construction phase and permanent employment opportunities will be created for the operational phase of the proposed development for skilled and unskilled workers
	2.16.2. whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area),	The majority of the semi- and low-skilled employment opportunities are likely to be available to the local communities, which will present a positive social benefit to these communities due to the low availability of employment opportunities in these areas.
	2.16.3. the distance from where labourers will have to travel,	It is expected that most workers will reside in the nearby towns.
	2.16.4. the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits),	The majority of employment opportunities associated with the operational phase is likely to benefit the community. It will also be possible to increase the number of local employment opportunities through the implementation of a skills development and training programme linked to the operational phase. The local hospitality industry is likely to benefit from the operational phase. These benefits are associated with site visits by company staff members and other professionals (engineers, technicians etc.) who are involved in the company and the project but who are not linked to the day-to-day operations. Procurement during the operational phase will also create opportunities for the local economy and businesses.
	2.16.5. the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).	The creation of jobs associated with the proposed SEF represents a high opportunity cost, as the employment by current agriculture operations is very low, and could continue.

2.17. What measures were taken to ensure:	2.17.1. that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment	All applicable planning policies and legislation were considered. The proposed development fits with all planning policies. Organs of State were pre-identified and registered on the I&AP database.
	2.17.2. that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?	As registered I&APs all public correspondence including notifications of reports availability are provided.
2.18. What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?		The proposed development aims to uphold the principles of sustainable development. The project team consists of suitably qualified individuals that comply with all legal requirements.
2.19. Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?		Specialist mitigation measures were identified during the EIA process and provided in the BAR. Refer to Section to Section 6.6-Section6.12
2.20. What measures were taken to ensure that he costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?		An EMPr is submitted with BAR. The EMPr is a legally binding document, which when enforced during construction, operational or decommissioning phases, hold the applicant or their representative liable for any remedial actions as a result of negligence.
2.21. Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?		The alternative selection process includes the assessment of the No Development alternative, site alternatives, design layout alternatives and technology alternatives.
2.22. Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area?		Specialist identified cumulative impacts during the EIA process and provided in the BAR. Refer to Section to Section 6.6-Section6.12

3 LEGAL CONTEXT

The DFFE is Competent Authority for this project. The legislative and policy context of the Report is described in detail below.

3.1 NATIONAL ENVIRONMENTAL SCREENING TOOL AND ENVIRONMENTAL THEME PROTOCOLS

3.1.1 Screening Report

The Minister of Environment, Forestry and Fisheries, gave notice that the submission of a report generated from the national web-based environmental screening tool[1], as contemplated in Regulation 16(1)(b)(v) of the Environmental Impact Assessment Regulations, 2014, published under Government Notice No. R982 in Government Gazette No. 38282 of 4 December 2014, as amended, will be compulsory from 4 October 2019 when submitting an application for environmental authorisation in terms of regulation 19 and regulation 21 of the Environmental Impact Assessment Regulations, 2014.

In addition, a set of protocols that an applicant needs to adhere to in the Environmental Authorisation (EA) process were developed and on 20 March 2020 the Minister of Forestry, Fisheries and the Environment gazetted the Protocols for national implementation purposes. The gazette '*Procedures to be followed for the Assessment and Minimum Criteria for Reporting of Identified Environmental Themes in terms of Section 24(5)(a) and (h) of the National Environmental Management Act (1998) when Applying for Environmental Authorisation*', has protocols that have been developed for environmental themes which include agriculture, avifauna, biodiversity (Terrestrial and Aquatic Biodiversity), noise, defence and civil aviation.

The protocols set requirements for the assessment and reporting of environmental impacts of activities requiring EA. The higher the sensitivity rating of the features on the proposed site as identified by the screening tool report, the more rigorous the assessment and reporting requirements.

Based on the generated screening report, all environmental theme sensitivities are indicated in Table 3-1 below.

Table 3-1: Environmental themes from Screening Tool which needs to adhere to in the Environmental Authorisation process.

Theme	Very High sensitivity*	High sensitivity*	Medium sensitivity	Low sensitivity
Agriculture Theme				
Animal Species Theme				
Aquatic Biodiversity Theme				
Archaeological and Cultural Heritage Theme				
Avian Theme				
Civil Aviation (Solar PV) Theme				
Defence Theme				
Landscape (Solar PV) Theme				

[1] https://screening.environment.gov.za/screeningtool/#/pages/welcome

Paleontology Theme				
Plant Species Theme				
RFI Theme				
Terrestrial Biodiversity Theme				

* Require full assessments.

All the environmental themes followed the relevant protocols (20 March 2020; 30 October 2020) and accompanied guidelines (SANBI 2020) to assess and verify the sensitivities.

3.2 RENEWABLE ENERGY AUTHORISATION REQUIREMENTS

The legislative and policy context of this Report is detailed below.

Constitution of the Republic of South Africa, Act 108 of 1996

The Constitution of the Republic of South Africa is the supreme law of the country and underpins all environmental legislation. As such, any law or conduct that is inconsistent with the Constitution is invalid (Constitution, 1996). The Constitutional environmental right is included in section 24, which states:

"Everyone has the right—

(a) to an environment that is not harmful to their health or well-being; and

(b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that—

(i) prevent pollution and ecological degradation;

(ii) promote conservation; and

secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development".

The constitution also gives provision in section 27(1)(b) which states that everyone has the right to have accesses to sufficient water and section 27(2) requires the state to take reasonable and other measures, within its available resources, to achieve the progressive realization of each of these rights.

The Constitution of the Republic of South Africa forms the foundation of all environmental principles and management in the country and it is enshrined in all legislation. Such legislation is discussed below with specific reference to the environment.

National Environmental Management Act (Act 107 of 1998 as amended) and EIA Regulations (2014, as amended)

The National Environmental Management Act (NEMA; No. 107 of 1998, as amended) gives effect to the Constitution of the Republic of South Africa by providing a framework for cooperative environmental governance and environmental principles that enable and facilitate decision-making on matters affecting the environment.

Chapter one of the NEMA outlines national environmental management principles that must be incorporated into all decisions regarding the environment, throughout the country by all organs of state. Central to these principles is the concept of sustainability, which entails meeting the needs of the present generation without compromising the ability of future generations to meet their own needs.

Chapters two to three of the NEMA outline government and non-government institutions and their responsibilities for ensuring co-operative governance and making decisions.

Chapter 5 of NEMA provides for integrated environmental management. The purpose of this Chapter is to promote the application of appropriate environmental management tools in order to ensure the integrated environmental management of activities. Section 24 (1) specifically states:

> *"In order to give effect to the general objectives of integrated environmental management laid down in this Chapter. the potential impact on—*
>
> *(a) the environment;*
>
> *(b) soclo-economic conditions: and*
>
> *(c) the cultural heritage,*
>
> *of activities that require authorisation or permission by law and which may significantly affect the environment, must be considered, investigated and assessed prior to their implementation and reported to the organ of state charged by law with authorizing, permitting, or otherwise allowing the implementation of an activity*."

NEMA requires that an environmental authorisation be issued by a competent authority (CA) before the commencement of a listed activity in terms of the Environmental Impact Assessment Regulations Listing Notices for Basic Assessment or scoping & Environmental Impact Assessment (S&EIA).

Legal Requirements as per the EIA Regulations, 2014 (as Amended)

In South Africa, EIA became a legal requirement in 1997 with the promulgation of regulations under the Environment Conservation Act (ECA). Subsequently, NEMA was passed in 1998. Section 24(2) of NEMA empowers the Minister and any MEC, with the concurrence of the Minister, to identify activities which must be considered, investigated, assessed and reported on to the competent authority responsible for granting the relevant environmental authorisation. On 21 April 2006 the Minister of Environmental Affairs and Tourism promulgated the first EIA regulations in terms of Section 24 of NEMA. These EIA regulations, under sections 24(5) and 44 of NEMA, were updated in June 2010 and again in December 2014. In April 2017, the 2014 EIA regulations were amended.

Environmental authorisation for an activity may only be issued by the competent authority (CA) after the developer has complied with the procedural requirements as set out in the 2014 EIA regulations of NEMA.

NEMA, as amended, establishes the principles for decision-making on matters affecting the environment. Section 2 sets out the National Environmental Management Principles which apply to the actions of organs of state that may significantly affect the environment. Accordingly, NEMA identifies activities that require authorisation prior to commencement. Such activities listed in the 2014 EIA Regulations (GN R982) are detailed in Table 3-2.

Table 3-2: Listed activities triggered by the proposed Red Sands Solar East SEF.

Government Notice	Activity Number	Description	Aspect of the Project
Listing Notice 1: R.327 as amended on 7 April 2017	11	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;	Underground cables for the transmission of electricity generated by the PV panels to the onsite switching station.
	12	The development of – (ii) infrastructure or structures with a physical footprint of 100 square meters or more; where such development occurs- (a) within a watercourse; or (c) within 32 meters of a watercourse, measured from the edge of a watercourse	The proposed PV panels and associated infrastructure including access roads and laydown areas during the construction phase located within a watercourse or the 32m buffer area. The final placement of all infrastructures will be refined during the process, and avoid the watercourse and indicated buffer as far as possible.
	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 metres or more but not exceeding 500 cubic metres.	Storage of fuel, oil and other chemicals on site could trigger this activity. The volumes are not known but will have a combined capacity of between 80 and 500 m^3.
	19	The infilling or depositing of any material of more than 10 m^3 into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 m3 from a watercourse;	The infilling or depositing of any material of more than 10m^3 into a watercourse may be triggered with the construction of internal service roads or cables across drainage lines.
	24	The development of a road -	Roads are required throughout the construction and operational stages of the project during the

Government Notice	Activity Number	Description	Aspect of the Project
		(ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres.	construction phase, roads will be approximately 10m wide for the delivery of turbine parts and other equipment, and approximately 8m wide during the operational phase for maintenance purposes.
	28	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes of 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.	The current land use of the proposed farm on which the project is proposed is agriculture. The development is outside an urban area and the development footprint is > 1 ha (approximately 771 ha)
	56	The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre – (ii) where no reserve exists, where the existing road is wider than 8 metres	The widening of portions of existing roads or the lengthening of roads will be required to accommodate the logistical construction requirements to access the site and associated infrastructure.
Listing Notice 2: R.325 as amended on 7 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.	The Red Sands Solar East SEF will consist of PV panels with a capacity of up 240MW, depending on the available technology at the time of construction.
	15	The clearance of an area of 20 hectares or more of indigenous vegetation.	The total area to be cleared is expected to be approximately 771 ha, depending on the final layout. This includes PV Panel placement, roads, and other permanent infrastructure. During the construction phase, some areas will be cleared for the laydown, storage and assembly areas which will be rehabilitated post construction.
Listing Notice 3: R.324 as amended on 7 April 2017	10	The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic meters. g. Northern Cape ii. Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland;	A CBA runs through the study area and wetlands or watercourse is present throughout the study area. The exact location of the storage and handling of dangerous goods are not yet known, but the necessary precaution will be taken and where possible these areas will be avoided. It is possible that this activity may become redundant after the necessary steps have been taken.

Government Notice	Activity Number	Description	Aspect of the Project
	18	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre. g. Northern Cape ii. Outside urban areas: (ii) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland	Upgrades of existing roads are to take place within a watercourse. The existing roads, including the access roads, need to be expanded by >4m.

National Environmental Management: Biodiversity Act (Act 10 of 2004 as amended)

The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004 as amended) ("NEMBA") aims to provide for the management and conservation of South Africa's biodiversity within the framework of the NEMA, the protection of species and ecosystems that warrant national protection, the sustainable use of indigenous biological resources and the fair and equitable sharing of benefits arising from bio-prospecting involving indigenous biological resources. The Act places severe restrictions on activities that could have adverse effects on threatened or protected species.

The purpose of the NEMBA includes:

- the management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act, 1998;
- the protection of species and ecosystems that warrant national protection; and
- the sustainable use of indigenous biological resources and the fair and equitable sharing of benefits arising from bio-prospecting involving indigenous biological resources.

Provision is made for protection of threatened or protected ecosystems and species as well as provisions guarding against the introduction of alien and invasive species. The Act identifies restricted activities involving listed threatened, protected or alien species. These activities include picking parts of, or cutting, chopping off, uprooting, damaging or destroying, any specimen of a listed threatened or protected species. As stipulated in Section 57 of the Act, a person may not carry out a restricted activity involving a specimen of a listed threatened or protected species without a permit issued in terms of Chapter 7. Lists of critically endangered, endangered, vulnerable and protected species in GNR 151 of 23 February 2007 and List of threatened ecosystem 2011 have been published under NEMBA. Regulations have also been promulgated on Threatened and Protected Species in GNR 324 (29 April 2014). These lists and associated restricted activities as well as the regulations need to be taken into account during the implementation of any renewable energy development activities as well as during assessments for authorisations associated with these activities in terms of other legislation.

Application may be made for a permit to engage in restricted activities, which application may be subject to various stringent requirements as set out in Section 88 of the NEMBA. The CA responsible for administrating the NEMBA is dependent on the province in which the activity is taking place.

Environmental Conservation Act, Act No. 73 of 1989 (ECA)

In terms of section 25 of the ECA, the national Noise Control Regulations (GN R154 in Government Gazette No. 13717 dated 10 January 1992) (NCR) was promulgated. The NCRs were revised under Government Notice Number R55 of 14 January 1994 to make it obligatory for all authorities to apply the regulations. Currently, no provincial or local regulations exist in the Northern Cape and no approval is required. A noise assessment forms part of this BAR and the impact assessment and identified mitigation measures are included with requirements included in the EMPr.

National Environmental Management: Air Quality Act (Act 39 of 2004 as amended)

The National Environment Management: Air Quality Act (NEMAQA) serves to repeal the Atmospheric Pollution Prevention Act (45 of 1965) and various other laws dealing with air pollution.

According to the Act, the DEA, the provincial environmental departments and local authorities are separately and jointly responsible for the implementation and enforcement of various aspects of the Air Quality Act.

Although no major air quality issues are expected, the Applicant needs to be mindful of the Act as it also relates to potential dust generation during construction.

National Environmental Management: Waste Act (Act 59 of 2008 as amended)

The National Environmental Management: Waste Act (NEMWA) came into effect on 1 July 2009. Section 19 of the NEMWA provides for listed waste management activities and states in Section 19(1) that the Minister may publish a list of waste management activities that have or are likely to have a detrimental effect on the environment. Such a list was published in GN 921 of 29 November 2013, identifying those waste management activities that require a Waste Management Licence in terms of the Act. Activities are defined within Category A (non-hazardous) and Category B (hazardous) Category C (lower threshold in terms of waste volumes) wastes.

There are no listed activities which require authorisation. The Applicant must ensure that all activities associated with the project address waste related matters in compliance with the requirements of the Act and must consult with the local municipality to ensure that all waste is disposed of at a registered landfill site.

National Water Act (Act 36 of 1998 as amended)

The National Water Act (NWA) includes provisions requiring that a water use license be issued by the Department of Water & Sanitation (DWS) before a project developer engages in any activity defined as a water use in terms of the NWA. Water use definitions considered probably or possibly relevant to Renewable Energy projects in terms of the NWA, section 21 includes:

- Taking of water from a water resource;
- Storing of water;

- Impeding or diverting the flow of water in a water course;
- Engaging in a stream flow reduction activity;
- Engaging in a controlled activity (this includes the use of water for power generation purposes);
- Disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;
- Altering the bed, banks, course, or characteristics of a watercourse. This includes altering the course of a watercourse (previously referred to as a river diversion).

An authorisation might be required in terms of Section 21 (b), (c) and (i) in the form of a Water Use License Application (WULA). A WULA will be submitted with the DWS.

National Heritage Resources Act (No. 25 of 1999)

National Heritage Sites in South Africa are places that that are of historic or cultural importance and which are for this reason declared in terms of Section 27 of the National Heritage Resources Act (NHRA). The designation was a new one that came into effect with the introduction of the Act on 1 April 2000 when all former National Monuments declared by the former National Monuments Council and its predecessors became provincial heritage sites as provided for in Section 58 of the Act.

Both national and provincial heritage sites are protected under the terms of Section 27 of the NHRA and a permit is required to work on them. National Heritage Sites are declared and administered by the national Heritage Resources Authority, SAHRA whilst provincial heritage sites fall within the domain of the various provincial heritage resources authorities. Heritage resources are protected by the Act and may not be disturbed in any way without a permit issued by the South African Heritage Resources Agency or the relevant Provincial Heritage Resources Authority. Section 38(1) of the NHRA stipulates the triggers which would require a Heritage Impact Assessment (HIA) to become part of an EIA submitted for consideration by the relevant state department. Since the development is less than 5ha and no features have been found on site, an exclusion has been submitted to SAHRA for approval.

Conservation of Agricultural Resources Act (CARA; Act 43 of 1983)

The purpose of this Act is to ensure that natural agricultural resources of South Africa are conserved through maintaining the production potential of land, combating and preventing erosion, preventing the weakening or destruction of water sources, protecting vegetation, and combating weeds and invader plants.

As per the Screening Tool generated, the Agricultural Potential is considered low. There are currently no agricultural activities, not even grazing, taking place on the property. Where required, measures for addressing erosion, protection of vegetation and water sources and managing alien plants will be included in the EMPr.

Spatial Planning and Land Use Management Act (SPLUMA; Act 16 of 2013)

SPLUMA aims to confirm and regulate the role of municipalities in land-use planning and land-use management. Two of the most relevant objectives of the SPLUMA are to ensure that the system of spatial planning and land use management promotes social and economic inclusion and to provide for the sustainable and efficient use of land.

The Act provides that spatial planning consists of:

- Spatial development frameworks adopted at each level of government;
- Development principles, norms and standards;
- The management and facilitation of land use through land-use schemes; and
- Procedures to deal with and decide on development applications provided for in national and provincial legislation.

The national, provincial and local governments are instructed to adopt spatial development frameworks (SDFs). SDFs must 'guide planning and development decisions across all sectors'. At different levels of government the SDFs intended to guide some of the following:

- National Spatial Development Framework (NSDF) - must indicate the desired patterns of land use in South Africa;
- Provincial Spatial Development Framework (PSDF) - must provide a spatial representation of the province's land development policies, strategies and objectives and must indicate desired and intended patterns of land use and, importantly, delineate areas in which development would not be appropriate;
- Regional Spatial Development Framework (RSDF) – will be imposed if when a municipality fails to adopt or amend an MSDF the Minister may step in, declare a region and adopt an RSDF for that region and when it is 'necessary to give effect to national land-use policies or priorities' the Minister may do the same; and
- Municipal Spatial Development Framework (MSDF) - identify current and future significant structuring and restructuring elements of the spatial form of the municipality, including development corridors, activity spines and economic nodes where public and private investment will be prioritised and facilitated.

The proposed development needs to comply with the surrounding landscape, and must apply for a land use change with the relevant municipality since the land is classified as agricultural use.

National Roads Act (Act. 93 of 1996)

This Act provide for co-operative and co-ordinated strategic planning, regulation, facilitation and law enforcement in respect of road traffic matters by the national, provincial and local spheres of government.

The National Roads Act 93 of 1996 makes provision for regulating the transportation of dangerous goods and substances by road. Section 275 states that, no person shall operate on a public road any vehicle in or on which dangerous goods is transported, unless such dangerous goods is transported in accordance with Chapter VIII of the Act. Chapter VIII also incorporates the SABS standard specifications relating the transportation of dangerous goods and substances. Section 279 indicates the availability of an authority for classification and certification of dangerous goods should there be any doubt as to the appropriate classification of dangerous goods.

Certain vehicles and loads cannot be moved on public roads without exceeding the limitations in terms of the dimensions and/or mass as prescribed in the Regulations.

Civil Aviation Act (Act 13 of 2009)

Civil aviation in South Africa is governed by the Civil Aviation Act, 2009 (Act 13 of 2009). This Act provides for the establishment of a stand-alone authority mandated with controlling, promoting, regulating, supporting, developing, enforcing and continuously improving levels of safety and security throughout the civil aviation industry. This mandate is fulfilled by the South African Civil Aviation Authority (SA CAA) as an agency of the Department of Transport (DoT). The SA CAA achieves the objectives set out in the Act by complying with the Standards and Recommended Practices (SARPs) of the International Civil Aviation Organisation (ICAO), while considering the local context when issuing the South African Civil Aviation Regulations (SA CARs). All proposed developments or activities in South Africa that potentially could affect civil aviation must thus be assessed by SACAA in terms of the SA CARs and South African Civil Aviation Technical Standards (SA CATS) in order to ensure aviation safety.

The Obstacle Evaluation Committee (OEC) which consists of members from both the SA CAA and South African Air Force (SAAF) fulfils the role of streamlining and coordinating the assessment and approvals of proposed developments or activities that have the potential to affect civil aviation, military aviation, or military areas of interest. With both being national and international priorities, the OEC is responsible for facilitating the coexistence of aviation and renewable energy development, without compromising aviation safety.

Comments from the OEC are required to ensure the safety of aircrafts. No Comments have been received to date, follow ups will be made during the BAR comment period.

3.3 RENEWABLE ENERGY DEVELOPMENT ZONE

On 17 February 2016, Cabinet approved the Renewable Energy Development Zones (REDZs) for large scale wind and solar photovoltaic development and associated Strategic Transmission Corridors (STC) which support areas where long term electricity grid will be developed.

The procedure to be followed in applying for EA for a large-scale project in a REDZ or in a Power Corridor was formally gazetted on 16 February 2018 in GN113 and GN114. New wind or PV projects located within one of the eight REDZ areas, and new electricity grid expansion within the 5 Strategic Transmission Corridors are subject to a Basic Assessment and not a full EIA process, as well as a shortened timeframe of 147 days (90 day BA process and 57 decision-making process).

The proposed Red Sands Solar East SEF is located in a REDZ 8, Springbok. Accordingly, a Basic Assessment (BAR) is required for the SEF, and a BA process will be applied for the grid connection.

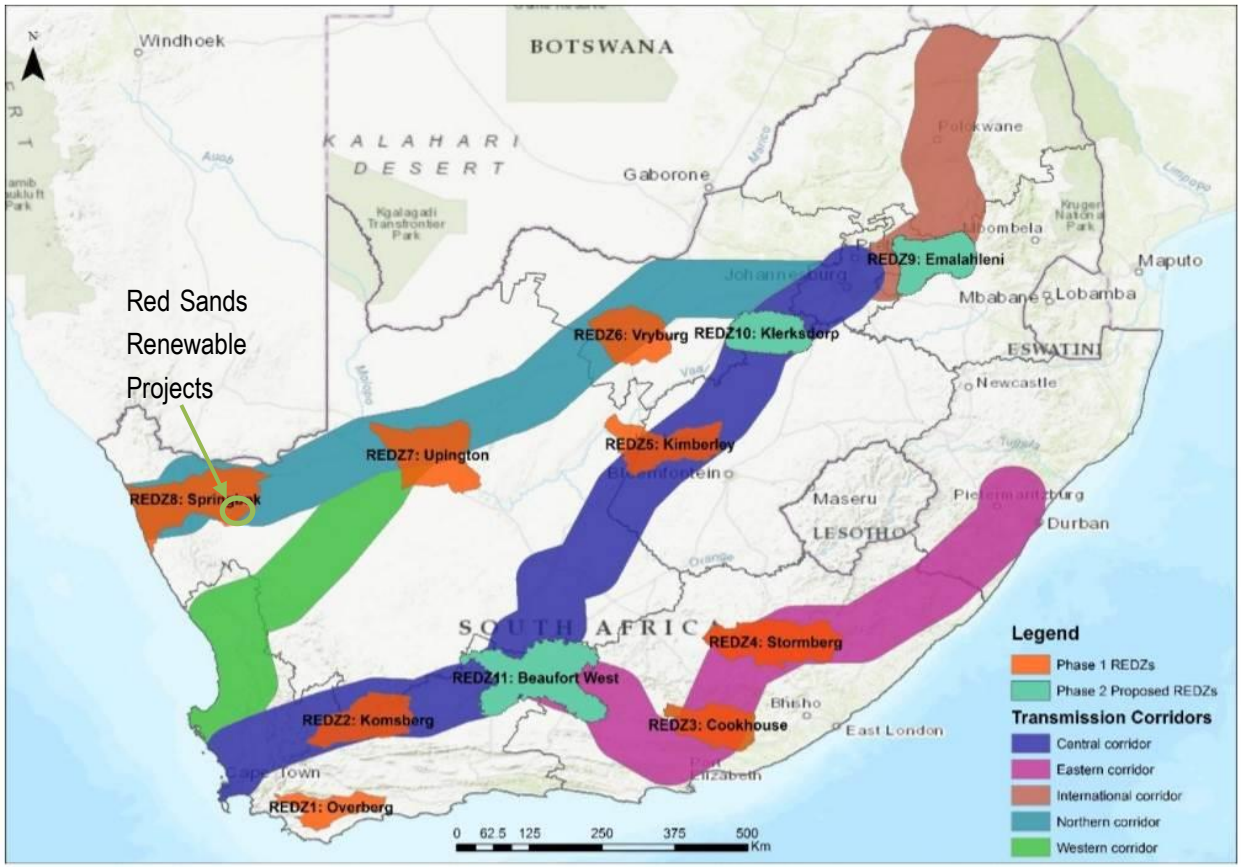

Figure 3-1: Location of eight existing Renewable Energy Development Zones (REDZs) overlayed onto the electricity grid infrastructure corridors (Source: CSIR). The proposed project area is circled in green.

4 BASIC ASSESSMENT (BA)PROCESS

The Basic Assessment (BA) will commence once the environmental authorisation application has been submitted with the competent authority (in this case Department of Forestry, Fisheries and the Environment - DFFE).

The requirements for the submission of the BA to competent authority is specifically contained in Chapter 4 Part 2 of the NEMA Reg No 326 (amended on 7 April 2017) and in terms of GN 114 (gazetted on 16 February 2018, as amended. The BA process has a shortened timeframe of 147 days to complete (90 days for BA and 57 days for competent authority to review). The applicant must, within 90 days of receipt of the application by the competent authority, submit to the competent authority a Basic Assessment Report (BAR) which has been subjected to a public participation process of at least 30 days and which reflects the incorporation of comments received, including any comments of the competent authority. The competent authority must, within 57 days of receipt of a BAR, make a decision.

The Basic Assessment process will follow the following procedures:

- Project and baseline environmental information is collated. Baseline information for the report is gathered through visual inspections during field visits of the proposed project area and surroundings, desktop studies which include GIS mapping, and review of existing reports, guidelines and legislation.
- Landowners, adjacent landowners, local authorities, environmental authorities, as well as other stakeholders which may be affected by the project, or that may have an interest in the environmental impacts of the project are identified.
- Interested and affected parties (I&APs) are informed about the proposed project.
- Environmental authorities are consulted to confirm legal and administrative requirements.
- Environmental issues and impacts are identified and described.
- Development alternatives are identified and evaluated, and non-feasible development alternatives are eliminated.
- Specialist investigations are undertaken in accordance Appendix 6 of the EIA regulations as well as the relevant and applicable protocols;
- An evaluation of development alternatives and identification of a proposed option.
- An assessment of existing impacts (no-go development option), environmental impacts that may be associated with the proposed project option, and cumulative impacts using the impact assessment methodology.
- Identification of mitigation measures to address the environmental impacts and development of actions required to achieve the mitigation required.
- Consultation with I&APs.
- Incorporation of public comment received during the 30-day comment period.
- After the draft BAR is reviewed, comments received are incorporated in the final BAR and Environmental Management Program (EMPr) is submitted to the Competent Authority for review.
- Issuing of the final BAR for review by the Competent Authority.

The requirements for the BAR process are specifically contained in Chapter 4 Part 2 of the NEMA Reg No 326 (amended on 7 April 2017), Appendix 1 of the regulations and in terms of GN 114 (gazetted on 16 February 2018, as amended. The BAR process can take up to of 147 days (90 day BA process and 57 decision-making process).

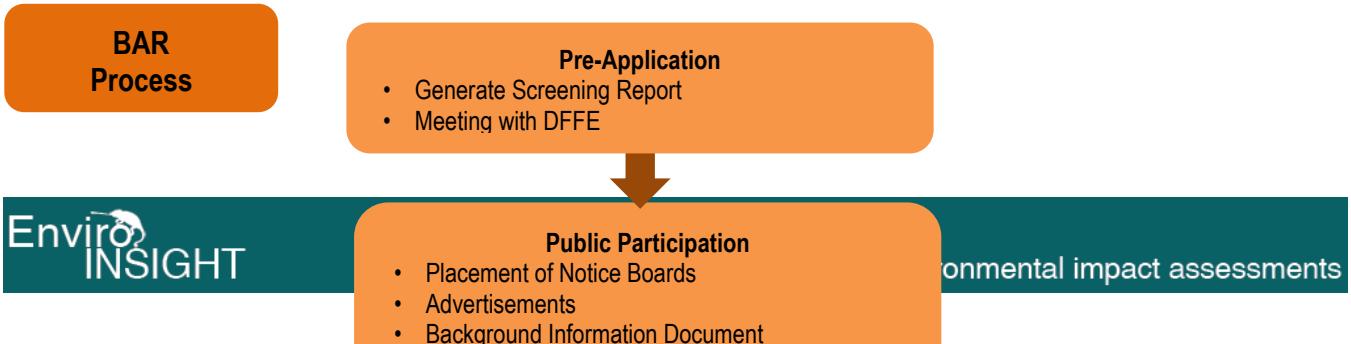

Figure 4-1: The Basic Assessment Process in terms of the EIA Regulations (2014, as amended).

5 PUBLIC PARTICIPATION

The Public Participation Process (PPP) was developed to ensure compliance with environmental regulatory requirements and to provide I&APs with an opportunity to evaluate the proposed project. During this process stakeholders are able to provide

inputs and to receive feedback from the environmental specialists, other stakeholders and the competent authority. Please refer to Appendix E for the Public Participation Report.

The current EIA process for the proposed Red Sands Solar East SEF has been subjected to a rigorous PPP both during the project.

5.1. OBJECTIVES OF PUBLIC PARTICIPATION

- Provide Stakeholders and Interested and Affected parties (I&APs) with an opportunity to voice their support or concerns and raise questions regarding the project, application or decision made by the CA;
- Provides an opportunity for I&APs, EAP and the CA to obtain clear, accurate and understandable information about the environmental, social and economic impacts of the proposed activity or implications of a decision;
- Provide Stakeholders, I&APs, and the CA with the opportunity of suggesting ways of reducing or mitigating negative impacts of an activity and for enhancing positive impacts;
- Enable the applicant / EAP to incorporate the needs, preferences and values of affected parties into the process and submitted reports for review.

5.2. LEGISLATION

The PPP must comply with the several important sets of legislation that require public participation as part of an application for authorisation or approval, namely:

- The National Environmental Management Act (Act No. 107 of 1998 - NEMA);
- The EIA Regulations (2014, as amended);
- Guidelines for Public Participation (2017)

Adherence to the requirements of the above-mentioned Acts will allow for an Integrated PPP to be conducted, and in so doing, satisfy the requirement for public participation referenced in the Acts. The details of the Integrated PPP are provided below.

Adherence to the requirements of the above-mentioned Acts and Regulations will allow for effective PPP to be conducted, and in so doing, satisfy the requirement for public participation referenced in the Acts.

5.3. IDENTIFICATION OF I&APS

An I&AP database will be compiled of key stakeholders and I&AP's identified for notification of the Environmental Authorisation Application. The I&AP database includes, amongst others; landowners, affected communities, regulatory authorities and other specialist interest groups. A list of key stakeholders was identified:

- Competent Authority: Department of Forestry, Fisheries and the Environment (DFFE)
- Northern Cape Department: Agriculture, Environmental Affairs, Rural Development and Land Reform

- Department of Water & Sanitation (DWS)
- Department of Mineral Resources and Energy (DMRE)
- Department of Agriculture, Rural Development and Land Reform (DARDLR)
- Eskom
- South African Heritage Resource Authority (SAHRA)
- Namakwa District Municipality
- Nama-Khoi Local Municipality
- Civil Aviation Authority (CAA)
- BirdLife South Africa
- Endangered Wildlife Trust (EWT)

5.4. REGISTER OF I&APS

The Public Participation Process (PPP) commenced on 4 August 2022 with the site notices to notify and inform the public of the proposed project and invite I&APs to register, who has not already done so in the previous process. All individuals who register for this project will be added to the I&AP list, provided that they have given the correct and complete contact details in order to receive communications for this project. The notification procedure included (Appendix E):

- Newspaper advertisement: published in Die Plattelander on 2 September 2022;
- Site Notices: erected at prominent points along the property boundaries and noticeable places on 4 August 2022; and
- Emails were composed and sent to the identified authorities, adjacent landowners, and I&APs that have registered thus far.

5.5. BACKGROUND INFORMATION DOCUMENT

Included in the I&AP notification letters and e-mails sent out was a Background Information Document (BID). The BID includes the following information:

- Locality map and description;
- Project description and background;
- Legal framework;
- Explanation of the BAR Process to be followed; and
- Provide opportunity to get involve and comment on the proposed project.

The BID was released for comment on 11 October 2022

5.6. NOTIFICATION OF AVAILABILITY OF DRAFT REPORTS

All registered I&APs and stakeholders have been notified via email of the availability of the Draft Scoping Report for review for a period of 30 days from **4 November to 6 December 2022**. The report was made available on Enviro-Insight's website at http://www.enviro-insight.co.za/download-it/project-downloads/. CD electronic copies are also available on request from Enviro-Insight.

5.7. FEEDBACK FROM I&APS

All comments received from I&APs were recorded and responded to accordingly in Appendix E. Limited comments were received at this stage of the EIA process. from I&APs during the process.

All comments received throughout the process will be collated and included in the comments and response report included in Appendix E.

6 DESCRIPTION OF THE RECEIVING ENVIRONMENT

A description of the study area is outlined in the section below. The receiving environment in relation to each specialist study is also provided.

The following environmental aspects further described in the following subsections:

- Terrestrial Biodiversity;
- Sensitive Animal Species;
- Sensitive Plant Species;
- Avifauna;
- Aquatic Biodiversity;
- Cultural Heritage and Archaeology;
- Agriculture;
- Socio-economic;
- Traffic and Transportation;
- Electromagnetic and radio frequency interference.

Please note that some specialist studies undertook the evaluation of the WEF and SEF proposed by FE Red Sands (Pty) Ltd and that the proposed WEFs may be mentioned.

6.1 REGIONAL AREA

The proposed study area for the renewable energy developments is located approximately 77 km southwest of Pofadder and 81 km east of Springbok within the Nama-Khoi Local Municipality, in the Northern Cape. The site can be reached via a gravel

road off the N14. The Project has a extent of approximately 490.2 ha situated on a Portion of the Remaining Extent of the Farm Donkerduispraat 95 (21 digit Surveyor General code: C05300000000009500000).

6.2 TOPOGRAPHY

The general topography of the study area can be described as a relatively flat terrain with a few small, isolated hills occurring within 15 km of the study area. Overall, the surface elevation varies between 760 meters above mean sea level (mamsl) and 1064 mamsl within 15 km of the proposed project area. Over the project area the derived 35 km B82C-04394 SQR profile has a gradient equal to 0.008 clearly showing a flat topography

6.3 LAND USE

Much of the land use in the wider study area is classified as bare (Other) with bare riverbed material embedded within it and pans. Sheep farming is the dominant activity in the area even though the arid nature of the climate restricts stocking densities which has resulted in relatively large farms across the area. There is no livestock grazing activities on the study area, and the landowner has not utilised the study area for any other purposes. Furthermore, the area is sparsely populated, and human-related infrastructure is largely restricted to isolated farmsteads and gravel access roads. There are no farmsteads that are occupied on the study area.

6.4 TERRESTRIAL BIODIVERSITY

The Terrestrial Biodiversity Report was undertaken by Enviro-Insight, kindly refer to Appendix D1.

The assessment and minimum reporting requirements of this protocol are associated with a level of environmental sensitivity identified by the national web based environmental screening tool (screening tool). The requirements for terrestrial biodiversity are for landscapes or sites which support various levels of biodiversity.

Based on the screening report generated on 03/02/2021, the Terrestrial Biodiversity Combined Sensitivity Theme is indicated as Very High sensitivity. The sensitive features which trigger the Very High sensitivity include:

- Critical Biodiversity Area 1 for Red Sands Southwest WEF; and
- Ecological Support Area for Red Sands Northwest WEF, Northeast WEF and Southwest WEF.

Accordingly, a Terrestrial Biodiversity Specialist Assessment was conducted by Enviro-Insight based on the Protocols (published on 20 March 2020). The Solar Area however, did not have a high sensitivity rating, as per the screening report, the site however was evaluated during the process.

The Animal species theme is indicated as High sensitivity due to the presence of sensitive avifauna species, while the remaining taxa groups are considered to be low. The avifauna component is addressed in a separate report based on the specific protocol and guidelines.

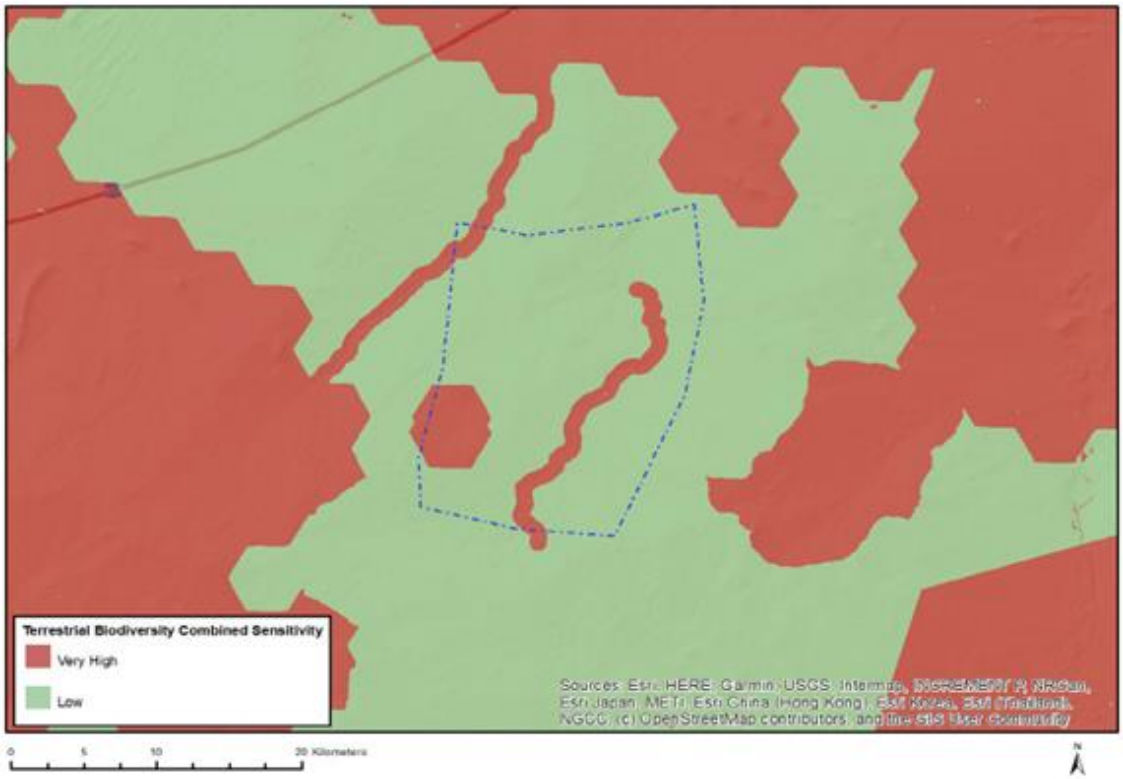

Figure 6-1: Screening Tool map of relative terrestrial biodiversity theme sensitivity.

Figure 6-2: Screening Tool map of relative animal species theme sensitivity.

The plant species theme indicated Medium sensitivity due to suitable habitat for sensitive species 144 and 12. Refer to next section discussing the site sensitivity verification.

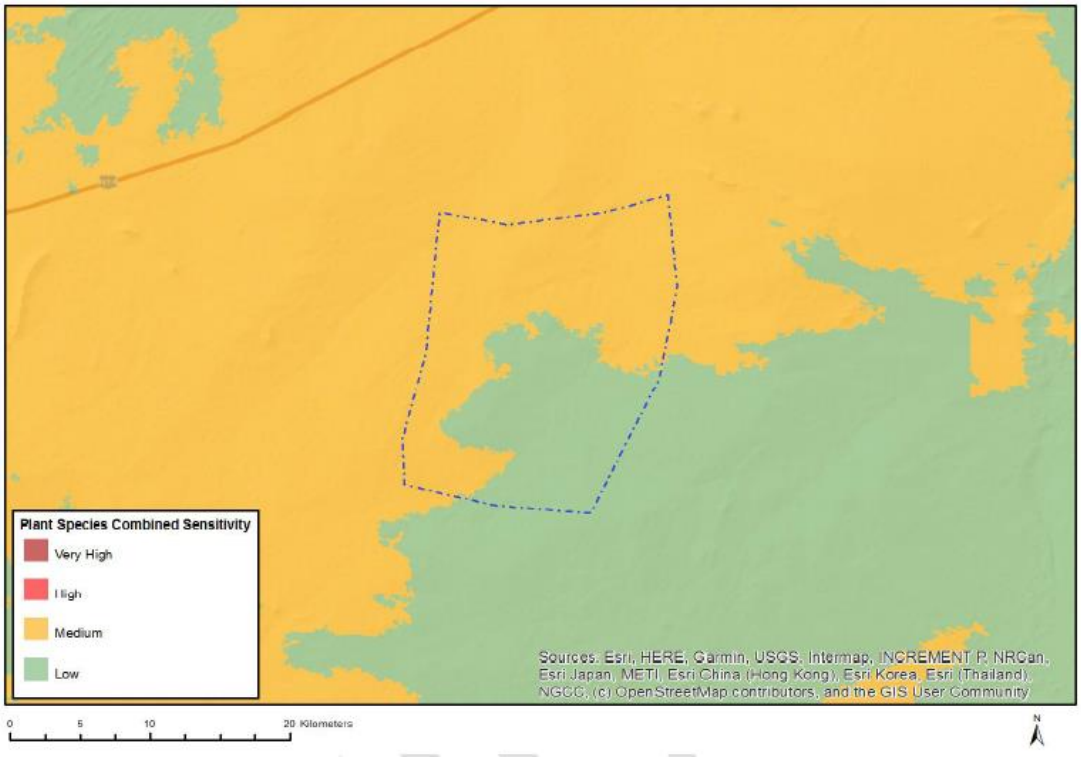

Figure 6-3: Screening Tool map of relative plant species theme sensitivity.

Regional Vegetation

The study area is located in the Bushmanland Arid Grassland (NKb3) vegetation type. The study area is not located in a national threatened ecosystem.

Bushmanland Arid Grassland

The Bushmanland Arid Grassland vegetation type is present in the Northern Cape Province, extending from around Aggeneys in the west to Prieska in the east. The southern border of the unit is formed by edges of the Bushmanland Basin while in the northwest this vegetation unit borders on desert vegetation (northwest of Aggeneys and Pofadder). The northern border (in the vicinity of Upington) and the eastern border (between Upington and Prieska) are formed with often intermingling units of Lower Gariep Broken Veld, Kalahari Karroid Shrubland and Gordonia Duneveld. Most of the western border is formed by the edge of the Namaqualand hills.

It is the second most extensive vegetation type in South Africa and occupies an area of 45 478 km^2. The vegetation type is located on plains on slightly sloping plateau sparsely vegetated by grassland dominated by white grass (Stipagrostis species) and with semi-desert characteristics. In places low shrubs of Salsola change the vegetation structure. During years of abundant rainfall annual species flower abundantly.

The soils are mostly a red-yellow apedal soil of less than 300 mm deep, but exceeding this depth in approximately a fifth of the area. The area has low rainfall, with a mean annual precipitation (MAP) of between 70mm and 200mm. Rainfall ranges mainly from the end of summer towards the beginning of autumn. Frost incidence towards the east can be up to 35 days.

The vegetation type is classified as Least Threatened. Although a very small area is statutorily conserved in Augrabies Falls National Park and Goegab Nature Reserve, very few areas have been transformed. However, this outdated assessment might have to be revisited since the construction of renewable energy projects since 2012 within this vegetation type. One biogeographically important species and six endemic species are listed by Mucina and Rutherford (2006, as amended).

Table 6-1: Attributes of the Bushmanland Arid Grassland vegetation type (Mucina and Rutherford, 2006 as amended).

Name of vegetation type	Bushmanland Arid Grassland
Code as used in the Book	NKb3
Conservation Target (percent of area) from NSBA	21%
Protected (percent of area) from NSBA	0.4%
Remaining (percent of area) from NSBA	99.4%
Description of conservation status from NSBA	Least threatened
Description of the Protection Status from NSBA	Hardly protected
Area (sqkm) of the full extent of the Vegetation Type	45478.96
Name of the Biome	Nama-Karoo Biome
Name of Group (only differs from Bioregion in Fynbos)	Bushmanland Bioregion
Name of Bioregion (only differs from Group in Fynbos)	Bushmanland Bioregion

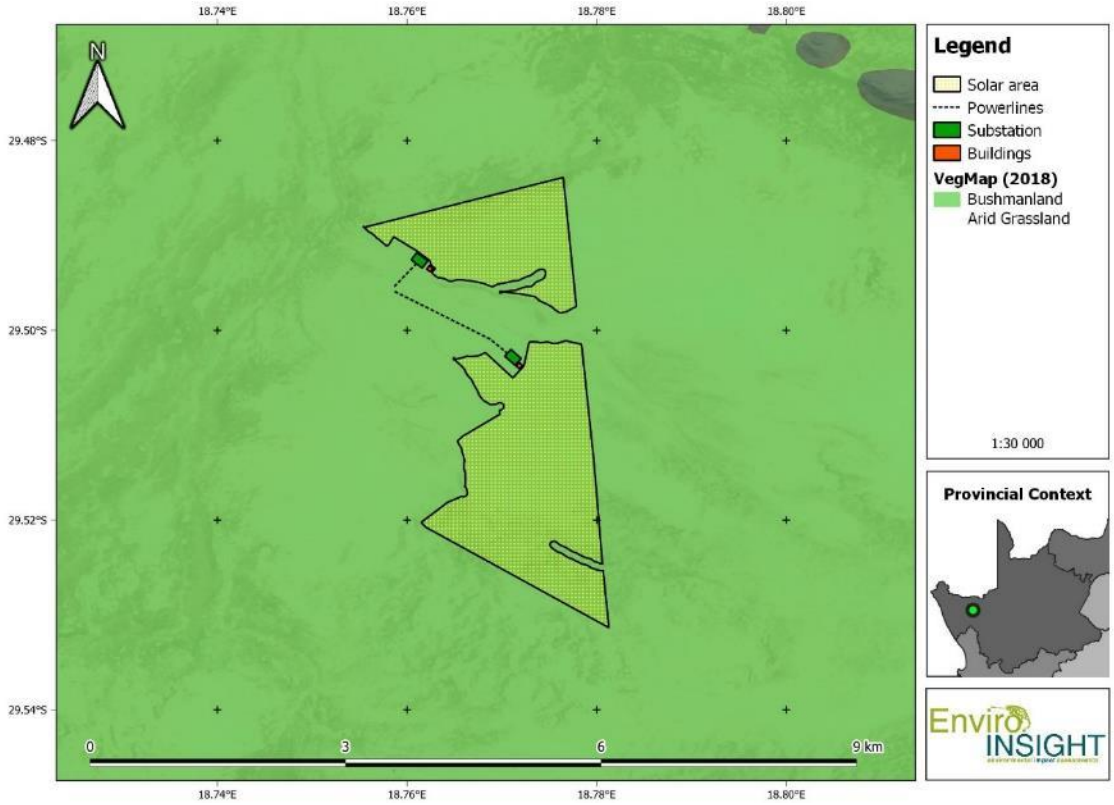

Figure 6-4: Regional vegetation types in relation to the study area (SANBI, 2018).

Northern Cape Critical Biodiversity Areas

The Northern Cape CBA Map (2016) identifies biodiversity priority areas, called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), which, together with protected areas, are important for the persistence of a viable representative sample of all ecosystem types and species as well as the long-term ecological functioning of e landscape as a whole (Holness & Oosthuysen, 2016). Priorities from existing plans such as the Namakwa District Biodiversity Plan, the Succulent Karoo Ecosystem Plan, National Estuary Priorities, and the National Freshwater Ecosystem Priority Areas were incorporated. Targets for terrestrial ecosystems were based on established national targets, while targets used for other features were aligned with those used in other provincial planning processes.

Critical biodiversity areas (CBA's) are terrestrial and aquatic features in the landscape that are critical for retaining biodiversity and supporting continued ecosystem functioning and services. The primary purpose of CBA's is to inform land-use planning in order to promote sustainable development and protection of important natural habitat and landscapes. Biodiversity priority areas are described as follows:

- Critical biodiversity areas (CBA's) are areas of the landscape that need to be maintained in a natural or near-natural state in order to ensure the continued existence and functioning of species and ecosystems and the delivery of

ecosystem services. In other words, if these areas are not maintained in a natural or near-natural state then biodiversity conservation targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity-compatible land uses and resource uses. For CBA's the impact on biodiversity of a change in land-use that results in a change from the desired ecological state is most significant locally at the point of impact through the direct loss of a biodiversity feature (e.g. loss of a populations or habitat). All FEPA prioritized wetlands and rivers have a minimum category of CBA1, while all FEPA prioritised wetland clusters have a minimum category of CBA2.

- Ecological support areas (ESA's) are areas that are not essential for meeting biodiversity representation targets/thresholds but which nevertheless play an important role in supporting the ecological functioning of critical biodiversity areas and/or in delivering ecosystem services that support socio-economic development, such as water provision, flood mitigation or carbon sequestration. The degree of restriction on land use and resource use in these areas may be lower than that recommended for critical biodiversity areas. For ESA's a change from the desired ecological state is most significant elsewhere in the landscape through the indirect loss of biodiversity due to a breakdown, interruption or loss of an ecological process pathway (e.g. removing a corridor results in a population going extinct elsewhere or a new plantation locally results in a reduction in stream flow at the exit to the catchment which affects downstream biodiversity). All natural non-FEPA wetlands and larger rivers have a minimum category of ESA.

According to the CBA Map (Figure 6-5), the study area is mainly located in the category "Other Natural Areas". The solar facility is not located in a CBA or ESA.

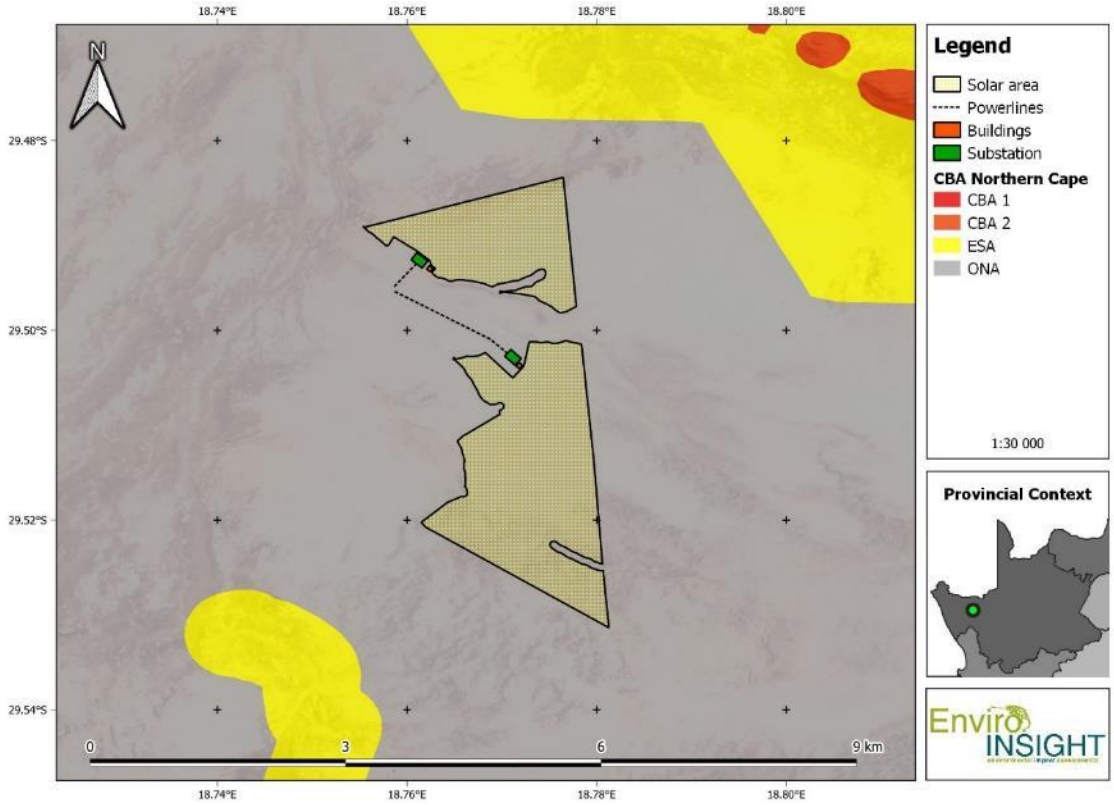

Figure 6-5: Red Sands Solar East SEF in relation to the Northern Cape Critical Biodiversity Areas (2016).

Ecology of the system

Ecological drivers and significant terrestrial landscape features

The study area is located in the D82C quaternary catchment of the Orange River water management area. Several important endorheic pans, wetlands clusters and rivers exist within this region which attracts multiple fauna species.

Changes in vegetation structure and composition are mainly driven by overgrazing and the introduction of alien invasive species such as Prosopis sp. Transformation in the Bushmanland Arid Grassland is minimal and has increased mainly due to the construction of renewable energy facilities, both wind and solar since 2012. Information with regards to this is unfortunately limited.

National Freshwater Ecosystem Priority Areas (NFEPA), 2011

The National Freshwater Ecosystem Priority Areas (NFEPA) project provides strategic spatial priorities for conserving South Africa's freshwater ecosystems and supports sustainable use of water resources. These priority areas are called Freshwater Ecosystem Priority Areas, or 'FEPAs'.

FEPAs were identified based on:

- Representation of ecosystem types and flagship free-flowing rivers
- Maintenance of water supply areas in areas with high water yield
- Identification of connected ecosystems
- Representation of threatened and near-threatened fish species and associated migration corridors
- Preferential identification of FEPAs that overlapped with:
    - Any free-flowing river
    - Priority estuaries identified in the National Biodiversity Assessment 2011
    - Existing protected areas and focus areas for protected area expansion identified in the National Protected Area Expansion Strategy.

The National spatial datasets revealed the presence of multiple depression systems as well as the two identified river systems, D82C-04394 and D82C-04152, as defined by the Sub Quaternary Reaches database. It must be noted that even though no NFEPA rivers or Sub Quaternary Reaches have been identified for the SEFs, it should not be interpreted that there are no drainage lines or depression systems on these sites. Please refer to the Aquatic Assessment for more information.

Ecological functioning and processes

The watercourses and red sands in the region represent the most important ecological features, and if not protected it could lead to reduced ecosystem services and could impact negatively on terrestrial biodiversity features. Neither vegetation units are considered threatened and there are limited sensitive features or important landscape features that, if disturbed or transformed, will result in a catastrophic collapse of the system. (Note: Please refer to the Aquatic Biodiversity and Avifauna Assessments for detailed information).

The proposed SEF does not represent a significant impact on the ecosystem processes and services. The main river courses and wetland pans located on the study area will be excluded from construction activities, and where linear infrastructure such as roads and powerlines need to cross, the appropriate mitigation measures need to be applied.

Ecological corridors and connectivity

An ecological corridor is a clearly defined geographical space that is governed and managed over the long-term to maintain or restore effective ecological connectivity.

The main watercourses / rivers act as corridors for the movement of fauna across the landscape

Species, distribution, and important habitats

This area generally receives very limited rain, sporadic rainfall. Accordingly, plant diversity is generally low. Three main habitats were identified based on species composition and structure. The main driver of vegetation pattern in the area is substrate.

Georeferenced photographs were taken to assist in both the site characterisation as well as the sensitivity analysis and provide lasting evidence for future queries. The specialist coverage is considered optimal as every habitat was surveyed, taking into consideration the large study area. Furthermore, all areas of the study area were clearly visible, but not completely accessible due to the extent of the study area and road access limitations.

Sandy Grassland

The major habitat is the Sandy Grassland, where perennial grasses with scattered shrubs occur on shallow, relatively coarse red sands. Dominant species include:

- grasses: *Stipagrostis ciliate, S. brevifolia, S. uniplumis and Aristida adscenionis, A. congesta* and *Eragrostis nindensis*,
- shrubs: *Lycium pumilum, Rhigozum trichotomum, Aptosimum spinescens, Plinthus karooicus, Salsola tuberculate, Asparagus cf. retrofractrus*
- forbs: *Leysera tenella, Osteospermum pinnatum, Tribulis cristatus, Felicia hirsuta, Lachenalia sp., Sesamum capense, Requienia sphaerosperma, Gisekia pharnaceoides* and *Limeum africanum*.

The abundance of listed or protected species within this habitat is low and apart from a low density of *Hoodia gordonii* which is scattered throughout the study area. Other provincially protected species include *Euphorbia sp, Anacampseros papyracea subsp. namaensis, Oxalis sp., Mesembryanthemum sp., Mesembryanthemum crystallinum, Crassula corallina, Colchicum sp.* As the habitat is not listed as threatened and is widely available in the area, it is not considered sensitive. The impacts are considered to be medium to low, and vegetation clearing will be localised to the turbine sites, expanded roads and associated infrastructure, as well as the limited clearing during the construction phase, which will be rehabilitated post-construction activities.

Shrubland

The Shrubland habitat is characterised by shrubs, forbs and succulent's characteristic of the Bushmanland Basin Shrubland, while tussock-grass-dominate areas on sandy soils. Overall diversity within this vegetation type at the site is considered low, which can be ascribed to the aridity of the area and the poorly developed soils. Dominant species include *Lycium cinereum, Rhigozum trichotomum, Stripagrostis uniplumis, S. ciliata, S. obtusa, Oncosiphon grandiflorum, Oxalis sp., Aptosimum spinescens, Pentzia incana, Ruschia intricata, Monsonia sp.* and *Salsola tuberculata.*

Provincially protected species (for which a permit for removal will be required) include: *Hoodia gordonii, Euphorbia dregeana, Oxalis sp.,* and *Mesembryanthemum crystallinum.*

Pans (Temporary)

The pans do not hold water regularly for extended periods and is only periodically filled with water after heavy rain. When filled with water it provides important ecosystem services which the fauna in the area relies on. Due to the nature of these pans and the important role they play in maintaining ecosystem services and functioning in the landscape, they are considered sensitive features which should be excluded from development.

Drainage lines

The drainage lines are not well defined due to limited active channels which limits the presentation of defined zonation typically present in riparian zones. Larger specimens of *Rhigozum trichotomum* were noted to occur in denser stands within the valley bottom and within depression systems, while *Stripagrostis uniplumis, S. ciliata and S. obtusa* grew in dense stands in the riparian zones.

Dominant species include *Rhigozum trichotomum, Stripagrostis uniplumis, S. ciliata, S. obtusa, Prosopis glandulosa, Salsola aphylla.*

Sensitive Plant Species

Nationally Sensitive Plant Species

As per the screening reports, two sensitive species (SCC) are likely to occur on the study area, sensitive species 12 and sensitive species 144[2]. Based on existing literature and surveys conducting, no additional SCC were included in this assessment (Table 4 1). The species provided in the POSA list do not occur within the area and were accordingly omitted from the assessment. Overall, the abundance of plant SCC within the site is low and no significant impacts on such species is expected.

Table 6-2: Expected and Observed list of Sensitive Plant Species for Red Sands SEF. Species highlighted in bold were recorded during this survey.

Species	National Status	Provincially Protected	Endemic to (1) RSA or (2) Northern Cape	Observed or likely to occur within the study area
Sensitive species 144	Vulnerable A3ce	Yes	No	No natural individuals were recorded, but several individuals have been planted at two of the homesteads on the study area. The species has a low likelihood to occur on the study area.
Sensitive species 12	Rare		Yes (1 and 2)	Likely to occur along drainage lines, which will be excluded from development.
***Hoodia gordonii* (Masson) Sweet ex Decne.**	**Data Deficient – Insufficient Information**	**Yes**	**No**	**Observed within the study area and on neighbouring properties. Refer to section below for more details.**

Sensitive species 144 – Vulnerable A3ce

This species occurs from Nieuwoudtville east to Olifantsfontein and northwards to the Brandberg in Namibia and is therefore not endemic to South Africa. It is known to occur on north-facing rocky slopes (particularly dolomite) in the south, and any slopes and sandy flats in the central and northern parts of its range. The main threats to this species include climate change, harvesting

[2] The names have been withheld as the species may be prone to illegal harvesting and must be protected. As per the best practise guideline, the name of the sensitive species may not appear in the final EIA report nor any of the specialist reports.

and trampling by livestock. Damage by baboons, scale insects and fungus has been observed, but none of these seem to cause mortality. Some social birds make large nest on the species, sometimes causing it to fall over due to the weight of the nests and its owners. Climate change models project a 36% decline in its range in 100 years, assuming dispersal into newly suitable areas. Patterns of modelled declines have been supported by field and repeat photo studies. However, no colonization of newly suitable areas has yet happened (Foden 2018). Without dispersal, the models predict a 73% decline in 100 years, qualifying the species as EN.

Several individuals were recorded within the study area at homesteads and will not be impacted on by the proposed layout. The species will be protected in situ as per the Provincial gazette No 968 of 1 April 2005 in terms of the Nature and Environmental Conservation Ordinance, 1974 (Ordinance No. 19 of 1974) which prohibits the harvesting of this species.

Sensitive species 12 – Rare

This species is a range-restricted habitat specialist endemic to Namaqualand, with an extent of occurrence (EOO) of 1955 km². It occurs on semi-arid flats east of O'kiep and Springbok in the Northern Cape. It is localised to deep red sands along drainage lines. There are no known threats to this species, and it's believed that less than 5% of its habitat is irreversibly modified.

Hoodia gordonii (Masson) Sweet ex Decne.

Within the study area, the species is not abundant, and less than five individuals have been recorded on site, with about another five individuals recorded in the surrounding area. Where the proposed development requires the removal or destruction of the species, the necessary permit from the Provincial Department for its relocation is required.

Individuals were not recorded on Red Sands Southeast and the two solar facilities, but this does not mean they are not present here. During the pre-construction monitoring, a walk through the site needs where the final infrastructure will be located is required. Only individuals impacted on by development activities requires a permit for relocation.

The species occurs in a wide variety of arid habitats from coastal to mountainous, also on gentle to steep shale ridges, found from dry, rocky places to sandy spots in riverbeds. It is a widespread species (EOO 850,000 km²) but has undergone decline since 2001 as a result of indiscriminate harvesting for its appetite suppressant properties. International and national demand was particularly high between 2004 and 2006 and as a result of the high economic value of this species (price range between R500 and R1200 per kilogram at this time); even remote areas of its distribution range are suspected to have been harvested. Unfortunately, data do not exist to quantify the degree of decline to the population and as this species is widespread and can be locally common it is not possible to estimate overall population decline. Research on population recovery post harvesting and degree of impact of the harvesting over the past 10 years is required before this species can be accurately assessed. As a result of a decrease in demand for Hoodia internationally and the strict enforcement of new legislation to protect this species wild harvesting has declined in South Africa (Raimondo et al., 2008).

Provincially Protected Species

In addition to the above species, there are several provincially protected species under the Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009) that occur on the study area which require permits for their removal from the Provincial Department. Prior to construction activities, all individuals of these species that will be directly impacted on by the proposed development, needs to be enumerated and marked with a GPS. A permit application for their relocation needs to be submitted to the Northern Cape Department Agriculture, Environmental Affairs, Rural Development and Land Reform and the necessary species needs to be removed or relocated prior to the commencement of construction activities.

Provincially protected species include:

Schedule 1 species:

- *Hoodia gordonii*
- *Sutherlandia spp.*

Schedule 2 species:

- All species within the Aizoaceae family, which includes *Ruschia, Mesembryanthemum crystallinum, Drosanthemum spp., Stomatium mustelinum,*
- All *Euphorbia spp., including E. dregeana*
- All *Mesembryanthemum sp.*
- All Crassulaceae spp., including *Crassula corallina*
- All *Colchicaceae spp.*
- All species within the Anacampserotaceae family, including *Anacampseros* spp.
- All species within the Oxalidaceae family, including *Oxalis* spp.,
- All species within the Apocynaceae family
- All species within the Asphodelaceae family

Impacts

Construction

- Habitat loss due to placement of infrastructure,
- Habitat fragmentation,
- Reduced connectivity within the landscape,
- Loss of sensitive flora,
- Increased alien invasive plant species due to soil disturbance and movement during the construction phase,
- Reduced ecosystem functioning due to construction within watercourse, pans and other sensitive features,
- Animal mortality due to construction phase activities, and
- Increased erosion due to removal of vegetation.

Operational

- Direct faunal impacts due to operation.
- Alien and invasive plant species

Decommissioning

When the four WEFs and two SEFs reaches the end of its lifespan, all machinery and related installations must be dismantled and removed, and the site should, as far as is reasonably possible, be restored to its original condition. The major issue is not the physical removal but rather the disposal of the used parts. Where possible, all recyclable materials must be repurposed in an environmentally friendly way.

It is expected that the dismantling of the PV arrays and associated infrastructure can lead to disturbance of fauna community, in all ways similar to that resulting from the construction phase. The ecological impacts associated with the decommissioning phase will be similar to those listed in the construction phase and the associated mitigations measures must be updated and implemented to reduce potential adverse impacts.

The dismantling of the project will eventually contribute to the removal of all the implemented structures; accordingly, this may be considered a positive impact.

Cumulative

Where other renewable energy developments occur within the surrounding area of the proposed development, a cumulative impact assessment is required. This includes a general assessment of cumulative impact as well as an assessment of different potential cumulative impact sources and an indication of the size or extent of the identified cumulative impact. There are not large amounts of existing renewable energy facilities within the area, except for the planned SEFs towards the north of these projects, and the operational Kangnas wind farm situated east of Springbok. The cumulative impacts from the four WEFs and the two SEFs will probably be greater compared to the other renewable energy facilities, due to their close proximity to one another, and currently no existing facilities surrounding the proposed projects. The large amount of renewable energy developments in the area would potentially generate significant cumulative impact in terms of habitat loss and potential disruption of landscape connectivity. However, it must be noted that these projects are all located within the Springbok REDZ for large scale wind and solar photovoltaic developments.

The PV panels and associated infrastructure are expected to have a moderate cumulative impact. Cumulatively these developments will be responsible for the destruction of a large portion of vegetation in various states.

Some of the main cumulative impacts of renewable energy developments in the region will include:

- Vegetation and habitat loss,
- Increased habitat fragmentation,

- Loss of critical habitat for flora SCC as well as endemic species,
- Loss of provincially protected species which require a permit,
- Surface water impacts and associated ecological processes,
- Increased erosion due to flooding (not a yearly event but longer term),
- Increased alien flora and fauna species.

Mitigation

Construction

- Ensure that lay-down and other temporary infrastructure is within low sensitivity areas, preferably previously transformed areas if possible.
- This impact can also be greatly mitigated if the development in natural vegetated areas do not completely remove the existing vegetation and natural cover, with the removal of vegetation to be restricted to the minimum as possible. For the SEF vegetation clearing and soil disturbance is more significant. Even though species can continue to exist between and underneath PV arrays, the layout of the arrays need to take this into consideration.
- The number of roads should be reduced to the minimum possible and routes should also be adjusted to avoid areas of high sensitivity as far as possible. Where possible, existing roads must be used to avoid additional habitat loss and fragmentation.
- Movements of machinery, vehicles and persons should be restricted to the existing roads and avoid the existing natural areas.
- Solar panels placement can be the cause for the loss of areas with natural vegetation, so care should be taken to limit the placement of solar panels to already disturbed areas or of low significance.
- Demarcate all areas to be cleared with construction tape or other appropriate and effective means. However, caution should be exercised to avoid using material that might entangle fauna.
- Rehabilitate disturbed areas that are no longer required by the operational phase of the development. Inadequate rehabilitation could result in limited revegetation and/or an invasion of alien vegetation which will result in long term ecological degradation and damage.
- Approximately 213,516 ha for the SEFs needs to be rehabilitated post-construction as these sections were only required during the construction phase. This includes laydown areas and the widening of internal roads.
- A Rehabilitation Management Plan must be developed and implemented during the construction phase as construction is complete at each site.
- An Environmental Control Officer (ECO) must be employed to monitor the clearing of vegetation for the construction of roads and hardstands.

- A comprehensive Plant Search and Rescue must be undertaken by a suitably qualified botanical specialist prior to vegetation clearance.
- Avoidance of drainage lines is necessary for the protection of suitable habitat for sensitive species 12.
- All relevant plant permits must be obtained from the provincial authority prior to the removal or relocation of SCC, including provincially protected species.
- Plant SCC found within the proposed site must either be housed in an onsite nursery for use during rehabilitation or be relocated to suitable areas where vegetation clearance will not occur.
- A site-specific Alien Invasive Species (AIS) Management Plan must be implemented during the construction phase and continued monitoring and eradication needs to take place throughout the life of the project.
- Alien vegetation, within the development footprints, should be removed from the site and disposed of at a registered waste disposal site.
- The development footprints and immediate surroundings should be monitored for the growth/regrowth of alien vegetation throughout the construction and operation phases of the project.
- Soil erosion and Rehabilitation Plan to be part of the EMPr.
- The clearance of vegetation, at any given time, must be kept to a minimum to reduce the possibility of soil erosion.
- Rehabilitation of eroded areas on a regular basis during the construction period.
- All roads and other hardened surfaces should have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk.
- Regular monitoring for erosion after construction to ensure that no erosion problems have developed as result of the disturbance.
- Ground clearing and the digging of trenches should ideally take place at the end of the dry season, prior to the first rains in order to minimise the impacts of dust.
- Newly cleared and exposed areas must be managed for dust and landscaped with indigenous vegetation to avoid soil erosion. Where necessary, temporary stabilisation measures must be used until vegetation establishes.
- Speed restrictions (40 km per hour is recommended) should be in place to reduce the amount of dust caused by vehicle movement along the roads, and to reduce possible fauna fatalities with vehicle collisions.
- Driving around in the area as well as noise levels at night should be limited, as should the use of harsh lights which could cause light pollution for nocturnal species.
- Where appropriate, sound dampeners must be used.
- Avoid the presence of people and vehicles in highly sensitive areas, including riverine areas and natural vegetation, as far as possible.

- Fences should be constructed in such a way so that burrowing animals can still gain access. Additionally, gaps can be made below certain areas in the fences to allow fauna movement underneath the fence. Where possible the electrification of fences should be limited.
- Strict measures should be put into place to prevent workers from poaching and hunting naturally occurring fauna.
- Working at night should be limited, as should the use of harsh lights which could cause light pollution for nocturnal species.

Operational

- Reduce the presence of human activity on the project area as far as possible by only focusing on the areas where operational tasks are required,
- avoid the presence of people and vehicles in highly sensitive areas as far as possible,
- no unauthorised persons should be allowed onto the operational sites,
- any potentially dangerous fauna such snakes or fauna threatened by the maintenance and operational activities should be removed to a safe location,
- lower the levels of noise whenever possible and avoid the destruction or disturbance of identified important features,
- illegal collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden by anyone except by individuals with the appropriate permits,
- all hazardous materials 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 as related to the nature of the spill,
- fences should be constructed in such a way so that burrowing animals can still gain access, which will allow other animals to also utilise the holes dug under fences to increase connectivity in the area.
- The site-specific AIS Management Plan must be implemented for the first year of the operational phase. Thereafter, alien vegetation must continue to be monitored and eradicated annually throughout the life of the project.
- Due to the disturbance at the site as well as the increased runoff generated by the hard infrastructure, alien plant species are likely to be a long-term problem at the site and a long-term control plan will need to be implemented. Problem woody species such as Prosopis are already present in the area and are likely to increase rapidly if not controlled.
- Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible.
- Alien vegetation, within the development footprints, should be removed from the site and disposed of at a registered waste disposal site.

Decommissioning

The ecological impacts associated with the decommissioning phase will be similar to those listed in the construction phase and the associated mitigations measures must be updated and implemented to reduce potential adverse impacts.

Conclusion

The study area is located within the Bushmanland Arid Grassland vegetation type, listed as Least Threatened. The solar facility does not intersect with a CBA or ESA. The SEF consist of grasslands on flat plains and gently sloping hills that are not considered sensitive. The watercourses and pans are considered sensitive and should be avoided during the construction period for placement of PV arrays, laydown areas and associated infrastructure. Roads and cables will cross watercourses, and the impacts can be mitigated by reducing it to acceptable levels since avoidance is not possible.

Large sections of the affected area are not considered sensitive and there are no specific features of the affected area which would indicate that it is of broad-scale significance for faunal movement or landscape connectivity. For other provincially listed species which are affected by the proposed development, a permit application for their removal must be applied for with the provincial authority prior to the commencement of construction activities.

Considering the above-mentioned information, no fatal flaws are evident for the proposed project. It is the opinions of the specialists that the project, may be considered for authorisation, on condition all prescribed mitigation measures and supporting recommendations are implemented

6.5 AVIFAUNA

An Avifaunal Preconstruction Monitoring Assessment was conducted by Enviro-Insight. Please refer to Appendix D2 for the report.

- **Preconstruction Bird monitoring Survey**

The field surveys were arranged so that the study area and control sites were surveyed for a total of 12 months and completed in May 2022. This complies with the requirements of the Best Practice Guidelines available at the time (Jenkins et al. 2015). The preconstruction monitoring programme has included a total of four visits to the site, covering the study area through a twelve-month period that included the spring, summer, autumn and winter seasons of the (non-calendar) year. The first survey conducted in July 2021 (Winter). All subsequent survey dates are summarised in the table below:

Table 6-3: Avifauna monitoring sampling period for Red Sands Solar East SEF and Control Site.

Date	Season	Methodology applied
July 2021	Winter	VP, DT, WT, WB, NE
October 2021	Spring	VP, DT, WT, WB, NE
January 2022	Summer	VP, DT, WT, WB, NE
May 2022	Autumn	VP, DT, WT, WB, NE

** VP – Vantage points; WT – Walked transects; DT – Drive transects; NE – Nest searches, inspection and monitoring; WB – Water body inspections.*

Walked Transects

10 linear transects ranging from 2 km to 4.5 km in length (315.07 km total for the 12 month period), eight located in the proposed Project footprint (WEF and SEF) and two within the control area, were walked in order to characterize the passerine and small bird communities. Birds were only recorded (seen or heard) within a fixed maximum width of between 150 to 200 m on either side if the transect line. The same transects were repeated in every season. Surveys started after sunrise and were performed throughout the day to account for temporal variation in bird activity.

Driven Transects

Nine drive transects were identified in the project footprint and one drive transect in the control area with a combined total length of 744. 35 km. One observer travelling slowly in a vehicle recorded all species on both sides of the drive transect. The observer stopped at regular intervals (every 100 to 300 m) to scan the environment with binoculars. These transects were driven at a constant and slow speed (± 15 km/h), and all sightings of large terrestrial birds and raptors were recorded in terms of the same data-capture protocols used for walked transects (above), and in general compliance with the road-count protocols described for large terrestrial species (Young et al., 2003) and raptors (Malan, 2009).

Wetlands

Prior to the initiation of the preconstruction monitoring campaign, the main water bodies (including wetlands) present within the study area were identified using 1:50 000 topographic maps and aerial photos. Several significant water bodies were identified on and surrounding the study area. These identified and mapped water bodies were surveyed to determine their level of utilisation by water birds. Due to seasonality, the birds were only be surveyed during periods with some prevailing inundation or rainfall. Some drainage lines within the greater PAOI were inundated during the 2021 spring surveys and were observed accordingly.

Specialist Nest Survey

Any habitats within the PAOI of the proposed WEF, or equivalent habitats around the study area, deemed likely to support nest sites of key raptor and other species of conservation concern, including power lines, stands of large trees, marshes and drainage lines, were surveyed. All potential breeding sites, once identified fully, were mapped, and checked during each survey to confirm occupancy, and all evidence of breeding and the outcomes of such activity, where possible, recorded.

Incidental Observations of Priority Species

All other sightings of priority species (and particularly those suggestive of breeding or important feeding or roosting sites or flight paths) on the WEF and control site as well as within the broader study area were recorded, along with additional relevant information such as habitat type, abundance, habits and weather data. These observations were used as complementary data to characterise the bird community and its utilisation of the site, as recommended by the Best Practice Guidelines.

- **Results**

Regional Vegetation

The study area is located in the Bushmanland Arid Grassland (NKb3) and Bushmanland Basin Shrubland (NKb6) vegetation type. The Bushmanland Arid Grassland vegetation type is present in the Northern Cape Province, extending from around Aggeneys in the west to Prieska in the east. Three of the four WEFs, namely Red Sands Northwest, Northeast, and Southwest including the two solar facilities are located in NKb3. The Red Sands Southeast is located in the Bushmanland Basin Shrubland (NKb6) vegetation type.

Protected Areas and Important Bird Areas

The Red Sands Solar and WEF is not located in an Important Bird Area (IBA) or protected area but is situated in between the and the Haramoep Black Mountain Mine (approximately 31 km to the North East) and the Bitterputs Conservation Area which is approximately 42 km south east of the study area with the Marietjie van Niekerk Nature Reserve being situated approximately 20 km to the west. The Mattheus Cat Conservation Area is also situated relatively close to the Project PAOI.

Critical Biodiversity Areas

According to the CBA Map, the study area is mainly located in the category “Other Natural Areas”. CBA1 is located on Red Sands Southwest WEF while ESAs are located on Red Sands Northwest, Northeast and Southeast. The CBA1 is listed due to recorded presence of a listed unknown threatened species, but this was not picked up in the screening report. Accordingly, it is assumed that the threatened species is avifauna, as no plant or animal species was flagged by the screening report or recorded during the site surveys. The ESA are due to the large rivers running through the site and other natural non-FEPA Wetlands.

Flagship Species for the Region

This province hosts significant populations of arid-adapted large terrestrial birds which have been recorded (and are expected) within the PAOI such as Kori Bustard, Ludwig's Bustard and Karoo Korhaan. Additional "flagship" bird species include Martial Eagle, Verreaux's Eagle, Secretary Bird, with occasional incursions within the PAOI such as Lappet-faced Vulture (incidental sightings) and indeed, other vulture species.

Description of Major Bird Habitats

The primary avifaunal habitats are described below. It is apparent throughout the study area that most of the habitats are generic in their ability to support general avifaunal species and Red-Listed / SCC with little differentiation. However, unique geological (such as red dunes) geographical or topographical features exist which may cause the areas these areas to be buffered from proposed development. Due to the high diversity and density of the above mentioned Red-Listed species recorded during the survey, (including regionally and globally listed Endangered and Vulnerable birds), the PAOI as a whole is considered to be an area of avifaunal importance and the EIA will be strongly associated with Guidelines at a policy level, prioritising avoidance mitigation and the monitoring of avifaunal SCC.

Pans and Drainage Lines

Avifaunal assemblages differed depending on the classification of the pan and drainage line systems as well as the season. Most of the drainage line systems are seasonally ephemeral or dry while the pans inundate seasonally. Thus, most of the bird associations are linked to the prevailing vegetation and soil types within the delineated drainage line habitats or standing water. In summary, drainage lines with taller shrub and tree layers showed a much higher diversity of passerine species as well as sand-associates and ground-dwelling birds. Species of conservation concern such as Red Lark and Sclater's lark were observed in varying densities.

The seasonal drainage lines and accompanying riparian trees are linear dispersal corridors for terrestrial bird species. Much higher species diversity (as well as a unique composition) was observed in this habitat and therefore, these systems are classified to be of high avifaunal importance. The drainage lines act as important flight corridors for passerines and raptors between foraging and roosting sites.

Sandy Grassland

The sandy grassland habitats show a reduced structural complexity and vegetation which provides for a more generic species diversity albeit often higher densities of avifauna. The habitat contains features that provide suitable foraging habitat for Ludwig's Bustard (*Neotis ludwigii), Kori Bustard (Ardeotis kori) and Secretary bird (Sagittarius serpentarius*). However, the habitat is characterised by a much-reduced rocky substrate and a higher prevalence of grassed red sand infusions which provides infused and highly localized portions of optimal habitat for Red Larks.

Shrubland

The localised high population densities of small mammals such as rodents, springhares and hares within the PAOI as well as the regional linkage to the drainage line habitats, elevates the importance of this habitat for avifauna. The rocky habitats do not provide structural complexity which provides for an increase in species diversity and often showed lower densities of avifauna due to the lack of prey species that are found in this habitat. However, the habitat vegetation provides suitable foraging habitat for the Ludwig's Bustard (*Neotis ludwigii), Kori Bustard (Ardeotis kori) and Secretary bird (Sagittarius serpentarius*).

Observed and Expected Avifauna

The study area supports a relatively low diversity and abundance of avifauna. A total of 62 species have been observed to date. This low diversity is predominantly due to a number of factors including:

- High regional aridity which reduces the overall species diversity;
- Somewhat generic habitat types (albeit with some highly sensitive habitat such as red sands and temporary pans within the PAOI).
- Climate change which is characterised by lower rainfall and increased temperatures.
- A lack of standing water.
- An incomplete survey period (one year, still to be completed) which omits migrant species and seasonal water associates.
- Sub-optimal climate conditions experienced during the survey.

It must be noted that stochastic high rainfall events (especially after the prolonged drought periods) and other atypical prevailing influences (persistent cold) may have influenced the local avifaunal assemblage densities which were often recorded as being very high.

Priority species list

A total of 23 priority species are expected to occur on and surrounding the study area, of which 14 have been recorded within the study area to date during this study.

Preconstruction Monitoring main results

- *Walked and Driven Transects*

For walked transects, a total of 926 individual bird contacts were recorded of which 31 contacts and eight species are priority. For driven transects, a total of 625 individual bird contacts were recorded of which 90 contacts and 11 species are priority. The combined Index of Kilometric Abundance for walked and driven transects (IKA = birds/km) was calculated for each priority species as an average of 0,11. This is considered to be a very low-risk numeric value and represents the sparse, ecologically sub optimal habitat of the PAOI. The overall (priority and non-priority) IKA is 1,46 which is a significantly higher risk value.

However, a wholly insignificant fraction of all observations occurred at rotor sweep height which thus shows a strong data set (based on density of observations) interpreted as a low risk of significant collision mortality.

- *Focal Sites*

The pan, drainage line and dune systems scattered throughout much of the project study area contained a relatively high density (and higher diversity) of passerines, Ludwig's Bustards and Red Larks.

Nest Survey

Nest sites were searched for during the surveys which included windmills, trees, pylons, bridges and masts, representing most potential roost and nesting sites for raptors. Water bodies were potential roost and nesting sites for multiple species but the high degree of seasonality and highly arid conditions was prohibitive to being representative of optimal breeding habitat for water associates. The most significant breeding habitat recorded during the survey were the two active Martial Eagle nests, where breeding and foraging activity has been noted and strongly drive both the site development plan layout and the recommended mitigation measures. Ludwig's Bustard is considered a resident and to be breeding on site although no nests have been located.

Solar Sensitivity

Each demarcated sensitive feature was evaluated for the degree of sensitivity based on the complete data set. There is an important presence of a number (mainly two) SCC in the study area, recorded regularly and widespread through the proposed regional area. In addition, there are several raptors utilising the PAOI, some of them priority species and/or of conservation concern, such as the Martial Eagle, Lanner Falcon, Pale-chanting Goshawk and Black-winged Kite. Areas of drainage lines and natural vegetation which are vital to maintaining populations of habitat obligate sensitive species (such as Red Lark) are deemed to have some probability of collision consistently throughout the year. Furthermore, natural drainage line vegetation represents an important habitat to maintain natural geohydrological processes of the PAOI. A 200 m buffer is also applied around seasonally inundated watercourses in the PAOI, as these features attract birds under certain conditions and could be the only locations were certain sensitive species such as the ducks, herons, storks and water birds (and flamingos under rare circumstances) are likely to occur. These areas must be avoided by the developer where no solar panels and associated infrastructure may be located. The solar facility and associated infrastructure coincide with areas currently demarcated as Medium sensitive features within the prescribed buffers and consequently were subjected to the mitigation hierarchy, including mitigation measures and avoidance. The layout was carefully re-evaluated in order to mitigate against negative interaction with priority species such as Red Lark and Ludwig's Bustard.

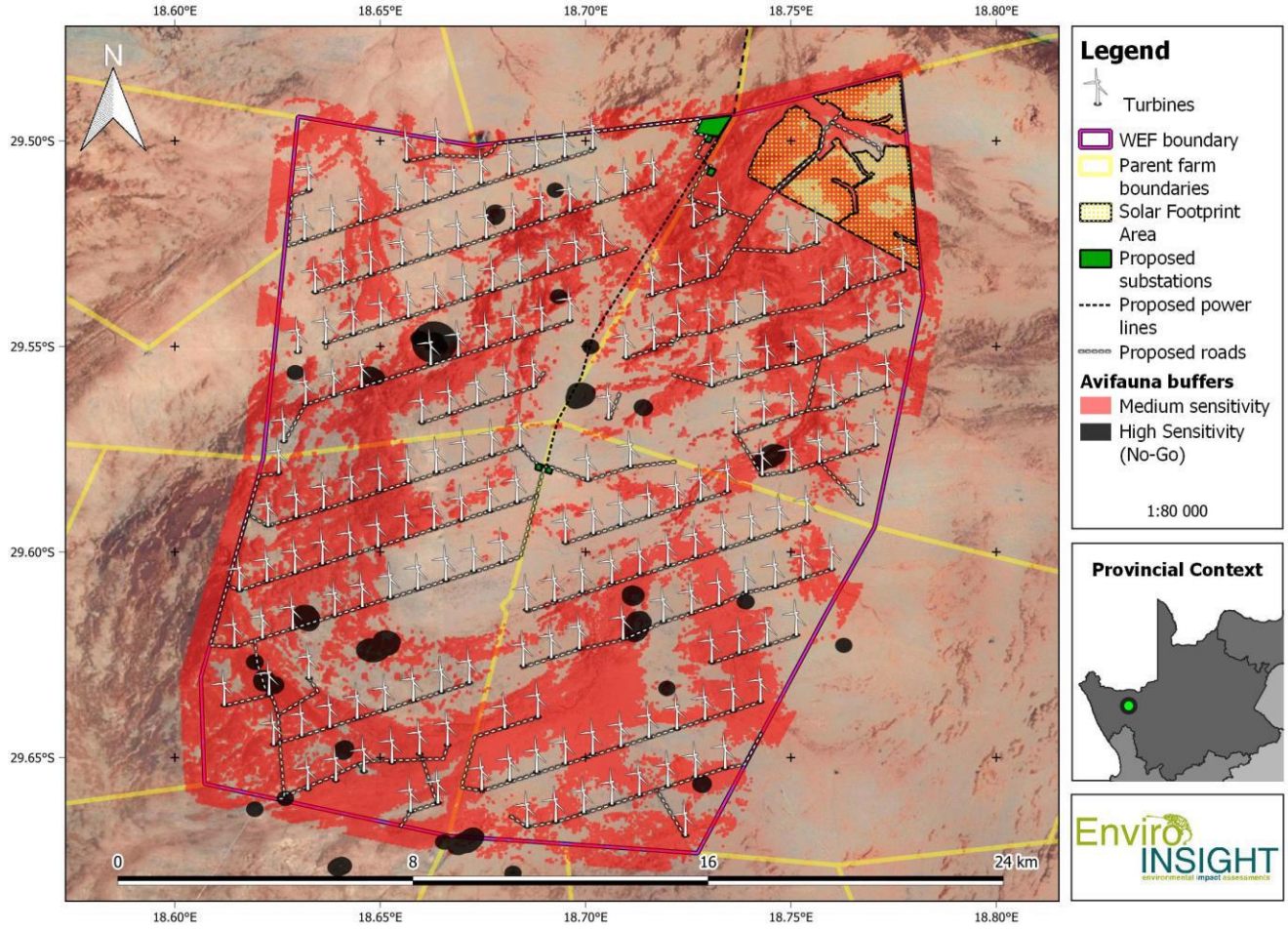

Figure 6-6: Overall avifauna sensitivity and associated buffers for Preferred layout 2.

- **<u>Impacts</u>**

Construction:

- Habitat destruction
- Disturbance due to lights, noise, machinery movements and maintenance operations.

Operation:

- Collision and electrocution with above-ground power transmission lines. In some cases, collision can be associated with polarised light pollution and waterbird species mistaking large PV panels areas as wetlands or other waterbodies, a case known as the "lake effect" (as per Jenkins et al. 2017).
- The attraction of some novel bird species due to the development of a solar farm with associated infrastructure such as lake effect, perches, nest and shade opportunities
- Chemical pollution: Chemicals being used to keep the PV panels clean from dust (suppressants) etc.
- Disruption of bird migratory pathways

Cumulative:

- Habitat loss: The destruction of highly sensitive habitat (for example sandy substrates for Red Lark) will greatly increase.
- Road-kills: Many birds are commonly killed on roads, especially nocturnal species such as Spotted Eagle-Owl.
- Powerlines: Numerous existing and new power lines are significant threats to large terrestrial priority species in the region as powerlines may kill significant numbers of all large terrestrial bird species.

- **Mitigation**

Construction

- Habitat destruction: avoid avifaunal specific sensitive areas and their associated buffers, such as the local drainage lines, impoundments, smaller watercourses, and pans. A green buffer should be maintained around all habitats with a SEI designated as High or above.

Operation

- PV Panels as Bird Attractants: Bird diverters, perch deterrents and the application of Non-polarising white tape can be used around and/or across panels to minimise reflection which can attract aquatic birds and insects (food) as panels mimic reflective surfaces of waterbodies.
- Chemical pollution: Chemical Storage should be strictly locked away and should follow procedures as recommended with the EMPr
- Flight/migratory paths: The linear drainage line habitats must be buffered by a minimum of 50 metres from the edge of the demarcated wetland.

General

Formal post construction monitoring must be resumed once the facility is operational, as per the most recent edition of the best practice guidelines. The exact scope and nature of the post-construction monitoring will be informed on an ongoing basis by the result of the monitoring through a process of an establishment of available new technology and adaptive management. The purpose of this would be to establish if and to what extent displacement of priority species has occurred through the altering of flight patterns post-construction.

- Post-construction monitoring should be undertaken as per the EMPr. The exact scope, nature and frequency of the post-construction monitoring will be informed on an ongoing basis by the results of the monitoring through a process of adaptive management.
- Lighting of the SEF (for example security lights) should be kept to a minimum. Lights should be directed downwards (provided this complies with Civil Aviation Authority regulations).

<u>Species Specific Mitigations</u>

Ludwig's Bustard (*Neotis ludwigii*)

Comprehensive and continuous data collection is required to monitor the situation on site and apply appropriate mitigation measures and far more significant weighting and value should be applied to the Cumulative Impact Assessment.

Red Lark (*Calendulauda burra*):

- Avoidance based mitigation is the primary mitigation measure and must be based upon the aforementioned delineated sensitivity. However as multiple solar panels fall within the delineated high sensitivity area for Red Lark and large-scale avoidance may not be possible. Panel infrastructure should be placed away from dune crests and side slopes.

Raptors and Vultures

- Set-back areas or buffer zones are allocated to sensitive or important habitat features to alleviate the effect of directly mortalities based upon attraction to such areas. The choice of an appropriate set-back distance is complex since different species and even different taxon groups demand different ecological requirements.

Monitoring

SCC community monitoring:

- Annual wet and dry season surveys; and
- Continuous observations by ECO

Collision and mortality monitoring

- Weekly for powerlines, daily for Solar Panel Locations

- **Conclusion**

The proposed Red Sands Solar does indicate moderately significant impacts to the receiving environment via the risk to Priority Species (such as Red Lark and Ludwig's Bustard) as well as the Cumulative Impacts.

It is still the opinion of the consultants that the impacts associated with SEF projects are far preferable (from an environmental impact perspective) to extractive and/ or non-renewable alternatives.

The presence of nesting Red Lark within the PAOI is of particular concern. Avoidance mitigation must be implemented in conjunction with the aforementioned micro sighting. Thus, the author sees no reason why an Environmental Authorisation (EA) should not be granted on the following conditions;

- All recommended buffering (200m and 100m habitat dependent) be strictly adhered to.
- Micro sighting of turbine placement must occur preconstruction supervised by a specialist zoologist in order to mitigate habitat loss for Red Lark.
- All recommended mitigation measures be applied preconstruction, post construction and operations.
- The EMPr be updated every three years in order to revaluate the potential distributional population changes of species such as Martial Eagles and Vultures. Thus, retrofitted mitigations such as AI, radar and camera technology may have to be applied.

6.6 AQUATIC BIODIVERSITY

The Freshwater Biodiversity and Watercourse Delineation was undertaken by Tate Environmental Specialist Services (TESS), dated August 2022, refer to Appendix D3.

The site is located within the D82C quaternary catchment of the Orange River water management area. The specific Area of Interest (AoI) for this project was drainage within the D82C-04152 and B82C-04394 Sub Quaternary Reaches (SQR). The watercourses do not reach the Orange River and typically terminate in depression lake/pan systems.

A site survey was conducted between the 18th and 20th of July 2022. Three sample points were selected namely an unnamed system (S1) as well as Kliphakskeen Se Vlei (S2) and Spioenkop Se Vlei (S3). The site selection process was completed to only include sites with visible inundation during the survey.

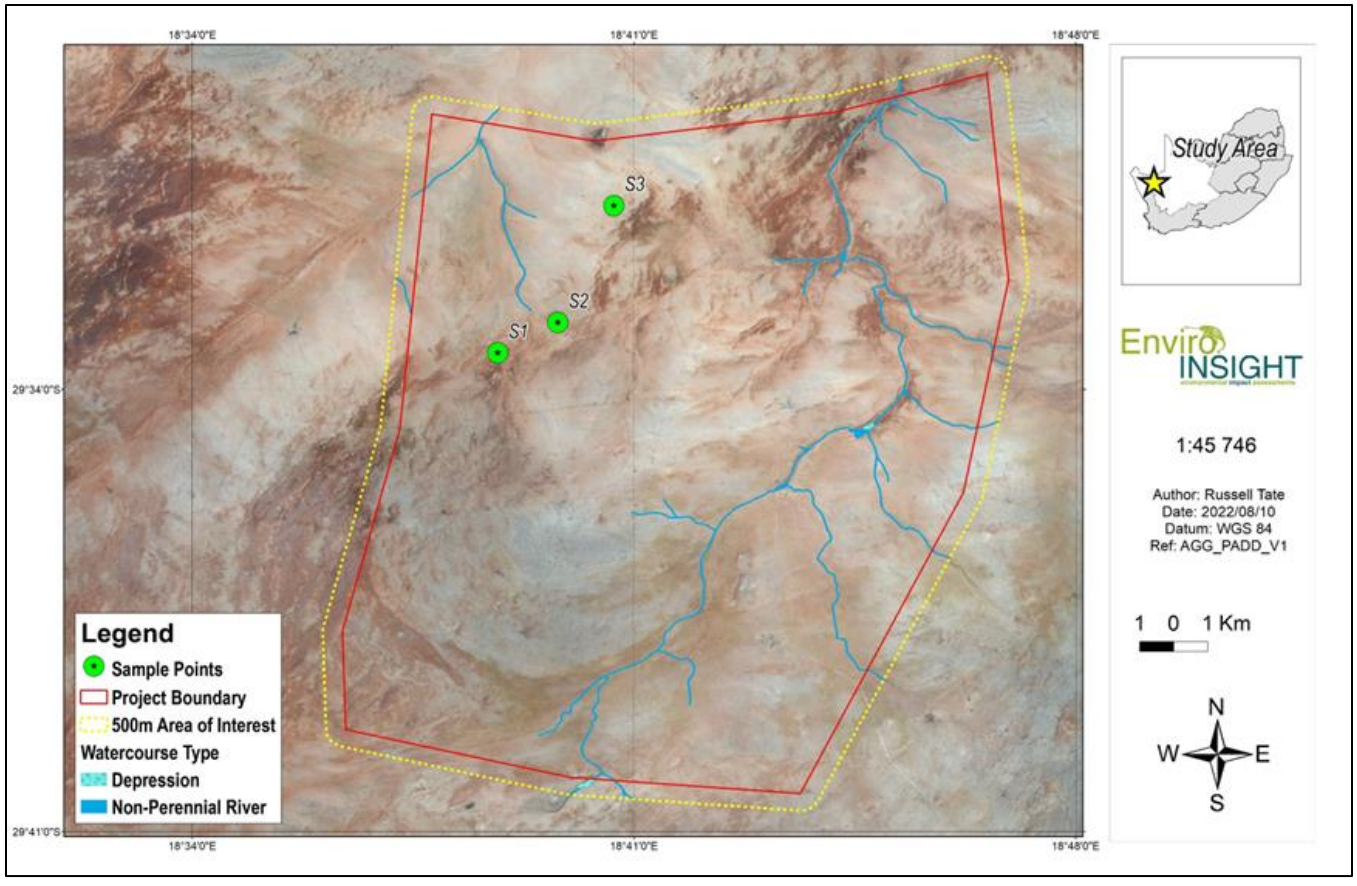

Figure 6-7: Water Sample points

The assessment does not conform to standard wetland definitions and classifications where typical indicators such as redoximorphic and hydrophytic vegetation indicators were absent however active inundation, landform indicators and at times hydrophytic vegetation indicators provided sufficient evidence to support the classification and delineation of the watercourses.

A total of 26 hydrogeomorphic (HGM) units were delineated in this study consisting of two watercourse types including depressions and non-perennial wash systems. Within the solar activities areas specifically, two HGM units were derived, a depression and non-perennial watercourse type. The HGM units were HGM23 and HGM24.

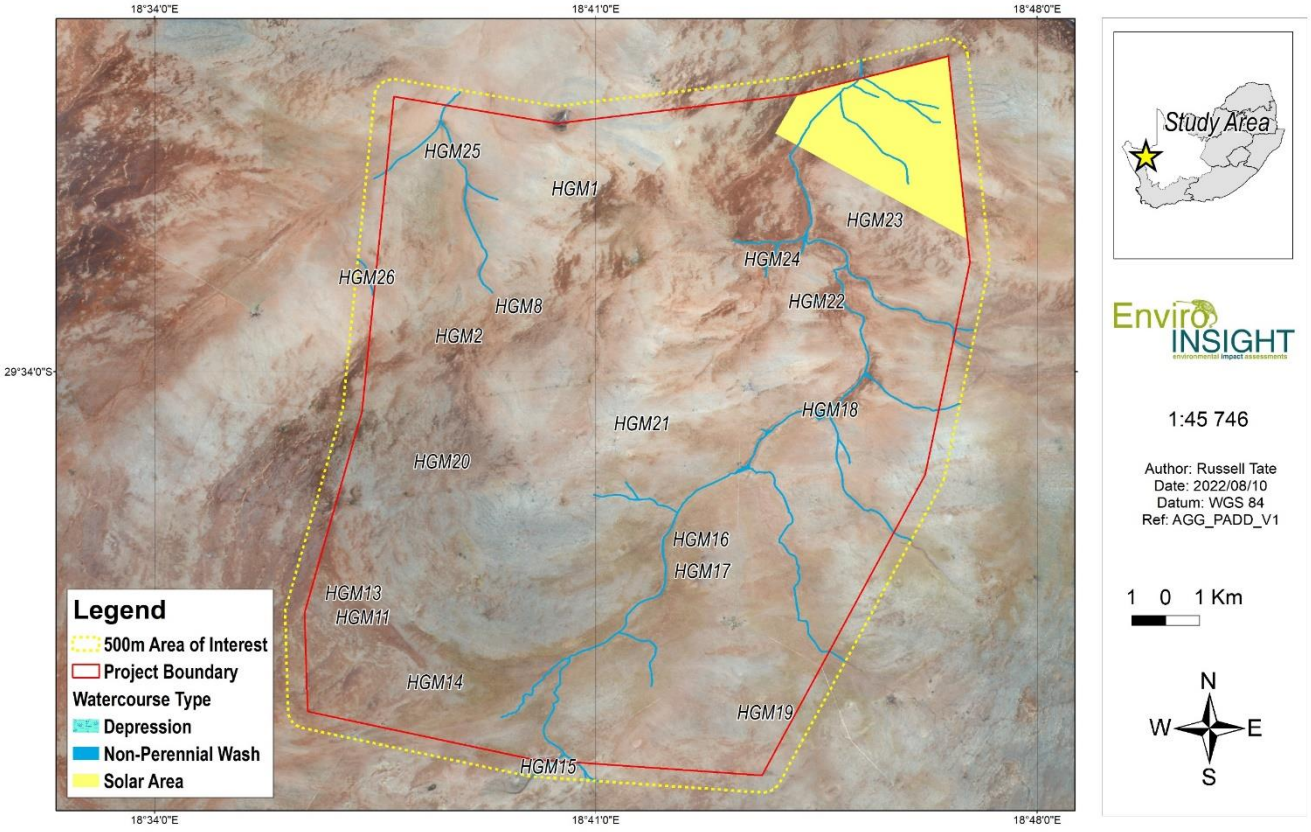

Figure 6-8: HGM Layout of the watercourses

Water Quality

Water Samples were taken from the 3 sampling points (Figure 6-12). The results indicated neutral pH levels and low concentrations of dissolved solids. The low concentrations of dissolved solids provide an indication that the water present was derived from the recent rainfall events in the month of June 2022 where up to 39 mm were recorded (WaPOR, 2022). The concentrations of dissolved oxygen indicated adequate levels of oxygen to support aquatic life. No perturbations for water quality within the depressions were expected or recorded. It is noted that no water quality guidelines would be applicable to the pan systems.

Table 6-4: In situ water quality results (July 2022)

Site	pH	Conductivity (mS/m)	DO (mg/l)	Temperature (°C)
S1	6.4	6.4	4.2	14

Site	pH	Conductivity (mS/m)	DO (mg/l)	Temperature (°C)
S2	7.1	10	4.6	14
S3	6.8	8.2	4.5	15

Watercourse conditions

Aspects such as channel modification were not considered owing to the absence of these structures in the assessed washes Intermediate Habitat Integrity Assessment (IHIA) used to define the ecological condition of the riparian/wash habitats of the considered areas. The areas samples were given a Category B Rating for instream and Riparian habitat. The Present Ecological Status for the various HGM Units were determined to be a Class A.

Aquatic Macroinvertebrates

Standardised aquatic sampling took place in the larger inundated pan systems to investigate their invertebrate compositions. Up to 10 taxa were identified within the 3 sites that were sampled, namely Chironomidae, Corixidae, Copepoda, Conchostraca, Anostraca, Notostraca, Notonectidae, Gerridae, Culicidae and Cladocera. The presence of the invertebrates within the depression pan systems further supports their classification as important and sensitive landscape features which corroborates their assessment and classification as watercourses. No listed aquatic macroinvertebrates are associated with the proposed project area.

Ecosystem Services

The depression and wash HGM units provided primarily biodiversity and grazing related eco-services. The results range from moderately high to very low. The results indicated a moderately high importance for biodiversity maintenance for both depression and wash systems. The results also indicted a moderate importance rating for provisioning services, particularly relating to the use of the systems for grazing.

Ecological Importance and Sensitivity (EIS)

EIS is determined using the PES scores obtained for WET-Health as well as function and service provision of the systems to enable determination of the representative EIS category for the wetland feature. The Northern Cape conservation plan indicates that the wash habitats are considered to be ecological support areas. The depression pan systems were derived to have very high EIS, whilst the non-perennial washes were derived to be of moderate EIS.

Buffers and Regulated Areas

Buffer zones were defined based on the river and wetland ecosystems buffer tool as defined in Macfarlane et al. 2017 and Macfarlane et al. (2009). The buffer zone tool indicated a need of 15m from the washes, whilst a buffer zone of 20m was provided for depressions.

It is important to consider that the buffer tool was not designed to be implemented for the uncharacteristic/arid watercourse types present in the considered project. The watercourses present onsite are located within the topographic valley bottom landforms and are noted to be undefined/unconfined and unchanneled systems which flow across an alluvial plain in the valley bottom setting. Catchment sizes derived for the watercourses considered in this study were 295 km^2 and 398 km^2, thus expected peak flows are likely to range from 40 m^3/s to 65 m^3/s. Within the valley floor of the project area, it is anticipated that the flood extent would extend further than the expected maximum predicted flow rates of a linear 65m, therefore the floodline extent would exceed the delineated watercourses provided in this study. Considering the above, the washes have a buffer zone of 100m to conserve the necessary area to protect the natural hydrological processes present in the landscape. The depression systems were provided with a buffer zone of 150m to protect the expected catchment of the systems. The provision of the wider buffers aligns with the precautionary approach particularly where indicators for delineation were limited.

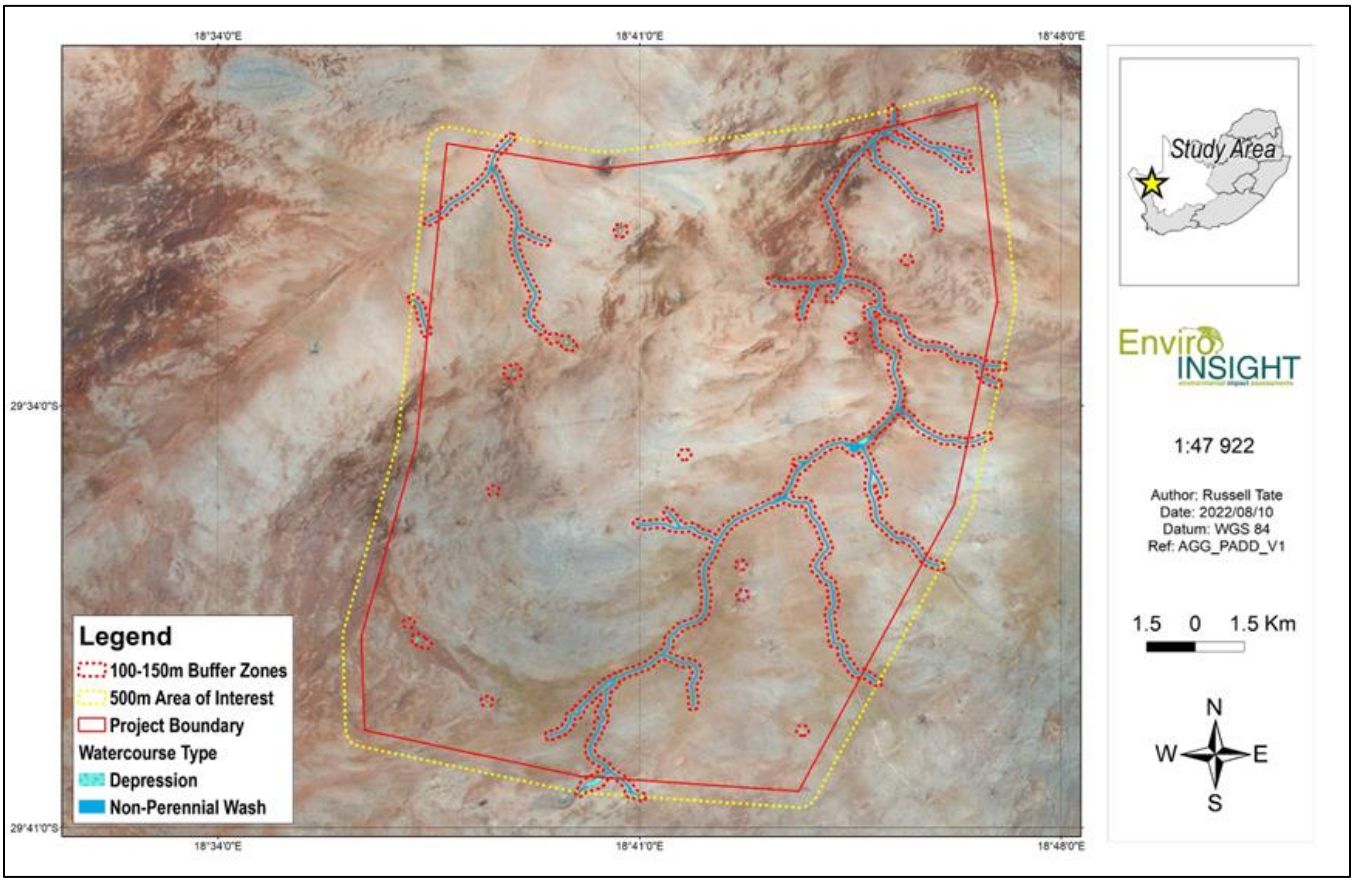

Figure 6-9: 100m and 150m buffer zone for the watercourses in the total project area

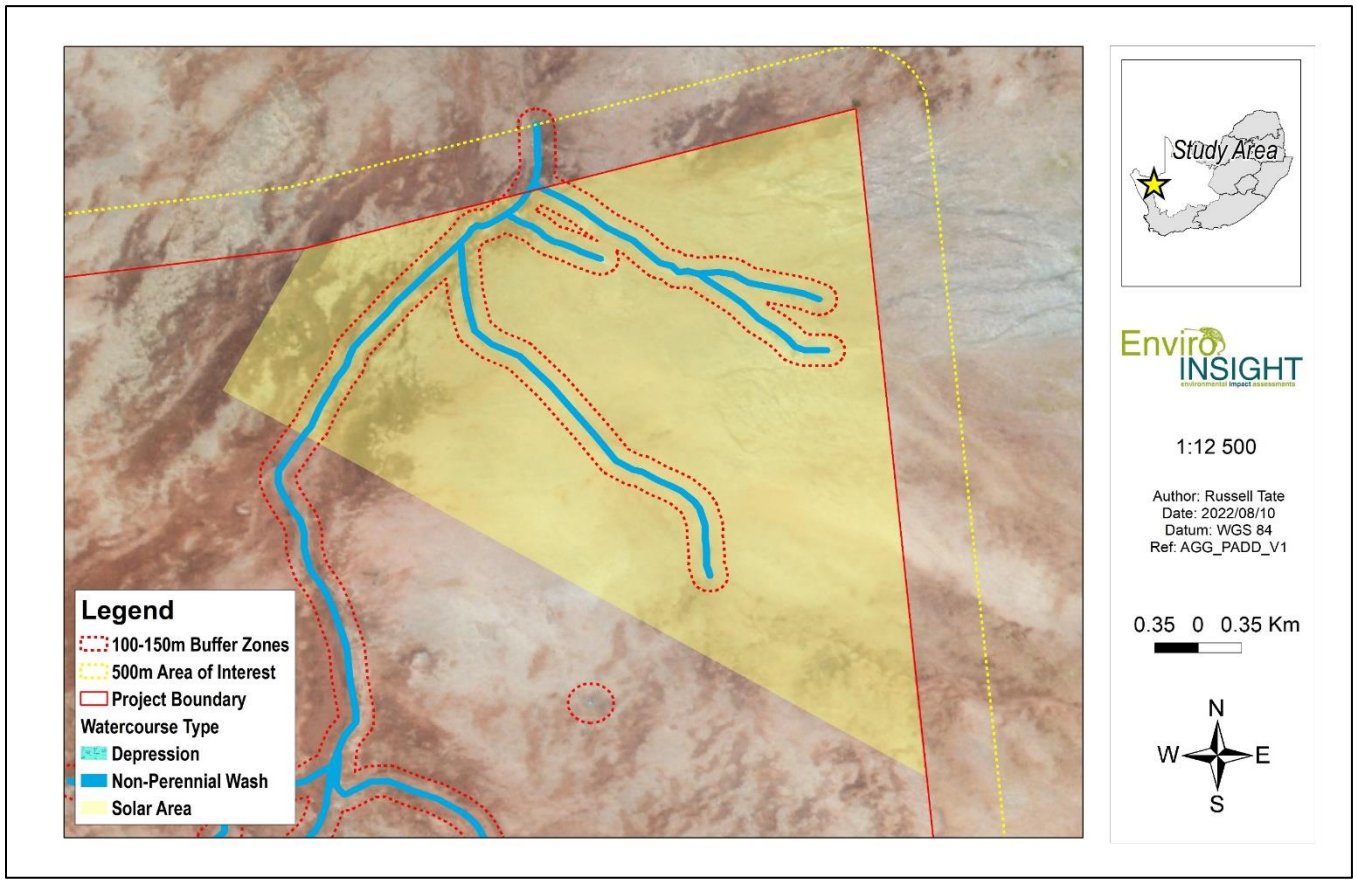

Figure 6-10: 100m and 150m buffer zone for the watercourses in the Solar East SEF

Impacts

- Operation of equipment and machinery
- Clearing vegetation
- Stockpiling of and placement construction materials
- Excavating/shaping landscape
- Final landscaping, backfilling and postconstruction rehabilitation
- Alteration of drainage
- Alteration of surface water flow dynamics
- Establishment of alien plants on disturbed areas
- Hydrocarbon spill

- Uncontrolled erosion

Cumulative Impacts

The expected cumulative impacts for the proposed project on aquatic biodiversity are minimal should the avoidance and mitigation measures be implemented. The nature of the soils, gentle topography and aridity of the region has significant effects on the runoff potential during storm events whereby anticipated impacts are minimal.

Mitigation Measures

- All contractors and staff are to be familiarised with the method statement and have undergone an induction / training on the location of sensitive No-Go areas and basic environmental awareness using the mitigation provided in this report.
- Access routes into or adjacent to the washes must make use of existing road ways and crossings where possible;
- Areas where construction is to take place must be clearly demarcated. Any areas not demarcated must be avoided;
- Storm-water generated from roadways must be captured and buffered, where flow velocities are to be significantly reduced before discharge into the environment.
- Storm-water verges as well as other denuded areas must be grassed (re-vegetated) with local indigenous grasses to protect against erosion;
- Any materials excavated must not be deposited in the river channel or valley slopes where it is prone to being washed downstream or impeding natural flow;
- The installation of sedimentation/erosion protection measures must be implemented before the start of construction, e.g., several rows of silt traps and fences (this is particularly important in the access roads leading or adjacent to the watercourse);
- Stockpiling or storage of materials and/or waste must be placed beyond the defined buffers in this report for each respective activity;
- No vehicles shall enter watercourse buffer zones outside of construction footprints;
- No vehicles shall be serviced on site; a suitable workshop with appropriate pollution control facilities should be utilised offsite;
- Hydrocarbons for refuelling purposes must be stored in a suitable storage device on an impermeable surface outside of the delineated wetland buffer zone;
- Disturbed areas must be re-vegetated after completion of the phase;
- A one-month timeframe for the initiation of this action;
- Ripping of the soils should occur in two directions; and
- Removed vegetation and topsoil can be harvested and applied here.
- Drainage channels constructed for the access roads must be constructed so as not to result in erosion;

- An inspection of the drainage channels must be completed within 1 week following the end of activities and within a week after the first rainfall event. Should excessive sediment be transported down the channels it is recommended that sediment screens are implemented.
- Sediment screens must be inspected, maintained and cleared every month or after significant rainfall (>30mm/24hrs);
- An alien vegetation removal and management plan must be implemented along the verges of the roads and crossing points.
- General storm-water management practices should be included in the design phase and implemented during the construction phase of this project; and
- Following the completion of the phase, all construction materials and debris should be removed and disposed of in a suitable off-site area. An inspection should be completed within a week after the phase is completed.
- The implementation of the buffer zone stipulated in this report.
- Clean and dirty surface water separation and a storm-water management plan must be put into place via standard best practice methods.
- A clear storm-water management plan for hardened surfaces must be implemented.
- The revegetation of disturbed non-active cleared areas must take place within 1 month of completing the construction phase. It must be noted that this area is generally dry and grass will only grow between wet season conditions.
- The above must be audited within 3 months of completing the phase.
- No discharge of domestic water must occur if possible. Domestic water must be reused for dust suppression.
- All stockpiles and hazardous waste storage areas must be bunded by either a cut-off trench or berm directed to a Pollution Control Dam inline with best practice surface water management guidelines.
- Erosion control measures must be put in place. Monitoring and active engagement with local land users is recommended to monitor for erosion in the long term.
- A spill response kit must be always available. The incident must be reported on and if necessary a wetland specialist must investigate the extent of the impact and provide rehabilitation recommendations.

Operation

- The implementation of a suitable storm-water management plan for the disturbance footprint must be in place and implemented by this phase.
- The access road and silt traps (if installed) must be inspected monthly for signs of erosion. When erosion is observed, the area should be rehabilitated within 7 days. In addition, inspections following a >80mm/24 hr rainfall event must occur within 7 days of the event.
- An annual audit of the roads for signs of environmental disturbance outside of the footprint area must be conducted; and
- Alien invasive management programmes should continue throughout the duration of the activity.
- Watercourse monitoring should take place annually as part of the environmental management plan.
- The implementation of the buffer zones provided in this report.

- Clean and dirty surface water separation and storm-water management plan must be put into place via standard best practice methods.
- An effective storm-water management plan for each turbine must be implemented.
- The revegetation of disturbed non active cleared areas must take place within 1 month of completing the construction phase.
- The above must be audited within 3 months of completing the phase.
- No discharge of domestic water must occur if possible. Domestic water must be reused for dust suppression. Should domestic water be required to be discharge, the management of nitrogen concentrations is imperative.
- All stockpiles and hazardous waste storage areas must be bunded by either a cut-off trench directed to a Pollution Control Dam or via a berm.
- A spill response kit must be always available. The incident must be reported on and if necessary a wetland specialist must investigate the extent of the impact and provide rehabilitation recommendations.
- Monitoring to occur once every 2 years to determine if avoidance of depressions have been implemented and to monitor erosion at crossings.

Conclusion

The outcome of this assessment delineated 26 watercourse units within the AoI. These watercourses were considered to be minimally modified and in a largely natural PES. The watercourses were classified as having Very High and Moderate EIS ratings. A scientific buffer was calculated for the watercourses, however inline with the precautionary principle, and given the highly variable nature of the washes, it was proposed that a 150m buffer for depressions and a 100m wash buffer was utilised to protect these sensitive environments.

In the view of the proposed new activities, should the proposed mitigation actions be implemented, no fatal flaw was identified. In line with the recommendations, avoidance must be implemented.

6.7 AGRICULTURAL POTENTIAL

The Agricultural Compliance Statement was conducted by Johann Lanz (the Compliance Statement is included in Appendix D4).

Agricultural Potential

The agricultural potential for the proposed project area is low as a result of extreme climate constraints. The terrain is unsuitable for cultivation and the opportunity for grazing is very limited for livestock. Currently, the land is not being utilised for livestock grazing.

Agricultural Sensitivity

In terms of sensitivity, the land is regarded as low. During the site assessment there were three agricultural impacts identified that might have a potential negative impact, namely occupation of land, soil erosion and degradation and dust generation. However, none of the impacts are of high significance. The positive impacts that was identified is the increase of financial security and improved security against stock theft and other crime. Figure 6-13 indicates the proposed development sight overlaid by the agricultural potential as per the Screening Tool, green = Low.

Impacts

An Agricultural Compliance Statement is not required to formally rate agricultural impacts. It is only required to indicate whether or not the proposed development will have an unacceptable impact on the agricultural production capability of the site.

Nevertheless, it is hereby confirmed that the agricultural impact of the proposed development is assessed as being of very low significance.

- Loss of agricultural potential by occupation of land: Agricultural land directly occupied by the development infrastructure will become restricted for agricultural use, with consequent potential loss of agricultural productivity for the duration of the project lifetime.
- Loss of agricultural potential by soil degradation: Erosion can occur as a result of the alteration of the land surface run-off characteristics, predominantly through the establishment of hard surface areas including roads. Soil erosion is completely preventable. The storm water management that will be an inherent part of the engineering on site and standard, best-practice erosion control measures recommended and included in the EMPr, are likely to be effective in preventing soil erosion. Loss of topsoil can result from poor topsoil management during construction related excavations
- Dust impact: The disturbance of the soil surface, particularly during construction, will generate dust that can negatively impact surrounding veld and farm animals.
- Enhanced agricultural potential through increased financial security for farming operations: Reliable and predictable income will be generated by the farming enterprises through the lease of the land to the energy facility. This is likely to increase their cash flow and financial security and could improve farming operations and productivity through increased investment into farming.
- Improved Security against stock theft and other crime: due to the presence of security infrastructure and security personnel at the energy facility.
- Improved Security against stock theft and other crime: This cumulative impact has been assessed using DFFE's criteria. The cumulative impact of loss of future agricultural production potential will not have an unacceptable negative impact on the agricultural production capability of the area. The proposed development is therefore acceptable in terms

of cumulative impact, and it is therefore recommended that it be approved. Due to the low agricultural sensitivity of the site, and the effectively uniform agricultural conditions across the site, there will be absolutely no material difference between the agricultural impacts of any alternative layouts that may be proposed, and there are therefore no preferred alternatives from an agricultural impact perspective. All alternatives are considered acceptable.

Mitigation Measures

The following mitigation measures are recommended to prevent soil degradation for the proposed SEF:

- Stormwater Management: will prevent erosion, will be an inherent part of the engineering on site. Any occurrences of erosion must be attended to immediately and the integrity of the erosion control system at that point must be amended to prevent further erosion from occurring there.
- Re-Vegetation: Any excavations during the construction phase, in areas that will be re-vegetated at the end of the construction phase, must separate the upper 20 cm of topsoil from the rest of the excavation spoils and store it in a separate stockpile. When the excavation is back-filled, the topsoil must be back-filled last, so that it is at the surface. Topsoil should only be stripped in areas that are excavated. Across the majority of the site, including construction lay down areas, it will be much more effective for rehabilitation, to retain the topsoil in place. If levelling requires significant cutting, topsoil should be temporarily stockpiled and then re-spread after cutting, so that there is a covering of topsoil over the entire cut surface. It will be advantageous to have topsoil and vegetation cover below the panels during the operational phase to control dust and erosion.

Conclusion

The proposed development will not have substantial negative impact on the agricultural production capability of the site and is therefore acceptable. This is substantiated by the facts that the land is of very low agricultural potential, the amount of agricultural land loss is within the allowable development limits, as the development is located within a REDZ which is prioritised for renewable energy development, and that the proposed development poses a low risk in terms of causing soil degradation, if the recommended mitigation measures are implemented.

Figure 6-11: Agricultural Potential sensitivity (green = Low) as per the Screening Tool.

6.8 HERITAGE

The Heritage Impact Assessment was conducted by Jaco van der Walt from Beyond Heritage (the report is included in Appendix D5).

Findings

Heritage

A site survey was conducted from the 11 July 2022. The assessment of the site resulted in a total of 29 locations where heritage observations were made, seven (7) sites were of High significance (AG009, AG010, AG014, AG019, AG024, AG027, AG028), two (2) of Medium significance (AG004-005) and the remaining twenty (20) were of Low significance (AG001-003, AG0006-008, AG011-013, AG015-018, AG020-023, AG025, AG026, AG029). During the survey material dating to Earlier Stone Age (ESA),

Middle Stone Age (MSA) and Later Stone Age (LSA) were recorded. The most significant being the LSA sites centred around fissures that holds water or rocky outcrops with associated lithics, ostrich eggshell fragments and pottery.

Stone Age sites AG009, AG019, AG024, AG027, AG028 is of high significance and will not be directly impacted on by the proposed development. All of these sites are located within environmental no-go areas with a minimum buffer zone of ~ 250 meters that will facilitate their protection in situ. The only significant site located outside a no-go area is site AG009 but no tower or infrastructure is located closer than 200 meters from this site and no impact is expected on this site. Two cemeteries (AG010, AG014) of high social significance are also located in the environmental no-go area with a minimum buffer zone of ~ 250 meters. Stone Age sites of medium significance AG004 & AG005 will also not be directly impacted on as the closest infrastructure (Tower 30) is located ~170 from AG004 and tower 33 ~200 meters from the latter. Other finds were limited to findspots with historical material that do not hold high significance due to low artefact ratio, farmsteads and graves

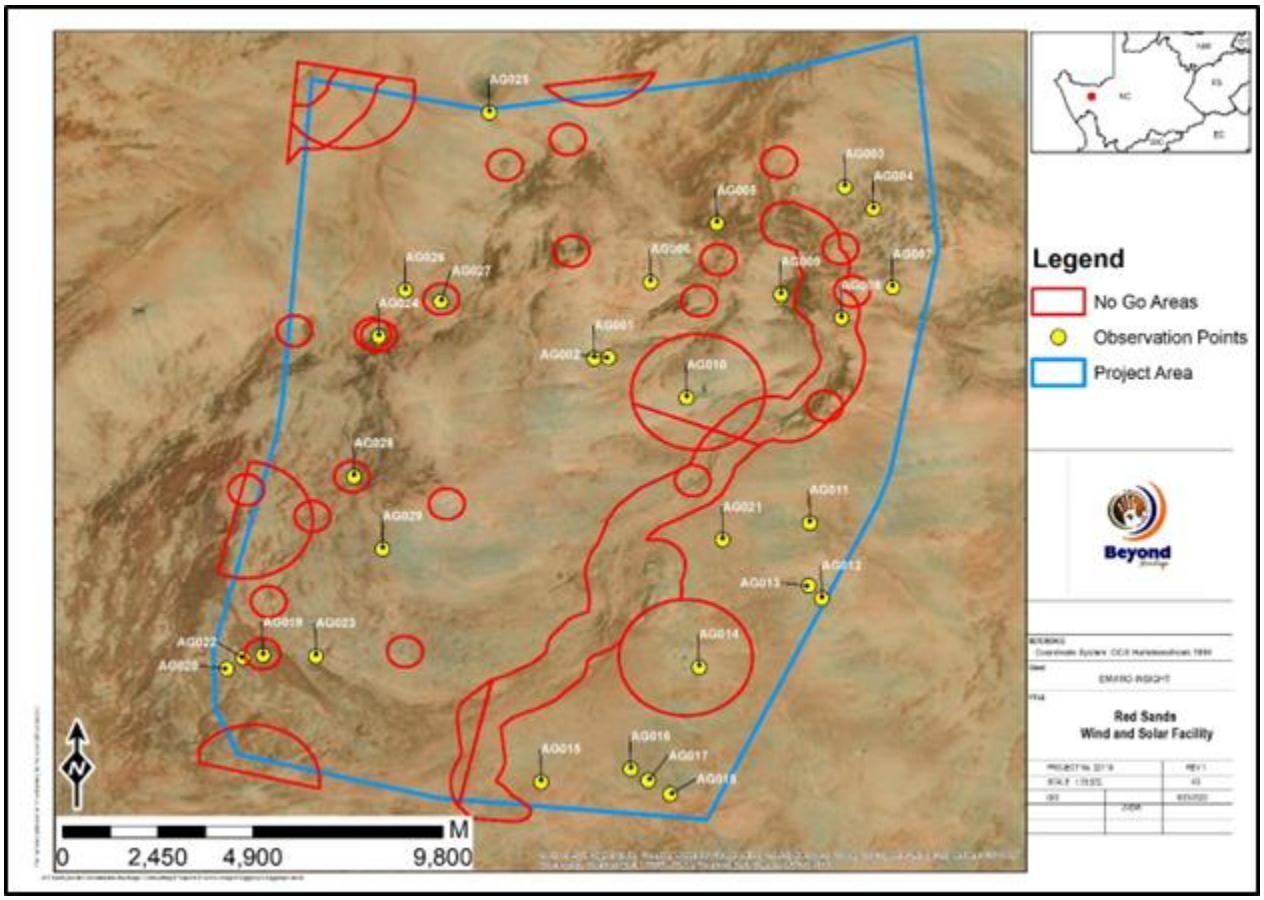

Figure 6-12: Heritage Site distribution in relation to environmental no go areas. Several of the high significant sites also fall into these areas and as a result will be preserved in-situ.

Paleontological Heritage

the SAHRA Paleontological sensitivity map, the majority of the study area is of low paleontological significance and the project can continue with the implementation of a Fossil Chance Find Protocol which should be added to the Environmental Management Programme (EMPr).

Chance Find Procedures

Heritage Resources

The possibility of the occurrence of subsurface finds cannot be excluded. Therefore, if during construction any possible finds such as stone tool scatters, artefacts or bone and fossil remains are made, the operations must be stopped, and a qualified archaeologist must be contacted for an assessment of the find and therefor chance find procedures should be put in place as part of the EMP. A short summary of chance find procedures is discussed below and monitoring guidelines for this procedure are provided in Section 10.5.

This procedure applies to the developer's permanent employees, its subsidiaries, contractors and subcontractors, and service providers. The aim of this procedure is to establish monitoring and reporting procedures to ensure compliance with this policy and its associated procedures. Construction crews must be properly inducted to ensure they are fully aware of the procedures regarding chance finds as discussed below.

- If during the pre-construction phase, construction, operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance or heritage site, this person must cease work at the site of the find and report this find to their immediate supervisor, and through their supervisor to the senior on-site manager.
- It is the responsibility of the senior on-site Manager to make an initial assessment of the extent of the find and confirm the extent of the work stoppage in that area.
- The senior on-site Manager will inform the ECO of the chance find and its immediate impact on operations. The ECO will then contact a professional archaeologist for an assessment of the finds who will notify the SAHRA.

Monitoring Program for Paleontology – to commence once the excavations / drilling activities begin.

1. The following procedure is only required if fossils are seen on the surface and when drilling/excavations commence.
2. When excavations begin the rocks must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (trace fossils, fossils of plants, insects, bone or coalified material) should be put aside in a suitably protected place. This way the project activities will not be interrupted.
3. Photographs of similar fossils must be provided to the developer to assist in recognizing the fossil plants, vertebrates, invertebrates or trace fossils in the shales and mudstones. This information will be built into the EMP's training and awareness plan and procedures.
4. Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.

5. If there is any possible fossil material found by the developer/environmental officer then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible.
6. Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.
7. If no good fossil material is recovered, then no site inspections by the palaeontologist will be necessary. A final report by the palaeontologist must be sent to SAHRA once the project has been completed and only if there are fossils.
8. If no fossils are found and the excavations have finished then no further monitoring is required.

Impacts

Impacts to archaeological resources would mostly occur during the construction phase and will be of low magnitude. A few recorded resources of higher significance that will potentially be impacted on by the project, specifically by roads and ancillary infrastructure, are the sites clustered around Waypoint 20 and 22 and if so, mitigation will be required.

Construction

- Isolated finds (AG001, AG002, AG003, AG006, AG007, AG008, AG011, AG012, AG013, AG015, AG016, AG017, AG018, AG020, AG021, AG022, AG023, AG025, AG026, AG029): During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological and paleontological material or objects.
- Cemeteries (AG010, AG014): During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological and paleontological material or objects.
- High significance Stone Age Sites (AG009, AG019, AG024, AG027, AG028): During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological and paleontological material or objects.
- Historical kraal (AG005) and medium significance Stone Age Site (AG004): During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological and paleontological material or objects.

Cumulative

Cumulative impacts are deemed to be of low significance in this case because the broader landscape is extensive and is likely to hold many similar archaeological resources.

Mitigation

Construction

- Implementation of a Chance Find Procedure for the project;
- Artefact ratio is low, and the isolated finds are of low significance.
- The graves should be avoided with 30m buffer zone.
- Stone Age sites are of high significance and should be avoided.
- Based on the current lay out the Historical kraal (AG005) will be avoided and retained as is.

Recommendations

- Monitoring of the project area by the ECO during pre-construction and construction phases for heritage chance finds, if chance finds are encountered to implement the Chance Find Procedure for the project
- A pre-construction walk through must be conducted of the final layout focussing on areas not previously covered.

Conclusion

Stone Age sites AG009, AG019, AG024, AG027, AG028 is of high significance and will not be directly impacted on by the proposed development. All of these sites are located within environmental no-go areas with a minimum buffer zone of ~ 250 meters that will facilitate their protection in situ. The only significant site located outside a no-go area is site AG009 but no tower or infrastructure is located closer than 200 meters from this site and no impact is expected on this site. Two cemeteries (AG010, AG014) of high social significance are also located in the environmental no-go area with a minimum buffer zone of ~ 250 meters. Stone Age sites of medium significance AG004 & AG005 will also not be directly impacted on as the closest infrastructure (Tower 30) is located ~170 from AG004 and tower 33 ~200 meters from the latter.

The overall impact of the project is considered to be low and residual impacts can be managed to an acceptable level through implementation of the recommendations. The socio-economic benefits also outweigh the possible impacts of the development if the correct mitigation measures are implemented for the project

6.9 SOCIO-ECONOMIC

The Social Impact Assessment was conducted by Tony Barbour and Schalk van der Merwe, the full report is included in Appendix D6.

The development of renewable energy and the associated energy infrastructure is strongly supported at a national, provincial, and local level. The development of and investment in renewable energy and associated energy distribution infrastructure is supported by the National Development Plan (NDP), New Growth Path Framework and National Infrastructure Plan, which all highlight the importance of energy security and investment in energy infrastructure. The proposed powerline is also located within the Springbok REDZ and Northern Transmission Corridor. The development of the proposed SEF and associated infrastructure is therefore supported by key policy and planning documents.

Impacts

Construction

- Creation of Employment, business opportunities, skills development and on-site training (Positive Impact)
- Impacts associated with the presence of construction workers on local communities.
- Increased risks safety, livestock and farming infrastructure associated with the construction related activities and presence of construction workers on the site.
- Increased risk of grass fires associated with construction related activities.
- Nuisance impacts, such as noise, dust, and safety, associated with construction related activities and vehicles.

Operation

- The establishment of infrastructure to improve energy security and support renewable sector (positive)
- Creation of employment opportunities (positive)
- Benefits for local landowners (positive)
- Benefits associated with socio-economic contributions to community development (positive)
- Noise impacts associated with the operation of the plant.
- Visual impacts and associated impacts on sense of place.
- Potential impact on property values.
- Potential impact on tourism.

Cumulative

- Increased pressure on services in the local area
- Loss of sense of place
- Improvement to the local economy (positive)

Mitigation

Construction

- Where reasonable and practical, the proponent should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories. However, due to the low skills levels in the area, the majority of skilled posts are likely to be filled by people from outside the area.
- Where feasible, efforts should be made to employ local contactors that are compliant with Broad Based Black Economic Empowerment (BBBEE) criteria.
- Before the construction phase commences the proponent should meet with representatives from the NKM to establish the existence of a skills database for the area. If such as database exists it should be made available to the contractors appointed for the construction phase.
- The local authorities, community representatives, and organisations on the interested and affected party database should be informed of the final decision regarding the project and the potential job opportunities for locals and the employment procedures that the proponent intends following for the construction phase of the project.
- Where feasible, training and skills development programmes for locals should be initiated prior to the initiation of the construction phase.
- The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.
- The proponent should liaise with the NKM with regards the establishment of a database of local companies, specifically BBBEE companies, which qualify as potential service providers (e.g., construction companies, catering companies, waste collection companies, security companies etc.) prior to the commencement of the tender process for construction service providers. These companies should be notified of the tender process and invited to bid for project-related work
- 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 the contractor(s) should develop a code of conduct for the construction phase. The code should identify which types of behaviour and activities are not acceptable. Construction workers in breach of the code should be subject to appropriate disciplinary action and/or dismissed. All dismissals must comply with the South African labour legislation.
- The proponent and the contractor should implement an HIV/AIDS awareness programme for all construction workers at the outset of the construction phase.
- The contractor should provide transport for workers to and from the site on a daily basis. This will enable the contactor to effectively manage and monitor the movement of construction workers on and off the site.
- The contractor must ensure that all construction workers from outside the area are transported back to their place of residence within 2 days for their contract coming to an end.
- No construction workers, with the exception of security personnel, should be permitted to stay over-night on the site.

- 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 agreement should be signed before the construction phase commences.
- 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 consider the option of establishing a MF (see above) that includes local farmers and develop a Code of Conduct for construction workers. This committee should be established prior to commencement of the construction phase. The Code of Conduct should be signed by the proponent and the contractors before the contractors move onto 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. This should be contained in the Code of Conduct to be signed between the proponent, the contractors, and neighbouring landowners. The agreement should also cover loses and costs associated with fires caused by construction workers or construction related activities (see below).
- The Environmental Management Plan (EMP) 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 all workers are informed at the outset of the construction phase of the conditions contained in the Code of Conduct, specifically consequences of stock theft and trespassing on adjacent farms.
- Contractors appointed by the proponent must ensure that construction workers who are found guilty of stealing livestock and/or damaging farm infrastructure are dismissed and charged. This should be contained in the Code of Conduct. All dismissals must be in accordance with South African labour legislation.
- It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay over-night on the site.
- Contractor should ensure that open fires on the site for cooking or heating are not allowed except in designated areas.
- Smoking on site should be confined to designated areas.
- Contractor should ensure that construction related activities that pose a potential fire risk, such as welding, are properly managed and are confined 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 special 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 should provide fire-fighting training to selected construction staff.

- No construction staff, with the exception of security staff, to be accommodated on site overnight.
- As per the conditions of the Code of Conduct, in the advent of a fire being caused by construction workers and or construction activities, the appointed contractors must compensate farmers for any damage caused to their farms. The contractor should also compensate the fire-fighting costs borne by farmers and local authorities.
- The movement of construction vehicles on the site should be confined to agreed access road/s.
- Establishment of a Grievance Mechanism that provides local farmers and other road users with an effective and efficient mechanism to address issues related to construction related impacts, including damage to local gravel farm roads.
- The movement of heavy vehicles associated with the construction phase should be timed to avoid times days of the week, such as weekends, when the volume of traffic travelling along the access roads may be higher.
- Establishment of a Grievance Mechanism that provides local farmers and other road users with an effective and efficient mechanism to address issues related to construction related impacts, including damage to local gravel farm roads.
- Dust suppression measures should be implemented, such as wetting on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.
- All vehicles must be road worthy, and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits.

Operation

- Implement a skills development and training programme aimed at maximizing the number of employment opportunities for local community members.
- Maximise opportunities for local content, procurement, and community shareholding.
- Maximise opportunities for local content and procurement.
- Implement agreements with affected landowner.
- The proponents should liaise with the NKM to identify projects that can be supported by SED contributions.
- Clear criteria for identifying and funding community projects and initiatives in the area should be identified. The criteria should be aimed at maximising the benefits for the community as a whole and not individuals within the community.
- Strict financial management controls, including annual audits, should be instituted to manage the SED contributions.

Cumulative

- The proposed establishment of suitably sited renewable energy facilities and associated projects, such as the proposed SEF, within the NKM should be supported.
- The proponent should liaise with the NKM to address potential impacts on local services.

Conclusion

The findings of the SIA indicate that the proposed FF Red Sands Solar East SEF will result in several social and socio-economic benefits, including creation of employment and business opportunities during both the construction and operational phase. The project will also contribute to local economic development though socio-economic development (SED) contributions. In addition, the development will improve energy security and reduce the carbon footprint associated with energy generation. The findings of the SIA also indicate that the potential negative impacts associated with both the construction and operational phase are likely to be Low Negative with mitigation. The potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented. The site is also located within the Springbok REDZ. The area has therefore been identified for the development of renewable energy projects.

The establishment of the proposed FF Red Sands Solar East SEF is therefore supported by the findings of the SIA.

6.10 TRANSPORTATION IMPACT ASSESSMENT

A Transportation Impact Assessment Report was compiled by Innovative Transport Solutions (refer to Appendix D7).

The existing traffic volumes along the public roads in the site vicinity are low and well within the capacity of the surrounding road network. The existing traffic volumes will not be any reason for concern in terms of network and intersection capacity. Access to the site is proposed via the existing farm access off the N14 close to kilometre marker N14-1/92.2E.

The required shoulder sight distance (SSD) for heavy vehicles along roads with a posted speed limit of 120km/h is 300 metres based on the geometric design guidelines of the UTG. The available SSD is more than 500 metres in both directions, which is acceptable and safe for the existing posted speed limits along the N14.

Traffic Analysis

- Year 2027 Background Traffic Conditions: A 3.0 percent annual traffic growth rate to the existing traffic volumes on the major links was applied for this assessment, however due to the low traffic volumes along the surrounding road network, it is expected that the road network will continue to operate at acceptable levels-of-service during the background conditions. The roads in the site vicinity are in a fair condition and no major maintenance will be required in the near future
- Construction Phase: A large amount of traffic will be generated during the construction phase. The internal access roads will be constructed mainly of local materials sourced on site if the material is suitable, otherwise material will be imported from commercial sites. These roads will be retained and used for inspection and maintenance of the solar panels.

Trip Generation:

It is estimated, based on similar projects, that approximately 1 000 trucks, worst-case scenario, will be required delivering equipment and building material during the construction period, depending on the type and configuration of the panel arrays,
It is estimated that with 150 working days in a six-month period, it means that on average approximately 7 trucks will visit the site per day which equates to approximately 14 truck trips spread over an eight-hour day.

Impacts

Construction

- Increase in traffic volumes on the surrounding road network because of construction traffic. During the construction phase there will be an increase in traffic volumes on the surrounding road network that will impact on the general road users.

Operation

The operational phase of this project is not expected to generate significant traffic volumes. The typical day-to-day activities will probably only be service vehicles undertaking general maintenance at the site.

Decommissioning

The transport impact during the decommissioning phase will be similar or less than the transport impact during the construction phase. The surrounding road network has sufficient capacity to accommodate the expected traffic volumes associated with the decommissioning phase.

Cumulative

Cumulative impacts are considered low in impacts identified.

Mitigation

Construction

- Construction traffic should not be allowed on the public road network during the typical weekday a.m. and p.m. peak hours in built up areas.
- These measures will be included in the Transport Management Plan.

Operation

The operational phase of this project is not expected to generate significant traffic volumes, therefore no mitigation measures are required

Decommissioning

The transport impact during the decommissioning phase will be similar or less than the transport impact during the construction phase

- Decommissioning traffic should not be allowed on the public road network during the typical weekday a.m. and p.m. peak hours in built up areas.

- These measures will be included in the Transport Management Plan.

Cumulative

Cumulative impacts were considered to be low, therefore no mitigation measures were provided.

Traffic Management and Transportation Plan

- During the construction phase there will be an increase in truck traffic along the roads in the site vicinity, compared to the current truck traffic along these roads. However, the expected total traffic volumes along these roads will still be well within the function of the roads and no operational or safety issues are expected.
- It is recommended that construction and abnormal load traffic should be limited to outside the typical traffic peaks in build-up areas and through towns.
- Most of the equipment and construction material will be delivered to the site with heavy vehicles. The turbine components will be transported by abnormal load vehicles. It is expected that the delivery of the equipment can occur over a 6-month period and the impact of the delivery vehicles on the existing traffic along the road network in the site vicinity will be acceptable. All deliveries with abnormal loads will operate under an approved transportation plan with the necessary traffic routes and traffic accommodation plans in place.

Conclusion

The existing road network has sufficient spare capacity to accommodate the proposed Red Sands Solar East SEF, without any road upgrades required to the existing road infrastructure. It is recommended that the proposed Red Sands Solar East SEF be approved from a transport impact perspective.

6.11 ELECTROMAGNETIC AND RADIO FREQUENCY INTERFERENCE

The South African Radio Astronomy Observatory (SARAO) is a National Facility managed by the National Research Foundation and incorporates all national radio astronomy telescopes and programmes.

The Square Kilometre Array (SKA) project is an international effort (co-hosted between South Africa and Australia) to build the world's largest radio telescope, with a square kilometre (one million square metres) of collecting area. It will have an unprecedented scope in observations, exceeding the image resolution quality of the Hubble Space Telescope by a factor of 50 times, whilst also having the ability to image huge areas of sky in parallel.9 The South African MeerKAT radio telescope, situated 90 km outside the small Northern Cape town of Carnarvon, is a precursor to the SKA telescope and will be integrated into the mid-frequency component of SKA Phase 1. The SKA is located in the Nama Karoo of South Africa, providing the perfect radio quiet backdrop for the high and medium frequency arrays that will form a critical part of the SKA's ground-breaking continent wide telescope. In an effort to protect this unique landscape in the country, the Minister of Science and Technology declared three Astronomy Advantage Areas in the Karoo in terms of the Astronomy Geographic Advantage Act (Act 21 of 2007).

The Applicant is committed to take all precautionary measures to limit the electromagnetic emissions (EMI) in all your electrical cable installations and equipment. The sensitivity with regards to telecommunications is considered low as there aren't any towers telecommunications towners within the vicinity of the site.

7 IMPACT ASSESSMENT

7.1 METHODOLOGY

Direct, indirect and cumulative impacts of the issues that will be identified during the specialist investigations will assessed in terms of these standard rating scales to determine their significance. The rating system used for assessing impacts (or when specific impacts cannot be identified, the broader term issue should apply) is based on six criteria, namely:

- **Status** of impacts – determines whether the potential impact is positive (positive gain to the environment), negative (negative impact on the environment), or neutral (i.e. no perceived cost or benefit to the environment). Take note that a positive impact will have a low score value as the impact is considered favourable to the environment;
- **Spatial extent** of impacts – determines the spatial scale of the impact on a scale of localised to global effect. Many impacts are significant only within the immediate vicinity of the site or within the surrounding community, whilst others may be significant at a local or regional level. Potential impact is expressed numerically on a scale of 1 (site-specific) to 5 (global);
- **Duration** of impacts – refers to the length of time that the aspect may cause a change either positively or negatively on the environment. Potential impact is expressed numerically on a scale of 1 (project duration) to 5 (permanent);
- **Frequency of the activity**– The frequency of the activity refers to how regularly the activity takes place. The more frequent an activity, the more potential there is for a related impact to occur.
- **Severity** of impacts – quantifies the impact in terms of the magnitude of the effect on the baseline environment, and includes consideration of the following factors:
    - The reversibility of the impact;
    - The sensitivity of the receptor to the stressor;
    - The impact duration, its permanency and whether it increases or decreases with time;
    - Whether the aspect is controversial or would set a precedent;
    - The threat to environmental and health standards and objectives;
- **Probability** of impacts –quantifies the impact in terms of the likelihood of the impact occurring on a percentage scale of <5% (improbable) to >95% (definite).

Determination of Impact Significance

The information presented above in terms of identifying and describing the aspects and impacts is summarised in below in and significance is assigned with supporting rational.

Table 7-1: Consolidated Table of Aspects and Impacts Scoring

Spatial Scale	Rating	Duration	Rating	Severity	Rating
Activity specific	1	One day to one month	1	Insignificant/non-harmful	1
Area specific	2	One month to one year	2	Small/potentially harmful	2
Whole site/plant/mine	3	One year to ten years	3	Significant/slightly harmful	3
Regional/neighbouring areas	4	Life of operation	4	Great/harmful	4
National	5	Post closure	5	Disastrous/extremely harmful	5

Frequency of Activity	Rating	Probability of Impact	Rating
Annually / Once-off	1	Almost never/almost impossible	1
6 monthly	2	Very seldom/highly unlikely	2
Monthly	3	Infrequent/unlikely/seldom	3
Weekly	4	Often/regularly/likely/possible	4
Daily / Regularly	5	Daily/highly likely/definitely	5

Significance Rating of Impacts	Timing
Very Low (1-25)	
Low (26-50)	Pre-construction
Low – Medium (51-75)	Construction
Medium – High (76-100)	Operation
High (101-125)	Decommissioning
Very High (126-150)	
Adjusted Significance Rating	

Confidence – The degree of confidence in predictions based on available information and specialist knowledge:

- Low;
- Medium; or
- High.

In addition, each impact needs to be assessed in terms of reversibility and irreplaceability as indicated below:

- **Reversibility** of the Impacts - the extent to which the impacts/risks are reversible assuming that the project has reached the end of its life cycle (decommissioning phase):
    - High reversibility of impacts (impact is highly reversible at end of project life i.e. this is the most favourable assessment for the environment);
    - Moderate reversibility of impacts;
    - Low reversibility of impacts; or
    - Impacts are non-reversible (impact is permanent, i.e. this is the least favourable assessment for the environment).

The environmental significance rating is an attempt to evaluate the importance of a particular impact, the consequence and likelihood of which is assessed by the relevant specialist. The description and assessment of the aspects and impacts is presented in a consolidated table with the significance of the impact assigned using the process and matrix detailed below.

The sum of the first three criteria (spatial scope, duration and severity) provides a collective score for the consequence of each impact. The sum of the last two criteria (frequency of activity and frequency of impact) determines the likelihood of the impact occurring. The product of consequence and likelihood leads to the assessment of the significance of the impact (Significance = Consequence X Likelihood), shown in the significance matrix below in Table 7-2

Table 7-2: Significance Assessment Matrix

	Consequence (Severity + Spatial Scope + Duration)														
Likelihood (Frequency of Activity + Probability of Impact)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	2	4	6	8	10	12	14	16	08	20	22	24	26	28	30
	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45
	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90
	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105
	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120
	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150

Table 7-3: Positive and Negative Impact Mitigation Ratings.

Colour Code	Significance Rating	Value	Negative Impact Management Recommendation	Positive Impact Management Recommendation
	Very High	126-150	Avoidance – consider alternatives	Optimal contribution from Project
	High	101-125	Avoidance as far as possible; implement strict mitigation measures to account for residual impacts	Positive contribution from Project with scope to improve
	High-Medium	76-100	Where avoidance is not possible, consider strict mitigation measures	Moderate contribution from Project with scope to improve
	Low-Medium	51-75	Mitigation measures to lower impacts and manage the project impacts appropriately	Improve on mitigation measures
	Low	26-50	Appropriate mitigation measures to manage the project impacts	Improve on mitigation measures; consider alternatives to improve on
	Very Low	1-25	Ensure impacts remain very low	Consider alternatives to improve on

7.2 IDENTIFICATION OF IMPACTS

Potential impacts resulting from the proposed Red Sands Solar East SEF were identified during the BAR phase using input from the following sectors:

- Existing information based on literature reviews and desktop assessments (EAP and specialist inputs);
- Site visit with the project team;
- Guidelines;
- Legislation; and
- Views of interested and affected parties (thus far).

The following potential impacts were identified:

- Socio-economic impacts;
- Sensitive Flora and Fauna;
- Terrestrial Biodiversity / Ecosystem services;
- Aquatic Impact;
- Agricultural;
- Heritage;
- Traffic;
- Dust;

- Transportation;
- Safety.

7.3 MITIGATION MEASURES

The Impact Mitigation Hierarchy (DEA 2013) will be followed to achieve no overall or limited negative impact on the receiving environment. The Impact Mitigation Hierarchy is a tool which is used reiteratively throughout the project lifecycle to limit negative impacts on the environment. There are four steps/tiers within the hierarchy, and include: Avoid/Prevent, Minimise, Rehabilitate and Offset.

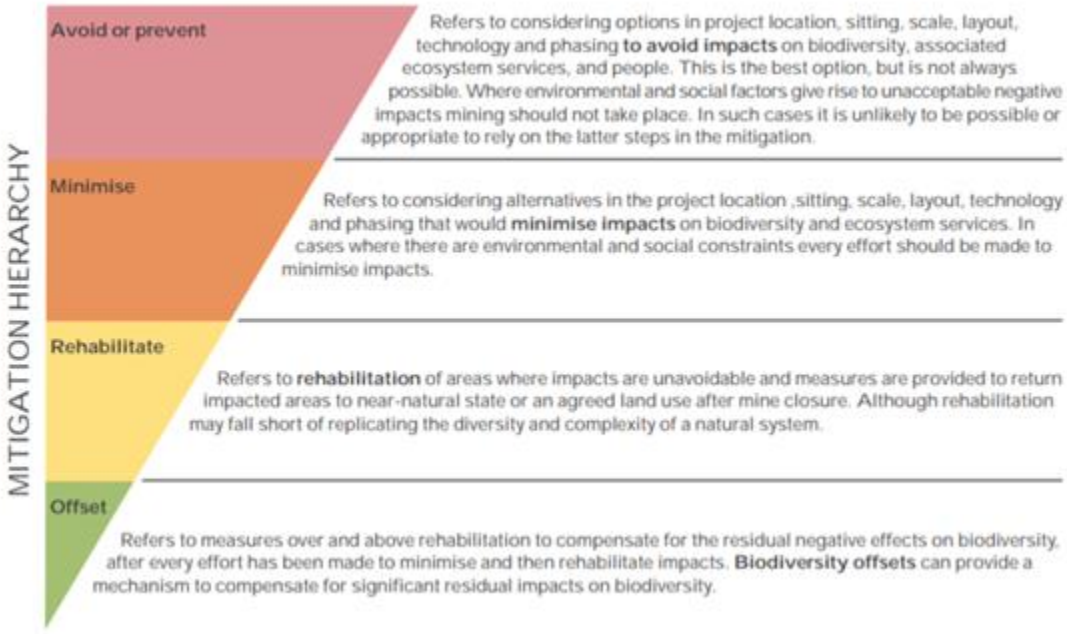

Figure 7-1: The Impact Mitigation Hierarchy (DEA et al., 2013).

Very High impacts should be avoided through alternative layout designs, technology alternatives etc. Where avoidance is not possible, the impacts that are generated by the development should be minimised if measures are implemented in order to reduce the impacts. The proposed mitigation measures should ensure that the development considers the environment and the predicted impacts in order to minimise impacts and achieve sustainable development. Where avoidance and/or minimisation are not possible, rehabilitation and possible offset will be considered. These last two options are rarely considered, and should only be done if the first two options could not be met.

7.4 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

Table 7-4: Potential Impacts prior to mitigation measures.

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
PLANNING & CONSTRUCTION										
Terrestrial Biodiversity										
Habitat Loss and Fragmentation.	Direct	Area specific	• Life of operation (WoM&WM)	• Partial (WoM) • Partial (WM)	• Moderate (WoM) • Low (WM)	Daily/highly likely/definitely	Partial	• Placement of solar panels within the High Sensitivity areas, including drainage lines should be avoided. • Ensure that lay-down and other temporary infrastructure is within low sensitivity areas, preferably previously transformed areas if possible.	Often/regularly/likely/possible	Low – Medium

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								• This impact can also be greatly mitigated if the development in natural vegetated areas do not completely remove the existing vegetation and natural cover, with the removal of vegetation to be restricted to the minimum as possible. For the SEF vegetation clearing and soil disturbance is more significant. Even though species can continue to exist between and		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								underneath PV arrays, the layout of the arrays need to take this into consideration. • The number of roads should be reduced to the minimum possible and routes should also be adjusted to avoid areas of high sensitivity as far as possible. Where possible, existing roads must be used to avoid additional habitat loss and fragmentation.		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								• Movements of machinery, vehicles and persons should be restricted to the existing roads and avoid the existing natural areas. • Solar panels placement can be the cause for the loss of areas with natural vegetation, so care should be taken to limit the placement of solar panels to already disturbed areas or of low significance. • Demarcate all areas to be cleared with construction		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								tape or other appropriate and effective means. However, caution should be exercised to avoid using material that might entangle fauna. • Rehabilitate disturbed areas that are no longer required by the operational phase of the development. Inadequate rehabilitation could result in limited revegetation and/or an invasion of alien vegetation which will result in long term		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								ecological degradation and damage. • Approximately 213,516 ha for the SEFs need to be rehabilitated post-construction as these sections were only required during the construction phase. This includes laydown areas and the widening of internal roads. • A Rehabilitation Management Plan must be developed and implemented during the		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact **WoM-**Without Mitigation **WM-** With Mitigation	Can impact be prevented/ reversed or managed? **WoM-**Without Mitigation **WM-** With Mitigation	Will irreplaceable resources be lost? **WoM-**Without Mitigation **WM-** With Mitigation	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
								construction phase as construction is complete at each site. • An Environmental Control Officer (ECO) must be employed to monitor the clearing of vegetation for the construction of roads and hardstands.		
Loss of species of conservation concern.	Direct	Activity specific	• Post closure WoM • One year to ten years • WM	• Non-reversible (WoM) • Moderate (WM)	• High (WoM) • Low (WM)	Infrequent/unlikely/seldom	Yes	• A comprehensive Plant Search and Rescue must be undertaken by a suitably qualified botanical specialist prior to vegetation clearance.	Very seldom/highly unlikely	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								• Avoidance of drainage lines is necessary for the protection of suitable habitat for sensitive species 12. • All relevant plant permits must be obtained from the provincial authority prior to the removal or relocation of SCC, including provincially protected species. • Plant SCC found within the proposed site must either be housed in an onsite nursery for use		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact **WoM-**Without Mitigation **WM-** With Mitigation	Can impact be prevented/ reversed or managed? **WoM-**Without Mitigation **WM-** With Mitigation	Will irreplaceable resources be lost? **WoM-**Without Mitigation **WM-** With Mitigation	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
								during rehabilitation or be relocated to suitable areas where vegetation clearance will not occur.		
Alien and invasive plant species	Direct	Whole Site	Post closure (WoM &WM)	Low (WoM) Moderate (WM)	Moderate (WoM) Low (WM)	Infrequent/unlikely/seldom	Yes	• A site-specific Alien Invasive Species (AIS) Management Plan must be implemented during the construction phase and continued monitoring and eradication needs to take place throughout the life of the project. • Alien vegetation, within the development footprints, should be removed from	Very seldom/highly unlikely	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								the site and disposed of at a registered waste disposal site. • The development footprints and immediate surroundings should be monitored for the growth/regrowth of alien vegetation throughout the construction and operation phases of the project.		
Increased risk of erosion and flash floods.	Direct and Indirect	Area specific	• Post closure (WoM&WM)	Low (WoM) Moderate (WM)	Moderate (WoM) Low (WM)	Infrequent/unlikely/seldom	Yes	• Soil erosion and Rehabilitation Plan to be part of the EMPr. • The clearance of vegetation, at any given	Very seldom/highly unlikely	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								time, must be kept to a minimum to reduce the possibility of soil erosion. • Rehabilitation of eroded areas on a regular basis during the construction period. • All roads and other hardened surfaces should have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk. • Regular monitoring for erosion after construction to		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact **WoM-**Without Mitigation **WM-** With Mitigation	Can impact be prevented/ reversed or managed? **WoM-**Without Mitigation **WM-** With Mitigation	Will irreplaceable resources be lost? **WoM-**Without Mitigation **WM-** With Mitigation	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
								ensure that no erosion problems have developed as result of the disturbance.		
Disturbances or displacement impacts on fauna including traffic, noise and dust.	Direct	Area specific (WoM) Activity specific (WM)	Life of operation (WoM) One year to ten years(WM)	Low (WoM) Moderate (WM)	Moderate (WoM) Low (WM)	Infrequent/unlikely/seldom	Yes	• Ground clearing and the digging of trenches should ideally take place at the end of the dry season, prior to the first rains in order to minimise the impacts of dust. • Newly cleared and exposed areas must be managed for dust and landscaped with indigenous vegetation to avoid soil erosion. Where necessary,	Very seldom/highly unlikely	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								temporary stabilisation measures must be used until vegetation establishes. • Speed restrictions (40 km per hour is recommended) should be in place to reduce the amount of dust caused by vehicle movement along the roads, and to reduce possible fauna fatalities with vehicle collisions. • Driving around in the area as well as noise levels at night should be limited, as should the use of harsh lights which could cause		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								light pollution for nocturnal species. • Where appropriate, sound dampeners must be used. • Avoid the presence of people and vehicles in highly sensitive areas as far as possible. • Fences should be constructed in such a way so that burrowing animals can still gain access. • Strict measures should be put into place to prevent workers from poaching and		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact **WoM-**Without Mitigation **WM-** With Mitigation	Can impact be prevented/ reversed or managed? **WoM-**Without Mitigation **WM-** With Mitigation	Will irreplaceable resources be lost? **WoM-**Without Mitigation **WM-** With Mitigation	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
								hunting naturally occurring fauna. • Working at night should be limited, as should the use of harsh lights which could cause light pollution for nocturnal species.		
Avifauna										
Habitat destruction	Direct	Area specific (WoM) Activity specific (WM)	Life of operation (WoM) One year to ten years (WM)	Medium (WoM) Low (WM)	No	Daily/highly likely/definitely	Yes	Impacts associated with the loss of bird foraging habitat due to operations can be mitigated by avoiding avifaunal specific sensitive areas and their associated buffers, such as the local drainage lines,	Often/regularly/likely/possible	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								impoundments, smaller watercourses, and pans. A green buffer should be maintained around all habitats with a SEI designated as High or above. Apply necessary buffers for roost and foraging sites and other sensitive bird habitat features, avoiding the construction of access roads in these areas. Roads must utilise or upgrade existing farm roads as far as possible.		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
Destruction or disturbance of bird roosts	Direct	Area specific (WoM) Activity specific (WM)	One month to one year (WoM&WM)	No (WoM) Yes (WM)	Yes (WoM) No (WM)	Daily/highly likely/definitely	Yes	Apply necessary buffers for roost sites and other sensitive bird habitat features, avoiding the construction of access roads in these areas. Roads must utilise or upgrade existing farm roads as far as possible.	Infrequent/unlikely/seldom	Low
Aquatic										
Operation of equipment and machinery	Direct	Activity specific	One year to ten years (WoM) Short Term (WM)	-	-	Often/regularly/likely/possible	Yes		Almost never/almost impossible	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
Clearing vegetation	Direct	Activity specific	One year to ten years (WoM) Short Term (WM)	-	-	Often/regularly/likely/possible	Yes		Almost never/almost impossible	Low
Stockpiling of and placement construction materials	Direct		One year to ten years (WoM) Short Term (WM)	-	-	Often/regularly/likely/possible	Yes		Almost never/almost impossible	Low
Excavating/shaping landscape	Direct	Activity specific	One year to ten years (WoM)	-	-	Often/regularly/likely/possible	Yes		Almost never/almost impossible	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
Final landscaping, backfilling and postconstruction rehabilitation	Direct	Activity specific	One year to ten years (WoM)	-	-	Often/regularly/likely/possible	Yes		Almost never/almost impossible	Low
Agricultural										
Loss of agricultural potential by occupation of land	Direct	Local	Long term (WoM)	-	-	High	Yes	Increased financial security for farming operations by the leasing of the property	Medium	Medium
Loss of agricultural potential by soil degradation	Direct	Local	Medium term (WoM) Short Term (WM)	-	-	Medium	Yes	• Design an effective system of storm water runoff control, where it is required that is at any points where runoff water	Low	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								might accumulate. The system must effectively collect and safely disseminate any runoff water from all accumulation points and it must prevent any potential down slope erosion. • Maintain where possible all vegetation cover and facilitate revegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion.		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact **WoM-**Without Mitigation **WM-** With Mitigation	Can impact be prevented/ reversed or managed? **WoM-**Without Mitigation **WM-** With Mitigation	Will irreplaceable resources be lost? **WoM-**Without Mitigation **WM-** With Mitigation	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
								• If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for respreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.		
Dust impact	Direct	Local	Medium term	-	-	Medium	Yes	Implement dust control measure	Low	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
			(WoM) Short Term (WM)							
Enhanced agricultural potential through increased financial security for farming operations	Positive Impact									
Improved security against stock theft and other crime	Positive Impact									

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
Heritage										
Disturbance of isolated finds (AG001, AG002, AG003, AG006, AG007, AG008, AG011, AG012, AG013, AG015, AG016, AG017, AG018, AG020, AG021, AG022, AG023, AG025, AG026, AG029)	Direct	Local	Permanent (WoM&WM)	Not reversible	Yes	Improbable	N/A	• Implementation of a Chance Find Procedure for the project; • Artefact ratio is low, and the isolated finds are of low significance. • The recorded heritage sites of high significance must be avoided and preserved as is within the environmental no go areas.	Improbable	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
Disturbance of cemeteries (AG010, AG014)	Direct	Local	Permanent (WoM&WM)	Not reversible	Yes	Improbable	N/A	• Implementation of a Chance Find Procedure for the project; • The graves should be avoided with 30m buffer zone. • The two cemeteries must be avoided and preserved as is within the environmental no go areas.	Very Improbable	Low
Disturbance of high significance Stone Age Sites (AG009,	Direct	Local	Permanent (WoM&WM)	Not reversible	Yes	Improbable	N/A	• Implementation of a Chance Find Procedure for the project; • These Stone Age sites are of high significance and should be avoided.	Very Improbable	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact **WoM-**Without Mitigation **WM-** With Mitigation	Can impact be prevented/ reversed or managed? **WoM-**Without Mitigation **WM-** With Mitigation	Will irreplaceable resources be lost? **WoM-**Without Mitigation **WM-** With Mitigation	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
AG019, AG024, AG027, AG028)										
Disturbance Historical kraal (AG005) and medium significance Stone Age Site (AG004)	Direct	Local	Permanent (WoM&WM)	Not reversible	Yes	Improbable	N/A	•Implementation of a Chance Find Procedure for the project; • Based on the current lay out the features will be avoided and retained as is.	Very Improbable	Low
Social										
Employment, business opportunities and skills development	Direct and Cumulative	Local (WoM&WM)	Short term (WoM) (WM)	-	-	Highly probable	Yes	• Where reasonable and practical, the proponent should appoint local contractors and implement a 'locals first' policy, especially for semi	Highly probable	High Positive

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								and low-skilled job categories. However, due to the low skills levels in the area, the majority of skilled posts are likely to be filled by people from outside the area. • Where feasible, efforts should be made to employ local contactors that are compliant with Broad Based Black Economic Empowerment (BBBEE) criteria. • Before the construction phase commences the		

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			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								proponent should meet with representatives from the NKM to establish the existence of a skills database for the area. If such as database exists it should be made available to the contractors appointed for the construction phase. • The local authorities, community representatives, and organisations on the interested and affected party database should be		

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			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								informed of the final decision regarding the project and the potential job opportunities for locals and the employment procedures that the proponent intends following for the construction phase of the project. • Where feasible, training and skills development programmes for locals should be initiated prior to the initiation of the construction phase.		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								• The recruitment selection process should seek to promote gender equality and the employment of women wherever possible. • The proponent should liaise with the NKM with regards the establishment of a database of local companies, specifically BBBEE companies, which qualify as potential service providers (e.g., construction companies, catering companies,		

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								waste collection companies, security companies etc.) prior to the commencement of the tender process for construction service providers. These companies should be notified of the tender process and invited to bid for project-related work.		
Construction workers on site and in local area	Direct	Local (WoM&WM)	Short term for community as a	No in case of HIV and AIDS	Yes, if people contract HIV/AIDS.	Probable	Yes	• Where possible, the proponent should make it a requirement for contractors to implement a 'locals first' policy for	Probable	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
			whole (WoM) (WM)		Human capital plays a critical role in communities that rely on farming for their livelihoods			construction jobs, specifically for semi and low skilled job categories. The proponent and the contractor(s) should develop a code of conduct for the construction phase. The code should identify which types of behaviour and activities are not acceptable. Construction workers in breach of the code should be subject to appropriate disciplinary action and/or dismissed. All dismissals		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact **WoM-**Without Mitigation **WM-** With Mitigation	Can impact be prevented/ reversed or managed? **WoM-**Without Mitigation **WM-** With Mitigation	Will irreplaceable resources be lost? **WoM-**Without Mitigation **WM-** With Mitigation	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
								must comply with the South African labour legislation. • The proponent and the contractor should implement an HIV/AIDS awareness programme for all construction workers at the outset of the construction phase. • The contractor should provide transport for workers to and from the site on a daily basis. This will enable the contactor to effectively manage and		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact **WoM-**Without Mitigation **WM-** With Mitigation	Can impact be prevented/ reversed or managed? **WoM-**Without Mitigation **WM-** With Mitigation	Will irreplaceable resources be lost? **WoM-**Without Mitigation **WM-** With Mitigation	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
								monitor the movement of construction workers on and off the site. • The contractor must ensure that all construction workers from outside the area are transported back to their place of residence within 2 days for their contract coming to an end. • No construction workers, with the exception of security personnel, should be permitted to		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact **WoM-**Without Mitigation **WM-** With Mitigation	Can impact be prevented/ reversed or managed? **WoM-**Without Mitigation **WM-** With Mitigation	Will irreplaceable resources be lost? **WoM-**Without Mitigation **WM-** With Mitigation	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
								stay over-night on the site.		
Risk to safety, livestock, and damage to farm infrastructure	Direct	Local (WoM&WM)	Short term (WoM&WM)	Yes, compensation paid for stock losses and damage to farm infrastructure etc.	No	Probable	Yes	• 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 agreement should be signed before the construction phase commences.	Probable	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								• 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 consider the option of establishing a MF (see above) that includes local farmers and develop a Code of Conduct for construction workers.		

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			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								This committee should be established prior to commencement of the construction phase. The Code of Conduct should be signed by the proponent and the contractors before the contractors move onto site. • The proponent should hold contractors liable for compensating farmers and communities in full for any stock losses and/or damage to farm		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								infrastructure that can be linked to construction workers. This should be contained in the Code of Conduct to be signed between the proponent, the contractors, and neighbouring landowners. The agreement should also cover loses and costs associated with fires caused by construction workers or construction related activities (see below).		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								• The Environmental Management Plan (EMP) 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 all workers are informed at the outset of the construction phase of the conditions contained in the Code of Conduct, specifically		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								consequences of stock theft and trespassing on adjacent farms. • Contractors appointed by the proponent must ensure that construction workers who are found guilty of stealing livestock and/or damaging farm infrastructure are dismissed and charged. This should be contained in the Code of Conduct. All dismissals must be in accordance with South African labour legislation.		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								• It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay over-night on the site.		
Increased risk of grass fires	Direct	Local (WoM&WM)	Short term (WoM&WM)	Yes, compensation paid for stock and crop losses etc.	No	Probable	Yes	• 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 agreement should be signed before the	Probable	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								construction phase commences. • Contractor should ensure that open fires on the site for cooking or heating are not allowed except in designated areas. • Smoking on site should be confined to designated areas. • Contractor should ensure that construction related activities that pose a potential fire risk, such as welding, are properly managed and are		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								confined 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 special 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.		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								• Contractor should provide fire-fighting training to selected construction staff. • No construction staff, with the exception of security staff, to be accommodated on site overnight. • As per the conditions of the Code of Conduct, in the advent of a fire being caused by construction workers and or construction activities, the appointed contractors		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								must compensate farmers for any damage caused to their farms. The contractor should also compensate the fire-fighting costs borne by farmers and local authorities.		
Nuisance impacts associated with construction related activities	Direct	Local (WoM&WM)	Short Term (WoM&WM)	Yes	No	Probable	Yes	• The movement of construction vehicles on the site should be confined to agreed access road/s. • Establishment of a Grievance Mechanism that provides local	Probable	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								farmers and other road users with an effective and efficient mechanism to address issues related to construction related impacts, including damage to local gravel farm roads. The movement of heavy vehicles associated with the construction phase should be timed to avoid times days of the week, such as weekends, when the volume of traffic travelling along the		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								access roads may be higher. • Establishment of a Grievance Mechanism that provides local farmers and other road users with an effective and efficient mechanism to address issues related to construction related impacts, including damage to local gravel farm roads. • Dust suppression measures should be implemented, such as		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact **WoM-**Without Mitigation **WM-** With Mitigation	Can impact be prevented/ reversed or managed? **WoM-**Without Mitigation **WM-** With Mitigation	Will irreplaceable resources be lost? **WoM-**Without Mitigation **WM-** With Mitigation	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
								wetting on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers. • All vehicles must be road worthy, and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits.		
Traffic										
Increase in traffic volumes	Direct	Local	Short Term (WoM&WM)	-	-	Highly Probable	Yes	• Construction traffic should not be allowed on	Probable	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
on the surrounding road network as a result of construction traffic								the public road network during the typical weekday a.m. and p.m. peak hours in built up areas. • These measures will be included in the Transport Management Plan		
General										
Stormwater Management	Indirect	Local	Construction	Yes – can be prevented/ managed	No	Medium	High	Vegetation maintenance: regular watering, weed control, replacement of dead plants, pest monitoring and control and dirt removal. Vegetation	Low	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact **WoM-**Without Mitigation **WM-** With Mitigation	Can impact be prevented/ reversed or managed? **WoM-**Without Mitigation **WM-** With Mitigation	Will irreplaceable resources be lost? **WoM-**Without Mitigation **WM-** With Mitigation	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
								maintenance should occur bi-weekly. Maintenance of infrastructure such as concrete pipe and channels as well as grids and kerb inlets should occur monthly.		
Hunting / Fishing by construction workers.	Direct	Local	Construction phase (short-term)	Yes – can be prevented	No	Medium - Low	High	Hunting / poaching and fishing are prohibited. During construction, guidelines set out by the ECO will be followed to ensure no potential impacts occur and workers will be instructed that hunting and	Low	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								fishing is a non-compliance of the authorized activity.		
Degradation and contamination of the surrounding environment by construction activities, cement, hydrocarbons and other hazardous materials.	Direct	Local/ regional	Construction phase (short-term)	Yes – can be managed/ prevented	No	High	High	Site workers will be trained in avoiding impacts in areas of potential concern. Designated concrete mixing areas and storage areas for any hazardous materials must be assigned; cement mixing is not permitted in any area where runoff can contaminate the surrounding environment. This must be strictly	Low	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								controlled through the site specific EMPr.		
Potential disturbance or unearthing of graves or disturbance to other heritage resources during the construction phase.	Direct	Local/ regional	Construction phase (short-term)	Yes – can be managed/ prevented	No	Low	Low	There is no evidence of any heritage resources. If any resources are discovered during construction, the ECO must be notified immediately and construction around the resource must cease immediately. This must be strictly monitored by the ECO and controlled through the EMPr.	Low	Low
Improper storage and	Direct	Local/ regional	Construction phase	Yes – can be	No	High	High	Due to the nature of the activity, waste is anticipated	Low	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
disposal of solid waste.			(short-term)	managed/ prevented				to be minimal. All solid waste generated during the construction process must be placed in a designated waste collection area within the construction camp and must not be allowed to blow around the site, be accessible by animals, or be placed in piles adjacent to the skips / bins. All solid waste must then be disposed of at the nearest licensed landfill and safe disposal certificates must be obtained and kept on site at		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								all times during construction. Separate skips/ bins for the different waste streams must be available on site. The waste containers must be appropriate to the waste type contained therein and where necessary should be lined and covered.		
Littering around the site.	Direct	Local	Construction & Operation phase (short-term)	Yes – can be prevented	No	Medium - Low	High	Littering is not permitted on the site and general housekeeping must be enforced. General waste bins must be readily	Low	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								available for litter disposal and general housekeeping.		
Improper disposal of rubble i.e.: burying or neglecting building rubble resulting in direct mechanical damage to surrounding vegetation and untidiness of the site.	Direct	Local (within construction site)	Construction phase (short-term)	Yes impact can be managed	No	Medium	High	All excess material and rubble must be removed from the site so not to restrict the rehabilitation process. All excess material and rubble must go to an approved designated landfill and a safe disposal certificate must be obtained. Site workers will be trained in avoiding such impacts during induction training and regular toolbox talks.	Low	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
Lack of toilet facilities resulting in unsanitary conditions.	Direct	Local	Construction & Operation phase (short-term)	Yes – can be prevented	No	High	High	Adequate toilet facilities must be provided for all staff members as standard construction practice as well as during operational activities. Chemical toilets, if used, must be secured to the ground and kept away from any sensitive areas. It should be regularly cleaned by a reputable company and maintained in a clean state. During operation toilet facilities provided by the venue must be used by staff	Low	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								and guests. This must be monitored in an EMPr.		
Improper disposal of toilet waste from chemical toilets resulting in contamination of the surrounding environment	Indirect	Local	Construction phase (short-term)	Yes – can be prevented	No	High	High	Chemical toilets must be placed onsite and not in close proximity to any sensitive areas. The chemical toilets must be provided by a registered company and all effluent must be regularly disposed of at a licenses facility. Safe disposal certificates must be obtained and kept on site.	Low	Low
Increase waste to landfill site.	Indirect	Local	Construction &	Yes – can be managed	No	High	Medium	Due to the nature of the activity during construction and operational phases,	Medium	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
			Operation phase (short-term)					waste is anticipated to be minimal. Where possible, waste streams will be separated and recycled to limit the amount of waste being added to the landfill site.		
Risk of spills from construction equipment (oils, fuels, cement etc.) contaminating soil and the watercourse.	Direct	Local (within construction site)	Construction phase (short-term)	Yes impact can be managed	No	Medium	High	Any hazardous or dangerous goods utilised during the construction phase must be stored on an impermeable surface that is bunded, fenced, locked and covered. A spill kit must be clearly marked and visible when utilizing hazardous or	Low	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								dangerous materials to ensure that all spills are immediately cleaned. Spill kits must be regularly checked and maintained.		
Dust Generation and control	Direct	Local	Construction & Operation phase	Yes impact can be managed	No	Medium	High	• The Developer and construction contractors must take all reasonable measures to minimise the generation of dust as a result of construction activities to the satisfaction of the ECO and the relevant regulatory authorities;	Low	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								• Removal of vegetation must be avoided until such time as soil stripping is required, and similarly exposed surfaces must be re-vegetated or stabilised as soon as is practically possible; • Appropriate dust suppression measures must be used when dust generation is unavoidable, e.g. damping down of all exposed soil surfaces with a water bowser or		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact **WoM-**Without Mitigation **WM-** With Mitigation	Can impact be prevented/ reversed or managed? **WoM-**Without Mitigation **WM-** With Mitigation	Will irreplaceable resources be lost? **WoM-**Without Mitigation **WM-** With Mitigation	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
								hosepipe when necessary; • To reduce dust dampening with water, particularly during prolonged periods of dry weather appropriate chemical binders may be used. Such measures must also include the use of temporary stabilising measures (e.g. chemical soil binders, straw, brush packs, chipping etc.); • During high wind conditions, the Contractor		

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			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								during construction and the developer during operation, must evaluate the situation and make recommendations as to whether dust-damping measures are adequate, or whether working will cease altogether until the wind speed drops to an acceptable level; • Excavations and other clearing activities must only be done during agreed working times and permitting weather		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact **WoM-**Without Mitigation **WM-** With Mitigation	Can impact be prevented/ reversed or managed? **WoM-**Without Mitigation **WM-** With Mitigation	Will irreplaceable resources be lost? **WoM-**Without Mitigation **WM-** With Mitigation	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
								conditions to avoid sand and dust drifting into neighbouring areas; • The dust monitoring programme as per the National Dust Control Regulations, will be implemented and the necessary steps taken to ensure compliance with the relevant quality requirements; and • A complaints register will be implemented and any complaints related to dust will be investigated and		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								appropriate measures taken to resolve the issue.		
Degradation of existing service infrastructure, e.g. roads, electricity.	Direct	Local	Construction phase (short-term).	Yes impact can be managed	No	High	High	Any damage to existing infrastructure will result in the reinstating of that infrastructure to an acceptable state. The cost of which will be that of the applicant. The site currently is not dependent on municipal services.	Low	Low
OPERATION										
Terrestrial Biodiversity										
Direct faunal impacts due to operation.	Direct	Area specific	Life of operation One year to	Low (WoM) Moderate (WM)	Moderate (WoM) Low (WM)	Infrequent/unlikely/seldom	Yes	• Reduce the presence of human activity on the project area as far as	Very seldom/highly unlikely	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
			ten years (WoM) WM)					possible by only focusing on the areas where operational tasks are required, • Avoid the presence of people and vehicles in highly sensitive areas as far as possible, • No unauthorised persons should be allowed onto the site, • Any potentially dangerous fauna such snakes or fauna threatened by the maintenance and operational activities should		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								be removed to a safe location, • Lower the levels of noise whenever possible and avoid the destruction or disturbance of identified important features, • illegal collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden by anyone except by individuals with the appropriate permits,, • All hazardous materials should be stored in the appropriate manner to		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								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 as related to the nature of the spill, • Fences should be constructed in such a way so that burrowing animals can still gain access, which will allow other animals to also utilise the holes dug under fences to increase connectivity in the area.		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
Alien and invasive plant species	Direct	Whole Site (WoM) Area specific (WM)	Post Closure (WoM&WM)	Low (WoM) Moderate (WM)	Moderate (WoM) Low (WM)	Infrequent/unlikely/seldom	Yes	• The site-specific AIS Management Plan must be implemented for the first year of the operational phase. Thereafter, alien vegetation must continue to be monitored and eradicated annually throughout the life of the project. • Due to the disturbance at the site as well as the increased runoff generated by the hard infrastructure, alien plant species are likely to be a long-term problem at	Very seldom/highly unlikely	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact **WoM-**Without Mitigation **WM-** With Mitigation	Can impact be prevented/ reversed or managed? **WoM-**Without Mitigation **WM-** With Mitigation	Will irreplaceable resources be lost? **WoM-**Without Mitigation **WM-** With Mitigation	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
								the site and a long-term control plan will need to be implemented. Problem woody species such as Prosopis are already present in the area and are likely to increase rapidly if not controlled. • Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible.		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								• Alien vegetation, within the development footprints, should be removed from the site and disposed of at a registered waste disposal site.		
Avifauna										
Bird mortalities	Direct	Whole site/plant/mine	Life of operation (WoM&WM)	No	Yes (WoM) Potentially (WM)	Daily/highly likely/definitely	Yes	Avoid placement of solar panels near sensitive bird breeding and roosting habitats. The application of adaptive mitigation measures (e.g., shutdown on demand retrofitting), according to post-construction monitoring	Infrequent/unlikely/seldom	Medium

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								results (counted strikes of threatened species) must be informed by environmental correlates of avifaunal activity and/or strikes. It is vital to understand that significant bird mortality for ground dwelling species such as Ludwig's Bustard and Karoo Korhaan will occur, not because of turbine collision, but as a result of collision with supporting infrastructure. Therefore, mitigation		

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			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								measures must be applied to powerlines and fences.		
Disruption of bird migratory pathways	Indirect	Whole site/plant/mine	Life of operation (WoM) One year to ten years (WM)	No (WoM) Yes (WM)	Yes (WoM) No (WM)	Daily/highly likely/definitely	Yes	Increase turbine cut in speed as this has been shown to reduce collisions. The risk is not considered to be high. The linear drainage line habitats must be buffered by a minimum of 50 metres from the edge of the demarcated wetland.	Very seldom/highly unlikely	Low
The attraction of some novel bird species due to the	Indirect	Whole site/plant/mine	Life of operation (WoM)	No (WoM) Yes (WM)	Yes (WoM) No (WM)	Daily/highly likely/definitely	Yes	Bird diverters, perch deterrents and the application of Non-polarising white tape can be	Very seldom/highly unlikely	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
development of a solar farm with associated infrastructure such as lake effect, perches, nest and shade opportunities.			One year to ten years (WM)					used around and/or across panels to minimise reflection which can attract aquatic birds and insects (food) as panels mimic reflective surfaces of waterbodies.		
Chemical pollution: Chemicals being used to keep the PV panels clean from dust	Direct	Indirect	Whole site/plant/mine	Life of operation (WoM) One year to ten years (WM)	No (WoM) Yes (WM)	Yes (WoM) No (WM)	Daily/highly likely/definitely	The application of strict chemical control protocols as per the EMPr.	Very seldom/highly unlikely	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
(suppressants) etc.										
Aquatic										
Alteration of drainage	Direct	Activity specific (WoM & WM)	Life of operation (WoM) Long Term (WM)	-	-	Often/regularly/likely/possible	Yes		Almost never/almost impossible	Low
Alteration of surface water flow dynamics	Direct	Activity specific (WoM & WM)	Life of operation (WoM) Short Term (WM)	-	-	Often/regularly/likely/possible	Yes		Almost never/almost impossible	Low
Establishment of alien plants	Direct	Activity specific	Life of operation (WoM)	-	-	Often/regularly/likely/possible			Almost never/almost impossible	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
on disturbed areas		(WoM & WM)								
Agriculture										
Protection of soil resources	Direct	Local	Long Term (WoM) Short Term (WM)	-	-	Medium	Yes	• Maintain the storm water runoff control system. Monitor • erosion and remedy the storm water control system • in the event of any erosion • occurring. • Facilitate revegetation of • denuded areas throughout the site	Low	Low
Social										

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
Renewable energy infrastructure and clean renewable energy	Direct and Cumulative	Local, Regional and National (WoM&WM)	Long term (WoM&WM)	Yes	Reduced CO2 emissions and impact on climate change	Highly Probable	Yes	• Implement a skills development and training programme aimed at maximizing the number of employment opportunities for local community members. • Maximise opportunities for local content, procurement, and community shareholding. • Maximise opportunities for local content and procurement.	Definite	High Positive

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
Creation of employment and business opportunities	Direct and Cumulative	Local and Regional (WoM) (WM)	Long term (WoM) (WM)	-	No	Highly Probable	N/A	• Local employment • On the job training and development • Local business development	Highly Probable	Medium Positive
Generation of income for landowner	Direct	Local (WoM&WM)	Long Term (WoM&WM)	-	-	Probable	N/A	Agreements with affected landowners should be in place before SEF becomes operational	Probable	Medium Positive
Social Economic Development and Enterprise Development	Direct and Cumulative	Local and Regional (WoM&WM)	Long term (WoM&WM)	Yes	-	Probable	N/A	• The proponents should liaise with the NKM to identify projects that can be supported by SED contributions. • Clear criteria for identifying and funding	Definite	High Positive

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								community projects and initiatives in the area should be identified. The criteria should be aimed at maximising the benefits for the community as a whole and not individuals within the community. Strict financial management controls, including annual audits, should be instituted to manage the SED contributions.		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
Visual impacts and associated impact on sense of place	Direct	Local (WoM&WM)	Long term (WoM&WM)	-	-	Probable	Yes	The visual impact mitigation measures should be implemented	Probable	Low-Medium
Impact on property values	Indirect	Local (WoM&WM)	Long term (WoM&WM)	Yes	No	Probable	N/A	Due to the limited prospect of this occurring no mitigation measures are suggested	Probable	Low
Impact on tourism	Direct	Local (WoM) (WM)	Long term (WoM&WM)	Yes	No	Probable	Yes	• The possible impact is low no mitigation is required • Marketing area as a tourist attraction	Probable	Low
DECOMMISSIONING										
Terrestrial Biodiversity										
The ecological impacts associated with the decommissioning phase will be similar to those listed in the construction phase and the associated mitigations measures must be updated and implemented to reduce potential adverse impacts.										

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			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
Agriculture										
Protection of soil resources	Direct	Local	Long Term (WoM) Short Term (WM)	-	-	Medium	Yes	• Implement an effective system of storm water runoff control, where it is required that is at any points where run off water might accumulate. The system must effectively collect and safely disseminate any runoff water from all accumulation points and it must prevent any potential down slope erosion.	Low	Low

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								• Maintain where possible all vegetation cover and facilitate revegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion. • If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for respreading during		

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.		
Social										
Deconstruction of the infrastructure and recycling	Direct	Whole site/plant/mine (WoM&WM)	One month to one year (WoM&WM)	-	-	Often/regularly/likely/possible	Yes	• Local contractors • Local employment • Rehabilitation	Daily/highly likely/definitely	Moderate
Loss of jobs and associated income	Direct	Area specific (WoM&WM)	Life of operation (WoM&WM)	-	-	Daily/highly likely/definitely	Yes	• Workers should be notified of their pending retrenchment • Workers should be assisted in calming form the UIF	Often/regularly/likely/possible	Moderate

Nature of impact (potential)	Direct or indirect or cumulative	Extent of impact	Duration of impact	Can impact be prevented/ reversed or managed?	Will irreplaceable resources be lost?	Probability before mitigation	Mitigatory potential	Mitigation measure	Probability after mitigation	Significance after mitigation
			WoM-Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation	**WoM-**Without Mitigation **WM-** With Mitigation					
								• Social services are prepared for the potential additional dependents		

8 ENVIRONMENTAL IMPACT STATEMENT

8.1 IMPACT ANALYSIS

The potential impacts associated with the proposed Red Sand Solar East SEF and associated infrastructure are summarised below in Table 8-1. Should the mitigation provided in the tables in Section 7, and detailed in the EMPr be implemented, post-migration impacts are anticipated to range between very low to medium negative significance, and up to highly positive.

Table 8-1: Summary of Impact Assessment

Aspect	Impact	Post Mitigation
	Planning and Construction	
Terrestrial Biodiversity	Habitat Loss and Fragmentation	Low – Medium
	Loss of species of conservation concern	Low - Medium
	Alien and invasive plant species	Low
	Increased risk of erosion and flash floods.	Low
	Disturbances or displacement impacts on fauna including traffic, noise and dust.	Low
Avifauna	Habitat destruction	Low
	Destruction or disturbance of bird roosts	Low
Aquatic	Operation of equipment and machinery	Low
	Clearing vegetation	Low
	Stockpiling of and placement construction materials	Low
	Excavating/shaping landscape	Low
	Final landscaping, backfilling and postconstruction rehabilitation	Low
Agricultural	Loss of agricultural potential by occupation of land	Medium
	Loss of agricultural potential by soil degradation	Low
	Dust impact	Low
	Enhanced agricultural potential through increased financial security for farming operations	High Positive
	Improved security against stock theft and other crime	High Positive
Heritage	Disturbance of isolated finds (AG001, AG002, AG003, AG006, AG007, AG008, AG011, AG012, AG013, AG015, AG016, AG017, AG018, AG020, AG021, AG022, AG023, AG025, AG026, AG029)	Low
	Disturbance of cemeteries (AG010, AG014)	Low
	Disturbance of high significance Stone Age Sites (AG009, AG019, AG024, AG027, AG028	Low
	Disturbance Historical kraal (AG005) and medium significance Stone Age Site (AG004)	Low
Social	Employment, business opportunities and skills development impact rating	High Positive
	Construction workers on site and in local area impact rating	Low

	Risk to safety, livestock, and damage to farm infrastructure	Low
	Increased risk of grass fires	Low
	Nuisance impacts associated with construction related activities	Low
Traffic	Increase in traffic volumes on the surrounding road network as a result of construction traffic	Low
General	Stormwater Management	Low
	Hunting / Fishing by construction workers.	Low
	Degradation and contamination of the surrounding environment by construction activities, cement, hydrocarbons and other hazardous materials.	Low
	Potential disturbance or unearthing of graves or disturbance to other heritage resources during the construction phase.	Low
	Improper storage and disposal of solid waste.	Low
	Littering around the site.	Low
	Improper disposal of rubble i.e.: burying or neglecting building rubble resulting in direct mechanical damage to surrounding vegetation and untidiness of the site.	Low
	Lack of toilet facilities resulting in unsanitary conditions.	Low
	Improper disposal of toilet waste from chemical toilets resulting in contamination of the surrounding environment	Low
	Increase waste to landfill site.	Low
	Risk of spills from construction equipment (oils, fuels, cement etc.) contaminating soil and the watercourse.	Low
	Dust Generation and control	Low
	Degradation of existing service infrastructure, e.g. roads, electricity.	Low
Operation		
Terrestrial Biodiversity	Direct faunal impacts due to operation.	Low
	Alien and invasive plant species	Low
Avifauna	Bird mortalities	Medium
	Disruption of bird migratory pathways	Low
	Collision and electrocution with above-ground power transmission lines. In some cases, collision can be associated with polarised light pollution and waterbird species mistaking large PV panels areas as wetlands or other waterbodies, a case known as the “lake effect” (as per Jenkins et al. 2017).	Low
	The attraction of some novel bird species due to the development of a solar farm with associated infrastructure such as lake effect, perches, nest and shade opportunities	Low

	Chemical pollution: Chemicals being used to keep the PV panels clean from dust (suppressants) etc.	Low
Aquatic	Alteration of drainage	Low
	Alteration of surface water flow dynamics	Low
	Establishment of alien plants on disturbed areas	Low
Agriculture	Protection of soil resources	Low
Social	Renewable energy infrastructure and clean renewable energy	High Positive
	Creation of employment and business opportunities	Medium Positive
	Generation of income for landowner	Medium Positive
	Social Economic Development and Enterprise Development	High Positive
	Visual impacts and associated impact on sense of place	Low Medium
	Impact on property values	Low
	Impact on tourism	Low
Decommissioning		
Terrestrial Biodiversity	The ecological impacts associated with the decommissioning phase will be similar to those listed in the construction phase and the associated mitigations measures must be updated and implemented to reduce potential adverse impacts	
Agriculture	Protection of soil resources	Low
Social	Deconstruction of the infrastructure and recycling	Moderate
	Loss of jobs and associated income	Moderate

8.2 VISUAL REPRESENTATION OF ALTERNATIVE AND SITE SENSITIVITY

The combined sensitivity map was based on the findings from all specialist assessments and inputs from all stakeholders. The following relevant features were included, which are considered “no-go” areas (i.e. no development make occur in these areas):

- Avifauna: 100, 200 m buffer sensitive areas (habitat dependent).
- Watercourses: 100m for washes and 150m for depressions
- Plants: 50m buffer for watercourse.

This report is based on a project description and site plan, provided to by the applicant, which has not been approved by DFFE at this stage of the project. The project description and site plan may undergo refinements before being regarded as final. Since only a few stakeholders participated in the process, the buffers could not be finalised.

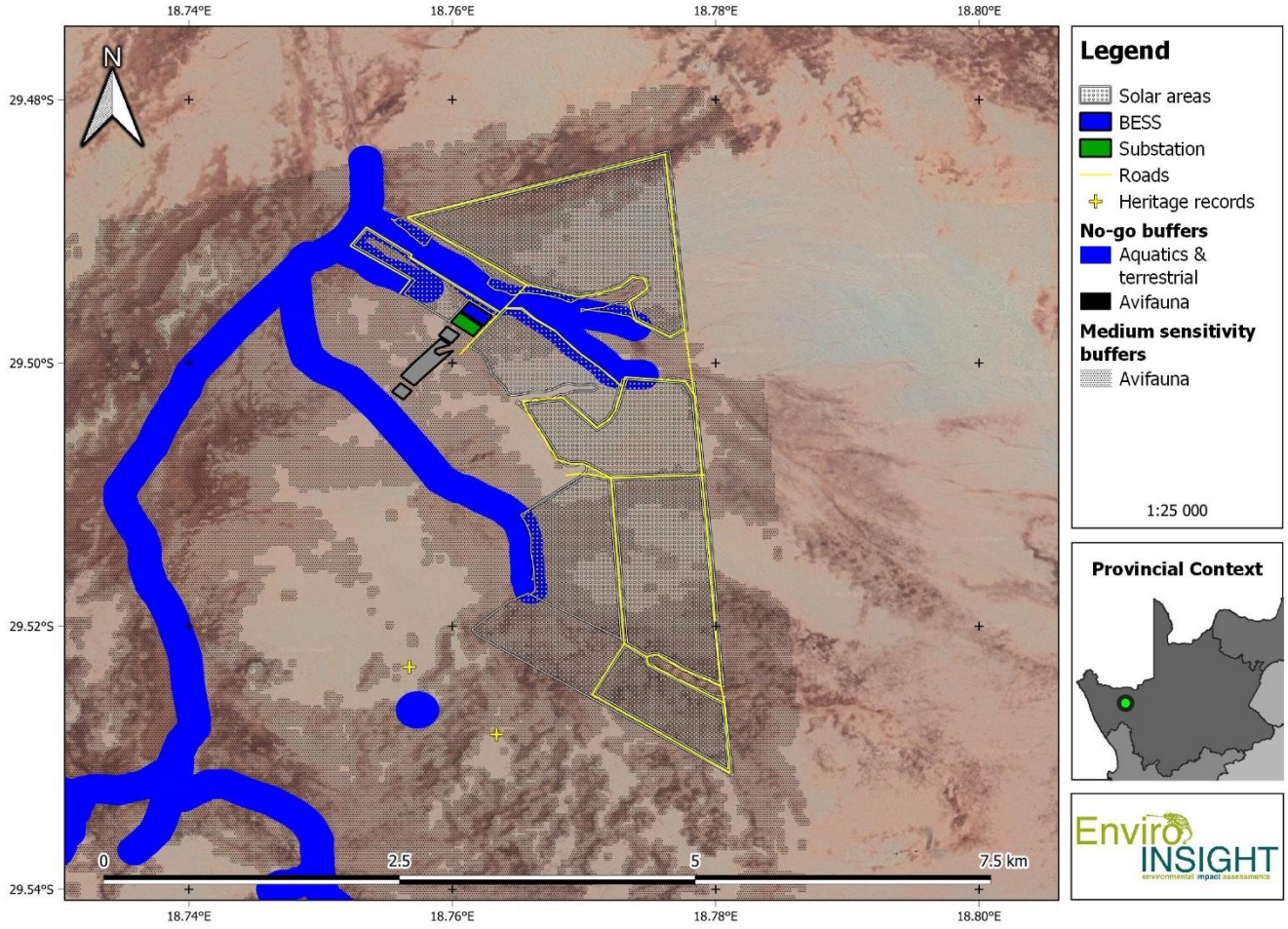

Figure 8-1: Sensitivity analysis indicating no-go areas for alternative 1 (preferred alternative)

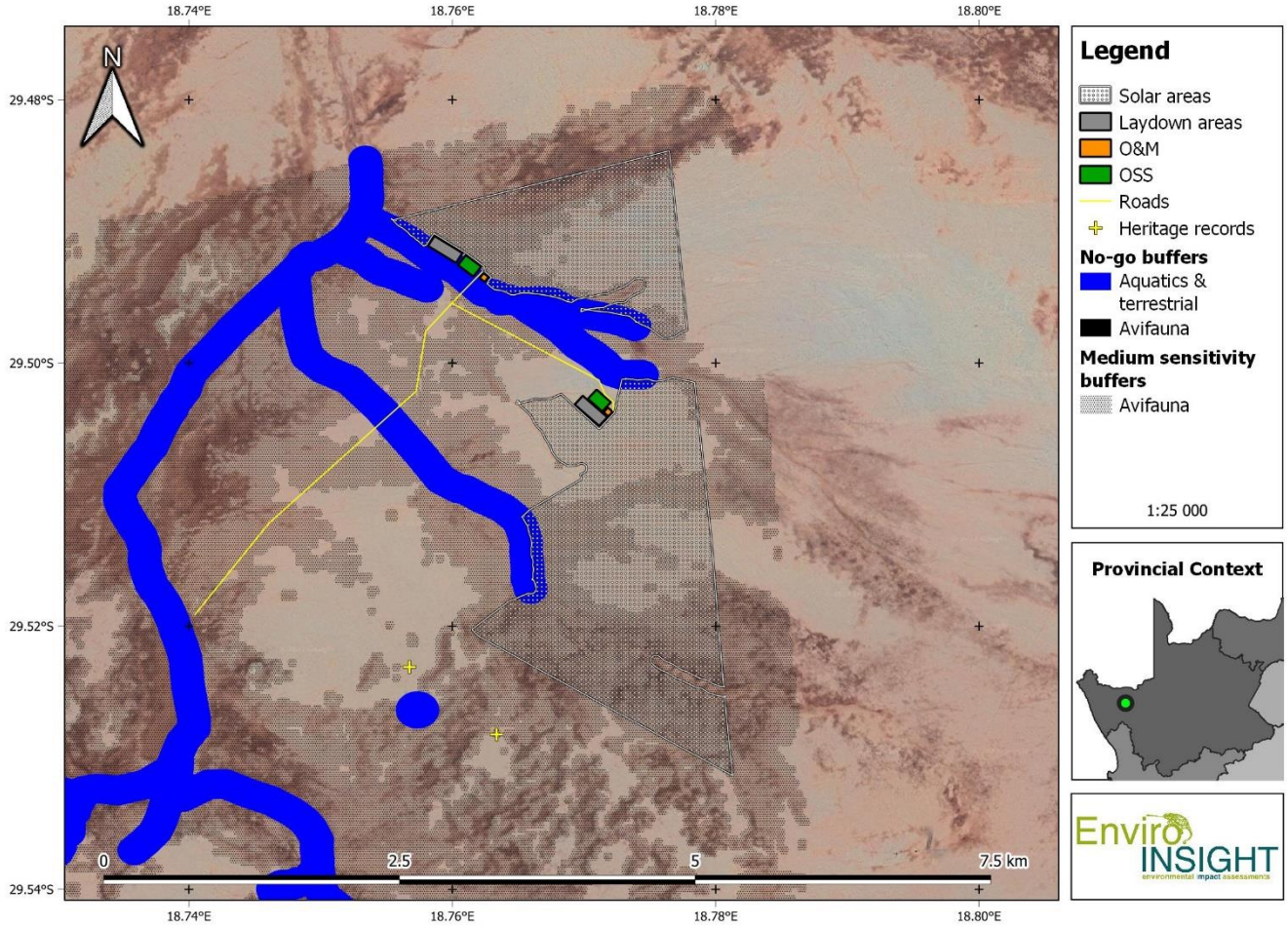

Figure 8-2: Sensitivity analysis indicating no-go areas for alternative 2

8.3 SPECIALIST RECOMENDATIONS

Summary of specialist opinions and recommendations

Table 8-2: Summary of Specialist Recommendations.

Specialist	Recommendation	Opinion
Terrestrial Biodiversity	Large sections of the affected area are not considered sensitive and there are no specific features of the affected area which would indicate that it is of broad-scale significance for faunal movement or landscape connectivity. For other provincially listed species which are affected by the proposed development, a permit application for their removal must be applied for with the provincial authority prior to the commencement of construction activities.	Project can proceed with the implementation of the recommended buffers and mitigation measures.

Avifauna	The presence of nesting Red Lark within the PAOI is of particular concern. Avoidance mitigation must be implemented in conjunction with the aforementioned micro sighting. Thus, the author sees no reason why an Environmental Authorisation (EA) should not be granted on the following conditions; • All recommended buffering (200m and 100m habitat dependent) be strictly adhered to. • Micro sighting of turbine placement must occur preconstruction supervised by a specialist zoologist in order to mitigate habitat loss for Red Lark. • All recommended mitigation measures be applied preconstruction, post construction and operations. • The EMPr be updated every three years in order to revaluate the potential distributional population changes of species such as Martial Eagles and Vultures. Thus, retrofitted mitigations such as AI, radar and camera technology may have to be applied.	Project can proceed with the implementation of the recommended mitigation measures and associated buffers
Aquatic Biodiversity	Considering the type of development proposed, a SEF, and the implementation of the recommendations and mitigation measures, the development is not likely to have a high impact on the FEPA catchment classification associate with the study area. Impacts area rated as low.	Project can proceed with the implementation of the recommended mitigation measures and associated buffers
Agriculture	The proposed development will not have substantial negative impact on the agricultural production capability of the site and is therefore acceptable. This is substantiated by the facts that the land is of very low agricultural potential, the amount of agricultural land loss is within the allowable development limits, as the development is located within a REDZ which is prioritised for renewable energy development, and that the proposed development poses a low risk in terms of causing soil degradation, if the recommended mitigation measures are implemented.	Project can proceed with the implementation of the recommended mitigation measures
Heritage	Stone Age sites of high significance and will not be directly impacted on by the proposed development. All of these sites are located within environmental no-go areas with a minimum buffer zone of ~ 250 meters that	Project can proceed with the implementation of the

	will facilitate their protection in situ. The only significant site located outside a no-go area is site AG009 but no tower or infrastructure is located closer than 200 meters from this site and no impact is expected on this site. The overall impact of the project is considered to be low and residual impacts can be managed to an acceptable level through implementation of the recommendations.	recommended mitigation measures
Social	The development of the proposed SEF will create employment and business opportunities during both the construction and operation phases of the project. It will also contribute to local economic development though socio-economic development (SED) contributions. The potential negative impacts associated with the construction phase can be mitigated. The proposed SEF will improve energy security and reduce the carbon footprint associated with energy generation. The site is also located within the Springbok REDZ. The area has therefore been identified for the development of renewable energy projects. The establishment of the proposed FF Red Sands Solar East SEF is therefore supported by the findings of the SIA	Project can proceed with the implementation of the recommended mitigation measures
Traffic	The existing road network has sufficient spare capacity to accommodate the proposed Red Sand Solar East SEF, without any road upgrades required to the existing road infrastructure. It is recommended that the proposed Red Sand Solar East SEF be approved from a transport impact perspective.	Project can proceed with the implementation of the recommended mitigation measures

9 CONCLUSION AND RECOMMENDATIONS

FE Red Sands (Pty) Ltd (hereafter the Applicant) is proposing the development of a solar energy facility (SEF) and associated infrastructure on a site located approximately 77 km southwest of Pofadder and 81 km east of Springbok in the Northern Cape province of South Africa. The proposed development, to be known as Red Sands Solar East SEF, will have a generation capacity of up to 240MW which will feed into the National Grid.

The proposed study area for the SEF development is located approximately 77 km southwest of Pofadder and 81 km east of Springbok within the Nama-Khoi Local Municipality, in the Northern Cape Province. The site can be reached via unnamed which branches off the N14. The Red Sands Solar East SEF extent is approximately 490.2 hectares (ha) and will be located on the Remaining Extent of the Farm Donkerduispraat 95 (21-digit Surveyor General code: C05300000000009500000)

The Red Sands Solar East SEF will consist of PV panels, with a generation capacity of 240MW, depending on the available technology at the time. Additional ancillary infrastructure to the SEF would include underground and above-ground cabling between project components, onsite substation/s, Battery Energy Storage Systems (BESS), mounting systems to support the PV panels, internal/ access roads (up to 10 m in width) linking the PV panels and other infrastructure on the site, and permanent workshop area and office for control, maintenance and storage. As far as possible, existing roads will be utilised and upgraded (where needed) with the relevant stormwater infrastructure and gates constructed as required. The perimeter of the proposed SEF may be enclosed with suitable fencing. A formal laydown area for the construction period, containing a temporary maintenance and storage building along with a guard cabin will also be established.

The findings of the specialist studies undertaken within this EIA provide an assessment of both the benefits and potential negative impacts anticipated as a result of the proposed SEF. The findings conclude that there are no environmental fatal flaws that should prevent the proposed project from proceeding. Areas of special concern have however been identified which will require site specific mitigation measures.

It was determined during the EIA that the proposed project will result in limited potential negative impacts and certain positive impacts. A preferred site layout has been identified which is less environmentally sensitive and will result in the least environmental impact.

A detailed public participation process was followed during the EIA process which conforms to the public consultation requirements as stipulated in the EIA Regulations. In addition, all issues raised by I&APs will be captured in the FBAR and where possible, mitigation measures provided in the EMPr to address these concerns.

The two proposed site alternatives were assessed based on the viability and impact to the environment. Alternative 1 and Alternative 2 were under consideration, however taking into consideration the recommendations, buffers and no-go areas by the specialist a Preferred Layout was designed to account for the site sensitives. Kindly refer to Figure 8-1 for the sensitivity analysis in regard to the various alternatives. This report is based on a project description and site plan, provided to by the applicant, which has not been approved by DFFE at this stage of the project. The project description and site plan may undergo refinements before being regarded as final. A project description based on the final design will be concluded once all stakeholders have provided feedback on the layout provided in this report.

It is the opinion of the EAP that the information and data provided in this BAR is sufficient to enable the DFFE to consider all identified potentially significant impacts and to make an informed decision on the application. Further, it is the opinion of the EAP that based on the findings of the EIA that the proposed project should be granted an EA and allowed to proceed provided that the conditions as stipulated in this report are adhered to.

When deciding whether the activity should or should not be authorised in terms of NEMA, the EAP has evaluated and considered all identified impacts (positive and negative) as listed in Table 7-8. Where impacts cannot be avoided, the significance of these impacts was measured. The EAP has included specialist recommendations and prescribed mitigation measures into the EMPr.

9.1. CONDITIONS FOR THE ENVIRONMENTAL AUTHORISATION

Considering all the information presented in this BAR, a number of conditions for environmental authorisation can be prescribed. These conditions include:

- The applicant must ensure that the construction and post-construction mitigation measures and controls specified in the EMPr are adhered to. An independent ECO must be appointed to assess compliance with these measures and to enforce the EMPr.
- Environmental audits during the construction phase should be conducted on a monthly basis by an independent ECO in addition to a post-construction audit (PCA), Avifauna
- The post-construction avifauna monitoring reports must be submitted to BirdLife South Africa as per the guidelines and as per recommendations by the Avifauna Specialists
- Mitigation measures provided by all specialists are to be adhered to.
- Inclusions, additions and adaptations of the EMPr, as well as all final plan drawings and maps must be submitted to DFFE for final approval.
- The final layout must exclude all no-go areas as per Figure 8-1.

This report is based on a project description and site plan, provided to by the applicant, which has not been approved by DFFE at this stage of the project. The project description and site plan may undergo refinements before being regarded as final. Since only a few stakeholders participated in the process, the buffers could not be finalised. Further discussions might be warranted with all stakeholders, and depending on the final buffer areas agreed upon, the layout will be adapted accordingly.

The following mitigation measures must be implemented as part of the planning and design, and pre-construction phases:

- All structures must be located outside no-go areas as per Figure 8-1.
- Project planning must include a plan for traffic control that will be implemented, especially during the construction phase of the development. Consultation with the local Road Traffic Unit in this regard must be done early in the planning phase. The necessary road traffic permits must be obtained for transporting parts, containers, materials and construction equipment to the site.
- Careful planning of the routes taken by heavy vehicles must highlight areas of road that may need to be upgraded in order to accommodate these vehicles. Once identified, these areas must be upgraded if necessary.
- The construction of surface stormwater drainage systems during the construction phase must be done in a manner that would protect the quality and quantity of the downstream system.
- A Stormwater Management Plan must be designed and implemented for the road network to prevent roads from serving as concentrated conduits for water run-off, significantly increasing erosion potential and sediment transport capacity. Water diversions along the road should be placed at regular intervals in order to divert water back into the natural veld on the downstream side of the road.

- It is recommended that all final positions of watercourse crossings be appropriately "fine-tuned" through field verification in order to minimise potential impacts and reduce road construction cost.
- An effective 100m watershed Buffer Zone and 150m buffer around pans must be established prior to any construction activities taking place. No person or vehicle will be allowed within the Buffer Zone, except for officially marked crossings. Management should be vigilant in preventing personnel taking short-cuts across the Buffer Zones between construction sites.
- A Waste Management Plan must be developed for handling onsite waste. This plan must designate an appropriate area where waste can be stored before disposal. All general waste must be disposed of at a registered landfill site.
- A plant search and rescue programme must be followed by a suitably qualified SACNASP registered botanist to identify all nationally and provincially protected species. The species already identified in the Terrestrial Biodiversity Assessment (Appendix D1) require a flora permit from the provincial authority for relocation prior to the commencement of construction activities.
- All sensitive areas must be clearly demarcated prior to construction activities.
- The illegal collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden by anyone except by individuals with the appropriate permits
- Where sensitive features occur close to laydown areas or permanent structures, these sensitive features need to be fenced off (or a similar method used) to protect it from construction activities. This includes *A. dichotomum*, watercourses, and avifauna nests.

The following mitigation measures must be implemented during the construction phase:

- Sensitive Terrestrial Biodiversity features must be avoided. In order to minimise the loss of vegetation and faunal habitat, several mitigation measures are proposed.
- A Rehabilitation Management Plan must be developed and implemented during the construction phase as construction is complete at each site.
- Rehabilitate disturbed areas that are no longer required by the operational phase of the development. Inadequate rehabilitation could result in limited revegetation and/or an invasion of alien vegetation which will result in long term ecological degradation and damage.
- The clearance of vegetation, at any given time, must be kept to a minimum to reduce the possibility of soil erosion.
- A site-specific Alien Invasive Species (AIS) Management Plan must be implemented during the construction phase and continued monitoring and eradication needs to take place throughout the life of the project.
- Newly cleared and exposed areas must be managed for dust and landscaped with indigenous vegetation to avoid soil erosion. Where necessary, temporary stabilisation measures must be used until vegetation establishes.

- All recommended buffering as per the Avifauna Assessment (200m and 100m habitat dependent) must be strictly adhered to
- Measures must be put in place to control the flow of surface water so that it does not impact on the vegetation, i.e., energy dissipaters and canal flow designs must be used to prevent scouring and erosion.

The following conditions are recommended for post-construction/operation phase:

- The post-construction and operational requires of the EMPr must be adhered to and an Independent ECO appointed to ensure compliance.
- All construction materials and waste must be removed from the site at the end of construction.
- Waybills must be produced showing the removal of waste / spoil / rubble to a registered waste site.
- A separate Post Construction audit must be carried out for the activities on completion to ensure compliance with the authorisation, if awarded, and this must be submitted to DFFE for review.
- A Complaints Register should be maintained onsite. All complaints should be recorded and addressed accordingly.
- The development must be in compliance with the following legislation: National Health Act, 2003 (Act 61 of 2003), the National Environmental Management Act, 1998 (Act 107 of 1998), the National Water Act, 1998 (Act 36 of 1998), the Occupational Health and Safety Act, 1993 (Act 85 of 1993), SABS 0400-1990, Hazardous Chemical Substances Regulations of 1995, The Environment Conservation Act of 1989, The National Forests Act of 1998, The National Heritage Resources Act of 1999 and the Environmental Regulations for Workplaces of 1987.
- Rehabilitation of areas disturbed by construction activities or earthworks must commence immediately after the completion of construction activities, utilising indigenous species.
- Hazardous materials that require disposal (paints, solvents, old fuel / oil etc.) must be disposed of to a registered hazardous landfill site. These materials may be removed by an appropriate hazardous waste contractor. Proof of appropriate disposal must be available to the ECO for scrutiny and kept on record.
- Measures must be put in place to control the flow of surface water so that it does not impact on the vegetation, i.e., energy dissipaters and canal flow designs must be used to prevent scouring and erosion.
- Formal post-construction avifauna monitoring must be resumed once the site have been activated, as per the most recent edition of the best practice guidelines (Jenkins et al. 2015). The exact scope and nature of the post-construction monitoring will be informed on an ongoing basis by the result of the monitoring through a process of an establishment of available new technology and adaptive management. The purpose of this would be to establish if and to what extent displacement of priority species has occurred through the altering of flight patterns post-construction, and to search for and identify carcasses onsite (mortality). The Avifauna Specialist has recommended post-construction monitoring for the site, which has been included in the EMPr, these recommendations will have to revaluated once the site has been activated.

Decommissioning Phase:

- All recyclable materials must be repurposed in an environmentally friendly way

APPENDICES