

CONSTRUCTION AND OPERATION OF
THE 100MW VREDE PHOTOVOLTAIC
SOLAR ENERGY FACILITY, BATTERY
ENERGY STORAGE SYSTEM (BESS) AND
ASSOCIATED INFRASTRUCTURE
LOCATED NEAR KROONSTAD, FREE
STATE PROVINCE

Free State Province
Scoping Report
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PROJECT DETAILS

Title	:	Environmental Impact Assessment Process: Scoping Report for the proposed construction and operation of the 100 MWac Vrede Photovoltaic Solar Energy Facility, Battery Energy Storage System (BESS) and associated infrastructure located near Kroonstad in the Moqhaka Local Municipality, Fezile Dabi District in the Free State Province of South Africa
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PURPOSE OF THE SCOPING REPORT AND INVITATION TO COMMENT

The Applicant, South Africa Mainstream Renewable Power Developments (Pty) Ltd ('Mainstream') is proposing the construction and operation of the 100MW Vrede Photovoltaic (PV) Solar Energy Facility (hereafter known as 'the Vrede Solar PV Facility'), Battery Energy Storage System (BESS) and associated infrastructure located near the town of Kroonstad in the Moqhaka Local Municipality (Fezile Dabi District) of the Free State Province of South Africa. The solar energy facility will comprise several arrays of PV panels and associated infrastructure and will have a contracted capacity of up to 100MWAC. The facility will be located within the Remaining extent of the Farm Vrede No. 1152, and Portion 1 of the farm Uitval No. 1104. The Vrede Solar PV facility will be connected to the grid via a separately authorised grid connection solution, which will consist of a 132kV distribution line from the on-site 33/132kV Eskom substation via a loop in loop out into the Eskom 132kV Kroonstad Municipality – Theseus 1 switching station power line.

South Africa Mainstream Renewable Power Developments (Pty) Ltd appointed Savannah Environmental as the independent environmental consultant to undertake the Environmental Impact Assessment (EIA) for the proposed project. The EIA process is being undertaken in accordance with the requirements of the 2014 EIA Regulations, as amended, promulgated in terms of the National Environmental Management Act (NEMA; Act No. 107 of 1998).

This Scoping Report represents the findings of the Scoping Phase of the EIA process and contains the following chapters:

- » **Chapter 1** provides background to the Vrede Solar PV Facility project and the environmental impact assessment.
- » **Chapter 2** provides a project description of the Vrede Solar PV Facility project.
- » **Chapter 3** describes identified project alternatives.
- » **Chapter 4** outlines strategic regulatory and legal context for energy planning in South Africa and specifically relating to the project.
- » **Chapter 5** describes the need and desirability of the Vrede Solar PV Facility.
- » **Chapter 6** outlines the approach to undertaking the Scoping/EIA process.
- » **Chapter 7** describes the existing biophysical and social environment within and surrounding the study and development area.
- » **Chapter 8** provides an identification and evaluation of the potential issues associated with the proposed solar PV facility and associated infrastructure.
- » **Chapter 9** presents the conclusions of the scoping evaluation for the Vrede Solar PV Facility.
- » **Chapter 10** describes the Plan of Study (PoS) for the EIA phase.
- » **Chapter 11** provides references used to compile the Scoping report.

The Scoping Report is available for review from **20 November 2020 – 11 January 2021** at (<http://www.savannahsa.com/public-documents/energy-generation/>). All comments received and recorded during the 30-day review and comment period will be included, considered and addressed within the final Scoping report for the consideration of the National Department of Environment, Forestry and Fisheries (DEFF).

EXECUTIVE SUMMARY

South Africa Mainstream Renewable Power Developments (Pty) Ltd is proposing the development of a solar energy facility. PV technology is proposed to be utilised for the generation of electricity, and the Vrede Solar PV Facility will have a contracted capacity of up to 100MW. Infrastructure associated with the solar PV facility will include:

- » Solar PV array comprising PV modules and mounting structures.
- » Inverters and transformers.
- » Cabling between the project components.
- » On-site facility substation to facilitate the connection between the solar PV facility and the Eskom electricity grid.
- » Battery Energy Storage System (BESS).
- » Site offices and maintenance buildings, including workshop areas for maintenance and storage.
- » Laydown areas.
- » Access roads, internal distribution roads and fencing around the development area.
- » Telecommunication infrastructure;
- » Stormwater channels; and water pipelines.

The Vrede Solar PV Facility is to be developed on the Remaining extent of the farm Vrede No. 1152 and Portion 1 of the farm Uitval No. 1104, located approximately 13km south-west of the town of Kroonstad in the Free State Province. The project site falls in Ward 7 of the Moqhaka Local Municipality, within the greater Fezile Dabi District Municipality. The full extent of the development area¹ (approximately 279ha in extent) has been considered within this Scoping Phase of the EIA process within which the Vrede Solar PV Facility will be appropriately located from a technical perspective and environmental sensitivity perspective.

Based on the desktop information available for the project site, sensitive areas considered as undevelopable have been identified within the project site. In order to avoid these areas of potential sensitivity and to ensure that potential detrimental environmental impacts are minimised as far as possible, while employing only parts of the project site which have been agreed by the land owner, the developer has identified a suitable development area within the project site within which the infrastructure of Vrede Solar PV Facility is proposed to be located and fully assessed during the EIA Phase. The development footprint will then be furthermore defined within this development area and is therefore the area where the PV panel array and other associated infrastructure for the Vrede Solar PV facility is planned to be constructed. This anticipated extent of the area required for the development footprint is ~195ha, although this will be dependent on the final layout determined for the facility, taking into account the environmental sensitivities determined during the EIA phase assessments for this project.

¹ The development area is that identified area (located within the project site) where the Vrede Solar PV Facility is planned to be located. This area has been selected as a practicable option for the facility, considering technical preference and constraints. The development area is ~279ha in extent.

From a technical perspective, the Kroonstad area is considered favourable for the development of commercial solar energy facilities by virtue of the prevailing climatic conditions (primarily as the economic viability of a solar energy facility is directly dependent on the annual solar irradiation values for a particular area), relief and aspect, the extent of the project site and development area, the availability of a direct grid connection (i.e. point of connection to the national Eskom grid), and the availability of land on which development can take place.

The Vrede SEF is planned to be bid into the Department of Mineral Resource and Energy's (DMRE) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme with the aim of evacuating the generated power into the national grid. This will aid in the diversification and stabilisation of the country's electricity supply with Vrede SEF set to inject up to 100MW_{AC} into the national grid.

The majority of potential impacts identified to be associated with the construction of Vrede Solar PV Facility are anticipated to be localised and restricted to the identified development envelope itself, while operation phase impacts/benefits range from local to regional. No environmental fatal flaws were identified to be associated with the development area. Features within the larger area have, however, been identified as 'no-go' areas or areas of high avifaunal impact should be avoided by the development footprint. A development envelope has been identified to avoid these areas of sensitivity present within the development area and therefore avoidance of sensitive features is considered a necessity for the placement of infrastructure early in the EIA process (Figure 1). The development envelope will be fully assessed during the EIA Phase.

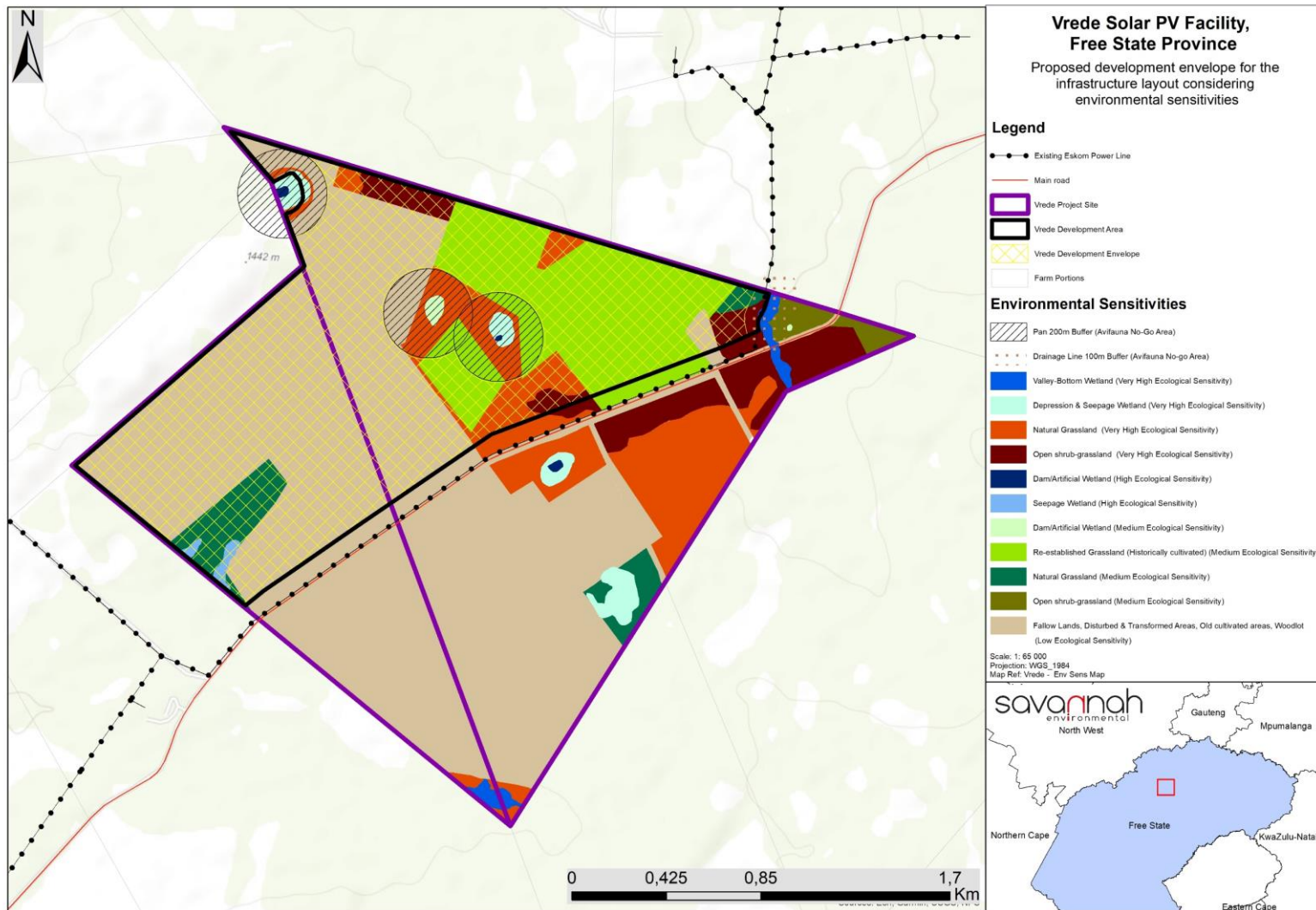


Figure 1: Preliminary Environmental Sensitivity Map from the results of the scoping evaluation for the Vrede Solar PV facility, indicating the recommended development envelope to be assessed within the EIA Phase.

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CHAPTER 1 INTRODUCTION

The Applicant, South Africa Mainstream Renewable Power Developments (Pty) ('Mainstream'), is proposing the construction and operation of the 100MW Vrede Photovoltaic (PV) Solar Energy Facility (hereafter known as 'the Vrede Solar PV Facility'), Battery Energy Storage System (BESS) and associated infrastructure located near the town of Kroonstad in the Moqhaka Local Municipality (Fezile Dabi District) of the Free State Province of South Africa (refer to **Figure 1.1**). The solar energy facility will comprise several arrays of PV panels and associated infrastructure and will have a contracted capacity of up to 100MW_{AC}. The facility will be located within the Remaining extent of the Farm Vrede No. 1152, and Portion 1 of the farm Uitval No. 1104. The Vrede Solar PV facility will be connected to the grid via a separately authorised grid connection solution², which will consist of a 132kV distribution line from the on-site 33/132kV Eskom substation via a loop in loop out into the Eskom 132kV Kroonstad Municipality – Theseus 1 switching station power line.

The PV facility is planned to be located a short distance from the proposed Rondavel 100MW Solar PV Facility, which is planned nearer to Kroonstad (and is the subject of a separate application for environmental authorisation and Environmental Impact Assessment (EIA) process). The broader project region is currently being utilised for agriculture, primary rainfed annual crop cultivation or planted pastures, although no agricultural, cultivation or game farming activities have taken place on the farm parcels planned for this development over the last ten years. Site-specific studies and assessments will delineate areas of potential sensitivity within the identified project site³. Once constraining factors have been confirmed, the layout of the solar PV facility can be planned to minimise social and environmental impacts. The location of the development area⁴, located within the project site, is indicated in **Figure 1.2**.

From a regional perspective, the Kroonstad area is considered favourable for the development of a commercial solar energy facility by virtue of prevailing climatic conditions, relief, aspect, the extent of the affected property, the availability of nearby grid connection (i.e. a point of connection to the national grid) and the availability of land on which the development can take place.

The Vrede SEF is planned to be bid into the Department of Mineral Resource and Energy's (DMRE) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme with the aim of evacuating the generated power into the national grid. This will aid in the diversification and stabilisation of the country's electricity supply with Vrede SEF set to inject up to 100MW_{AC} into the national grid.

² The grid connection solution for the Vrede Solar PV facility forms part of a separate application for environmental authorisation subject to a Basic Assessment, to be submitted in due course. This application will be submitted separately and does therefore not form part of this application.

³ The project site is defined as the remaining extent of the farm Vrede No. 1152 and Portion 1 of the farm Uitval No. 1104, which combined have the extent of ~ 538ha.

⁴ The development area is that identified area (located within the project site) where the Vrede Solar PV Facility is planned to be located. This area has been selected as a practicable option for the facility, considering technical preference and constraints. The development area is ~279ha in extent.

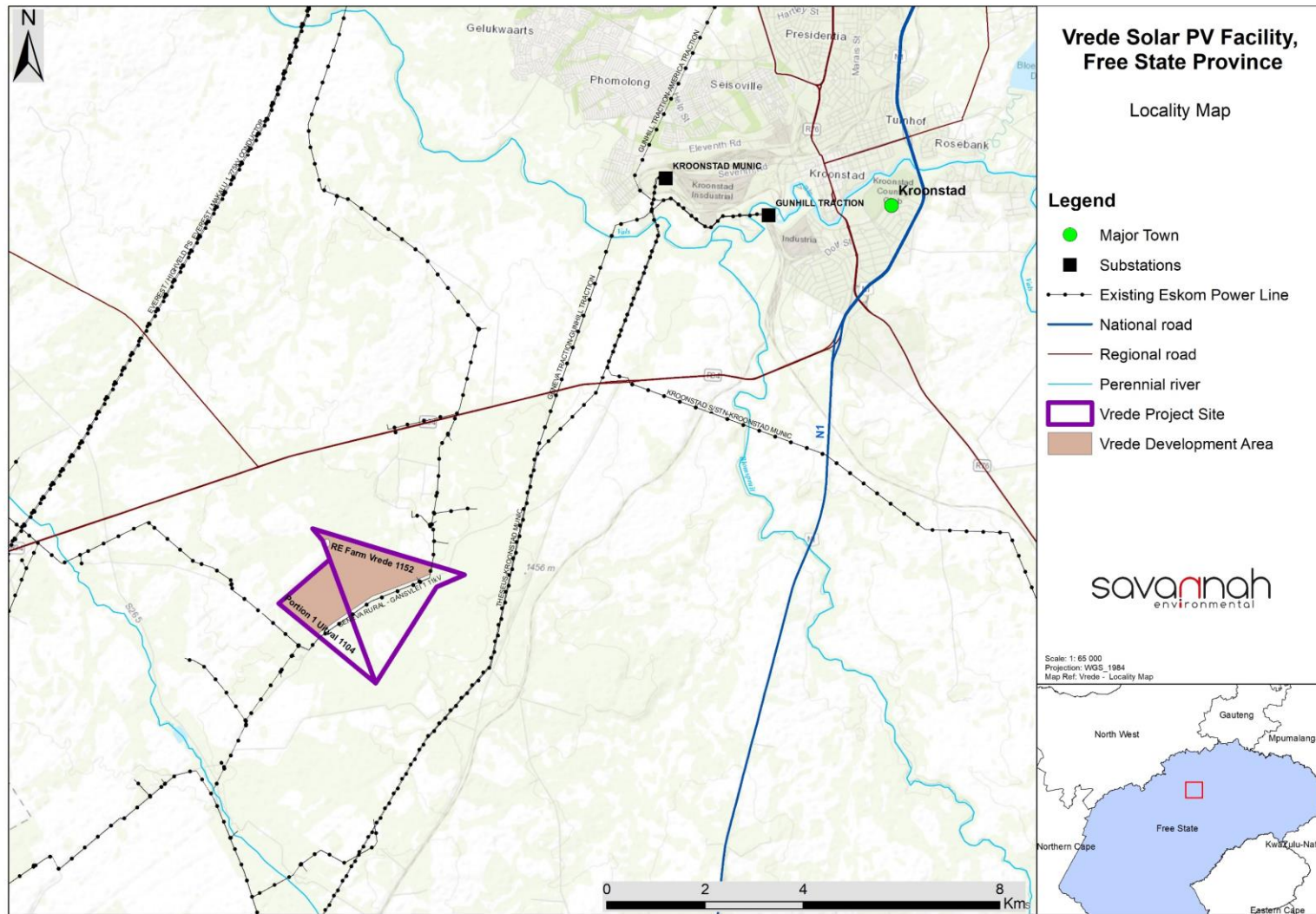


Figure 1.1: Locality map illustrating the location of the Vrede Solar Energy Facility project site on the Remaining extent of the farm Vrede No.1152, and Portion 1 of the farm Uitval No. 1104 (refer to **Appendix J** for A3 maps).

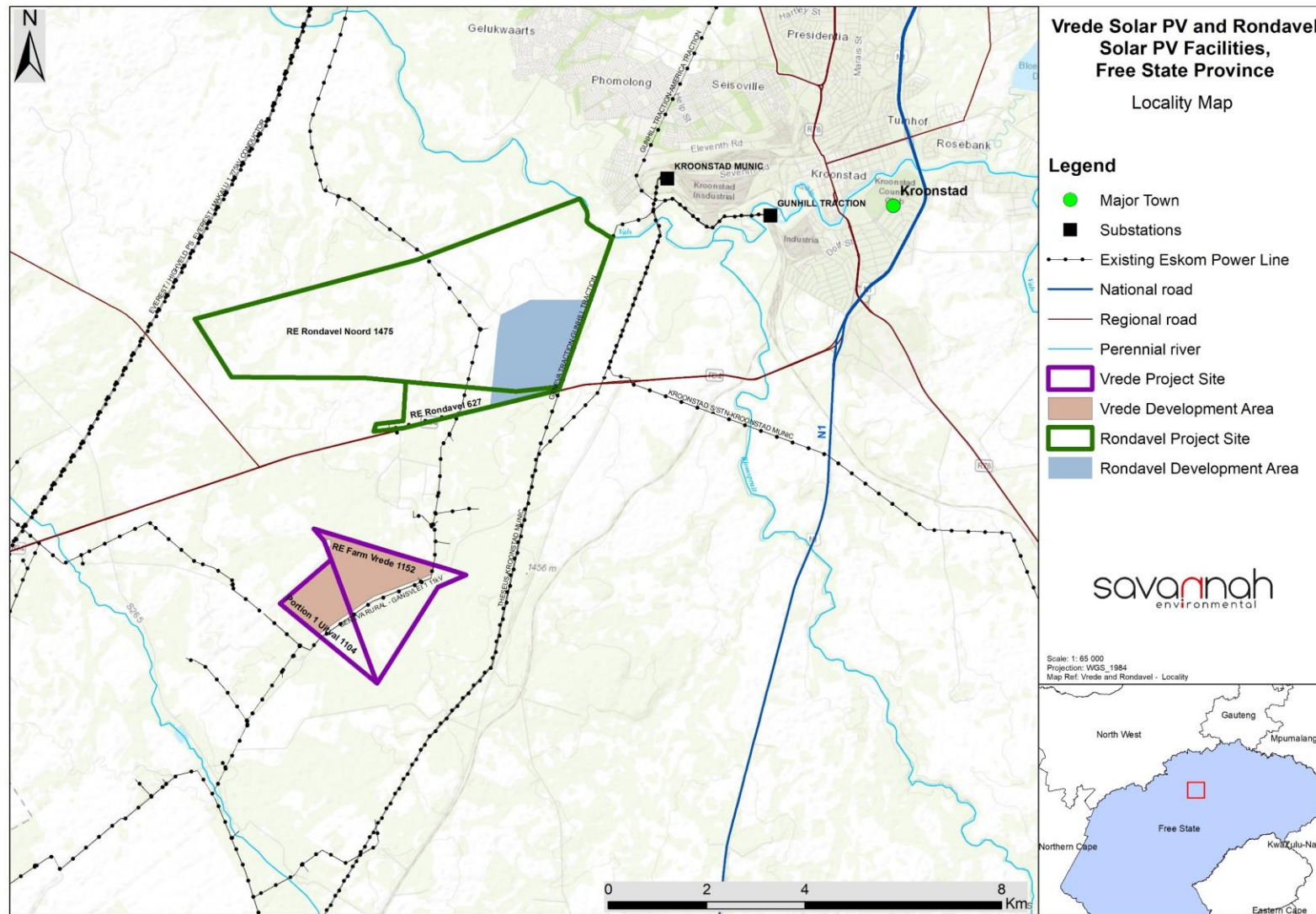


Figure 1.2: Locality map illustrating the locations of the planned Rondavel Solar PV Facility development area in relation to that of the Vrede Solar PV facility.

1.1 Project Overview

The project site has been identified by the Applicant as a technically feasible site which has the potential for the development of a solar PV facility, including a Battery Energy Storage System (BESS). A development area of approximately 279ha has been identified within the project site by the proponent for the development. The full extent of the development area has been considered within this Scoping Report with the aim of determining the suitability from an environmental and social perspective and identifying areas that should be avoided in development planning.

Within this identified development area, a development footprint⁵ or facility layout will be defined for assessment in the EIA Phase. The development footprint/facility layout is estimated to require an area of approximately 195ha in extent (for the 100MW PV facility, including a BESS, and all associated infrastructure), however the extent of the development footprint will be confirmed in the EIA Phase once the layout design is available. The development area is larger than the area needed for the development footprint of a 100MW PV facility, and therefore provides the opportunity for the optimal placement of the infrastructure, ensuring avoidance of major identified environmental sensitivities or constraints identified through this Scoping and EIA process.

On the basis of the findings of the Scoping Study, the PV facility and associated infrastructure can be appropriately designed and sited taking environmental and any other identified constraints into consideration. Therefore, the exact location of the development footprint within the development area for the facility is not defined at this stage but will be positioned based on sensitivities identified in the Scoping Phase, and this will be further assessed during the EIA Phase.

Table 1.1: A detailed description of the project.

Province	Free State Province
District Municipality	Fezile Dabi District Municipality
Local Municipality	Moqhaka Local Municipality
Ward Number (s)	No. 7
Nearest town(s)	Kroonstad (~13km north-east)
Farm name(s) and number(s) of properties affected by the Solar Facility	<ul style="list-style-type: none"> • Vrede No. 1152 • Uitval No. 1104
Portion number(s) of properties affected by the Solar Facility	<ul style="list-style-type: none"> • Remaining extent of the farm Vrede No. 1152; and • Portion 1 of the farm Uitval No. 1104.
SG 21 Digit Code (s)	<ul style="list-style-type: none"> • Remaining extent of the farm Vrede No. 1152: F02000000000115200000; and • Portion 1 of the farm Uitval No. 1104: F02000000000110400001.
Current zoning	Agricultural (grazing of cattle and rainfed crops)
Site Coordinates (centre of development area)	Latitude: 27°44'35.35"S;

⁵ The development footprint is the defined area (located within the development area) where the PV panel array and other associated infrastructure for the Vrede PV facility is planned to be constructed. This is the anticipated actual footprint of the facility, and the area which would be disturbed. The exact size of this area is subject to finalisation of the layout, however is anticipated to be 195ha.

Province	Free State Province
	Longitude: 27° 8'21.35"E.

PV technology is proposed to be utilised for the generation of electricity, and the facility will have a contracted capacity of up to 100MW_{AC}. Infrastructure associated with the solar PV facility will include the following:

- » Solar PV array comprising PV modules and mounting structures.
- » Inverters and transformers.
- » Cabling between the project components.
- » On-site facility substation to facilitate the connection between the solar PV facility and the Eskom electricity grid.
- » Battery Energy Storage System (BESS).
- » Site offices and maintenance buildings, including workshop areas for maintenance and storage.
- » Laydown areas.
- » Access roads, internal distribution roads and fencing around the development area.
- » Telecommunication infrastructure.
- » Stormwater channels.
- » and water pipelines.

The key infrastructure components proposed as part of the facility are described in greater detail in Chapter 2 of this Scoping Report.

The overarching objective for the Vrede Solar PV Facility is to maximise electricity production through exposure to the available solar resource, while minimising infrastructure, operational and maintenance costs, as well as potential social and environmental impacts. In order to meet these objectives, local level environmental and planning issues will be assessed through the EIA process with the aid of site-specific specialist studies in order to delineate areas of sensitivity within the identified project site; this will serve to inform and optimise the design of the solar PV facility.

1.2 Requirement for an Environmental Impact Assessment Process

Section 24 of the National Environmental Management Act (No. 107 of 1998) (NEMA) pertains to Environmental Authorisations (EA), and requires that the potential consequences for, or impacts of, listed or specified activities on the environment be considered, investigated, assessed, and reported on to the Competent Authority (CA). The 2014 Environmental Impact Assessment (EIA) Regulations, as amended, published under NEMA prescribe the process to be followed when applying for Environmental Authorisation (EA), while the Listing Notices⁶ (Listing Notice 1 (GNR 983, as amended), Listing Notice 2 (GNR 984, as amended), and Listing Notice 3 (GNR 985, as amended) contain those activities which may not commence without EA from the CA.

⁶ GNR 983, 984 and 985 (2014), as amended 2017 (GNR 324 ,325, 327)

The proposed development requires Environmental Authorisation (EA) from the National Department of Environment, Forestry and Fisheries (DEFF) subject to the completion of a full Scoping and Environmental Impact Assessment (S&EIA), as prescribed in Regulations 21 to 24 of the 2014 EIA Regulations (GNR 982, as amended). The need for EA, subject to the completion of a full Scoping and Environmental Impact Assessment (S&EIR), is triggered by the inclusion of, amongst others, Activity 1 of Listing Notice 2 (GNR 984, as amended)⁷, namely:

“The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20MW or more.”

In terms of GNR 779 of 01 July 2016, the National DEFF has been determined as the Competent Authority for all projects which relate to the Integrated Resource Plan for Electricity (IRP) 2010 – 2030, and any updates thereto. Through the decision-making process, the DEFF will be supported by the Free State Department of Economic Development, Tourism and Environmental Affairs as a commenting authority.

1.3 Legal Requirements as per the EIA Regulations, 2014 (as amended) for the undertaking of an Impact Assessment Report

This Scoping Report has been prepared in accordance with the requirements of the EIA Regulations, 2014 (as amended) promulgated in terms of Chapter 5 of the National Environmental Management Act (Act No 107 of 1998). This chapter of the Scoping Report includes the following information required in terms of Appendix 2: Content of Scoping Report:

Requirement	Relevant Section
(a) (i) the details of the EAP who prepared the report and (ii) the expertise of the EAP to carry out scoping procedures; including a curriculum vitae	The details of the EAP has been who prepared the report is included in Section 1.5 . The Curriculum vitae of the Savannah Environmental team has been included as Appendix A .
(b) the location of the activity, including (i) the 21 digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name and (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties	The location of the proposed development has been included under Section 1.1 and within Table 1.1 .
(c) a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken	A locality map illustrating the location of the proposed development has been included as Figure 1.1 .

⁷ Refer to **Chapter 6** for a full list of applicable listed activities.

This Scoping Report consists of eleven chapters, which include:

- » **Chapter 1** provides background to the Vrede Solar PV Facility project and the environmental impact assessment.
- » **Chapter 2** provides a project description of the Vrede Solar PV Facility project.
- » **Chapter 3** describes identified project alternatives.
- » **Chapter 4** outlines strategic regulatory and legal context for energy planning in South Africa and specifically relating to the project.
- » **Chapter 5** describes the need and desirability of the Vrede Solar PV Facility.
- » **Chapter 6** outlines the approach to undertaking the Scoping/EIA process.
- » **Chapter 7** describes the existing biophysical and social environment within and surrounding the study and development area.
- » **Chapter 8** provides an identification and evaluation of the potential issues associated with the proposed solar PV facility and associated infrastructure.
- » **Chapter 9** presents the conclusions of the scoping evaluation for the Vrede Solar PV Facility.
- » **Chapter 10** describes the Plan of Study (PoS) for the EIA phase.
- » **Chapter 11** provides references used to compile the Scoping report.

1.4 Overview of this Environmental Impact Assessment (EIA) Process

An EIA is an effective planning and decision-making tool for the project developer as it allows for the identification and management of potential environmental impacts. It provides the opportunity for the developer to be forewarned of potential environmental issues and allows for the resolution of the issues reported on in the Scoping and EIA reports as well as dialogue with interested and affected parties (I&APs).

The EIA process comprises of two (2) phases (i.e. Scoping and Impact Assessment) and involves the identification and assessment of potential environmental impacts through the undertaking of independent specialist studies, as well as public participation. The processes followed in these two phases is as follows:

- » The **Scoping Phase** includes the identification of potential issues associated with the project through a desktop study (considering existing information) and consultation with affected parties and key stakeholders. This phase considers the broader project site in order to identify and delineate any environmental fatal flaws, no-go and / or sensitive areas. Following a public review period of the Scoping report, this phase culminates in the submission of a final Scoping Report and Plan of Study for the EIA to the CA for consideration and acceptance.
- » The **EIA Phase** involves a detailed assessment of the potentially significant positive and negative impacts (direct, indirect, and cumulative) identified in the Scoping Phase. This phase considers a proposed development footprint within the project site and includes detailed specialist investigations as well as public consultation. Following a public review period of the EIA Report, this phase culminates in the submission of a final EIA Report and an Environmental Management Programme (EMPr), including recommendations of practical and achievable mitigation and management measures, to the CA for final review and decision-making.

1.5 Appointment of an Independent Environmental Assessment Practitioner (EAP)

In accordance with Regulation 12 of the 2014 EIA Regulations (GNR 982, as amended), the applicant has appointed Savannah Environmental (Pty) Ltd as the independent environmental consultants responsible for

managing the Application for EA and supporting Scoping and Environmental Impact Assessment (S&EIA) process; inclusive of comprehensive, independent specialist studies. The application for EA and S&EIA process will be managed in accordance with the requirements of NEMA, the 2014 EIA Regulations, and all other relevant applicable legislation.

Neither Savannah Environmental nor any of its specialist consultants are subsidiaries of, or are affiliated to the Applicant. Furthermore, Savannah Environmental does not have any interests in secondary developments that may arise out of the authorisation of the proposed facility.

Savannah Environmental is a leading provider of integrated environmental and social consulting, advisory and management services with considerable experience in the fields of environmental assessment and management. The company is wholly woman-owned (51% black woman-owned) and is rated as a Level 2 Broad-based Black Economic Empowerment (B-BBEE) Contributor. Savannah Environmental's team have been actively involved in undertaking environmental studies since 2006, for a wide variety of projects throughout South Africa, including those associated with electricity generation and infrastructure development.

The Savannah Environmental team for this project includes:

- » **Gideon Raath** is the principle the author of this report, and EAP for the project. Gideon holds an MSc (Geography and Environmental Management; SU), a BSc Honours (Ecology and Environmental Studies - Cum laude; Wits) and a BSc (Geography and Environmental Management; UJ), and has been accredited with SACNASP as a professional natural scientist (Pr.Sci.Nat) since 2017 (registration no. 117178). Gideon's experience includes EIA permitting for ~94 different projects across 6.5 years, ranging from infrastructure, mining, energy, housing, renewable energy and the conservation industries. These include Environmental Authorisations (BAR, S&EIR), Water Use Licencing, Waste Licencing, Environmental Compliance Officer auditing, GIS studies and MPRDA permitting. He therefore has wide ranging experience with various legislation including NEMA, NHRA, NEM:WA, NEM:BA, MPRDA and NWA regulations, having applied them for numerous private and public sector clients across various industries for small, medium and large projects. Gideon also has experience beyond the permitting sphere through numerous screening assessments for potential developers, including fatal flaw screenings, regulatory and permitting approval screening as well as ecological and hydrological sensitivity screening. Gideon has also served in an advisory role for various infrastructure and mining projects, assisting with environmental due diligence, bankable feasibility study input and assistance towards financial close, most recently in the Renewable Energy sphere under the Risk Mitigation Independent Power Producer Procurement Programme (RMIPPPP).
- » **Karen Jodas** holds a Master of Science Degree from Rhodes University and is registered as a Professional Natural Scientist (400106/99) with the South African Council for Natural Scientific Professions (SACNASP). She has gained extensive knowledge and experience on potential environmental impacts associated with electricity generation and transmission projects through her involvement in related EIA processes over the past 20 years. She has successfully managed and undertaken EIA processes for infrastructure development projects throughout South Africa.
- » **Nicolene Venter** – holds a Higher Secretarial Diploma and has over 20 years of experience in public participation, stakeholder engagement, awareness creation processes and facilitation of various meetings (focus group, public meetings, workshops, etc.). She is responsible for project management of

public participation processes for a wide range of environmental projects across South Africa and neighbouring countries.

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

In order to adequately identify and assess potential impacts associated with the project, a number of independent specialist consultants will provide specialist input into the EIA process. The specialists will prepare an assessment report, which will inform and be appended to the EIA Report to be undertaken as part of the EIA Phase.

CHAPTER 2 PROJECT DESCRIPTION

This Chapter provides a description of the Vrede Solar PV Facility and associated infrastructure proposed for development. It must be noted that the project description presented in this Chapter may change to some extent based on the outcomes and recommendations of detailed engineering and other technical studies, the findings and recommendations of the EIA and supporting specialist studies, and any licencing, permitting, and legislative requirements.

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

This chapter of the Scoping Report includes the following information required in terms of Appendix 2: Content of the Scoping Report:

Requirement	Relevant Section
(d)(ii) a description of the activities to be undertaken including associated structures and infrastructure	A description of the associated structures and infrastructure is included in Section 2.5 . Activities to be undertaken during the various project development phases is included in Section 2.6 .
(g)(ix) the outcome of the site selection matrix	Refer to Section 2.3 for a description of the selection of the proposed project site and development area.

2.2 Project Site Overview

The Vrede Solar PV Facility is to be developed on the Remaining extent of the farm Vrede No. 1152 and Portion 1 of the farm Uitval No. 1104, located approximately 13km south-west of the town of Kroonstad in the Free State Province. The project site falls in Ward 7 of the Moqhaka Local Municipality, within the greater Fezile Dabi District Municipality. The full extent of the development area⁸ (approximately 279ha in extent) has been considered within this Scoping Phase of the EIA process within which the Vrede Solar PV Facility will be appropriately located from a technical perspective and environmental sensitivity perspective.

Based on the desktop information available for the project site, sensitive areas considered as undevelopable have been identified within the project site. In order to avoid these areas of potential sensitivity and to ensure that potential detrimental environmental impacts are minimised as far as possible, while employing only parts of the project site which have been agreed by the land owner, the developer has identified a suitable development area within the project site within which the infrastructure of Vrede Solar PV Facility is proposed to be located and fully assessed during the EIA Phase. The development footprint will then be furthermore defined within this development area, and is therefore the area where the PV panel array and

⁸ The development area is that identified area (located within the project site) where the Vrede Solar PV Facility is planned to be located. This area has been selected as a practicable option for the facility, considering technical preference and constraints. The development area is ~279ha in extent.

other associated infrastructure for the Vrede Solar PV facility is planned to be constructed. This anticipated extent of the area required for the development footprint is ~195ha, although this will be dependent on the final layout determined for the facility, taking into account the environmental sensitivities determined during the EIA phase assessments for this project.

From a technical perspective, the Kroonstad area is considered favourable for the development of commercial solar energy facilities by virtue of the prevailing climatic conditions (primarily as the economic viability of a solar energy facility is directly dependent on the annual solar irradiation values for a particular area), relief and aspect, the extent of the project site and development area, the availability of a direct grid connection (i.e. point of connection to the national Eskom grid), and the availability of land on which development can take place.

The development footprint includes the following:

- » Solar PV array comprising PV modules and mounting structures.
- » Inverters and transformers.
- » Cabling between the project components.
- » On-site facility substation to facilitate the connection between the solar PV facility and the Eskom electricity grid.
- » Battery Energy Storage System (BESS).
- » Site offices and maintenance buildings, including workshop areas for maintenance and storage.
- » Laydown areas.
- » Access roads, internal distribution roads and fencing around the development area.

Table 2.1 provides information regarding the proposed project site identified for the Vrede Solar PV facility.

Table 2.1: A description of the project site identified for Vrede Solar PV facility.

Province	Free State Province	
District Municipality	Fezile Dabi District Municipality	
Local Municipality	Moqhaka Local Municipality	
Ward Number(s)	No. 7	
Nearest Town(s)	Kroonstad (~13km north-east)	
Farm Portion(s), Name(s) and Number(s) associated with the Facility	Remaining extent of the farm Vrede No. 1152; and Portion 1 of the farm Uitval No. 1104.	
SG 21 Digit Code (s)	F0200000000011520000 (Vrede)	F02000000000110400001 (Uitval)
Current Zoning	Agricultural	
Current land use	The properties both currently lie fallow, having been used historically for agriculture	
Site Extent (development area)	~ 279 ha	
Site Co-ordinates (development area)	<p>The centre of the development area is located at the following co-ordinate:</p> <p>Latitude: 27°44'35.35"S; and Longitude: 27° 8'21.35"E;</p>	

2.3 Summary of Site Selection Process and Pre-Feasibility Analysis

The broader study area (i.e. the greater Kroonstad area) was identified by the applicant as having the potential for the installation of PV panels on the basis of key technical criteria being met. The site selection process was informed by the following:

- » Solar resource availability;
- » Accessibility of the site;
- » Suitable development space;
- » Landowner agreements possible; and
- » Accessibility to the Eskom grid, and local site topography.

The development area was then sited within the project site through consideration and avoidance of the environmental sensitivities identified from desktop datasets available, including consideration of known freshwater features, as well as the most recent Free State Provincial conservation data (including conservation targets), such as Critical Biodiversity Areas and wetlands.

The detail regarding site-specific characteristics, and how these provide further motivation for the selection of the specific site for this project is provided below:

Project site extent, conditions and land availability: Availability of relatively level land of sufficient extent can be a restraining factor to PV development, as a 100 MW solar PV development and associated infrastructure requires sufficient land space. The development area (within which the project development footprint will be located) is ~195ha. This area is considered to be sufficient for the planned 100MW PV facility, and provides an opportunity for the avoidance of sensitive environmental features and areas.

The following are key considerations in this regard:

- » The project site and development area conditions are optimal for a development of this nature, with the site being of a suitable gradient for the development of a PV facility.
- » The region within which the development footprint is located can be described flat and homogenous. Elevation across the area ranges from 1402m above sea level in the west to 1419m above sea level in the east. There are no prominent hills within the project site with the highest areas of elevation situated to the east of the project site.
- » The property is larger than the area planned for the PV facility. The project site is an ~ 538ha, within which the smaller development area of approximately 279ha was determined. This development area is approximately 51% of the development area, allowing for consideration and avoidance of identified environmental sensitivities.

Site access: The site can be readily accessed via an existing gravel access road (the S172). Controlled access can be provided without significant improvements to this road. In addition, the readily accessible nature of the site largely reduces the need for additional project-related access and internal roads, reducing the overall road and clearance requirement of the development site.

Land use considerations: There is no currently cultivated agricultural land in the project site which could be impacted upon by the proposed development. The farm portion is not currently being utilised for agriculture and remains fallow, due to the poor economic yield as determined by the landowner. As such, the development provides opportunity for an alternative land use which will not be in conflict with the existing

land use, and which will provide a productive and economically viable solution. In addition, landowner agreements are in place towards the use of these properties for the solar PV development.

Grid connection considerations: Ease of access into the Eskom national electricity grid is vital to the viability of a solar energy facility, and addresses Eskom's concerns for lower cost connection alternatives given current funding constraints. The facility will loop into the existing Eskom 132kV Kroonstad Municipality – Theseus 1 power line. This line is ~3km from the proposed project site, reducing the grid connection requirements in order to allow for connection with the national grid.

A locality map illustrating the location of the project site and development area is provided in **Figure 2.1**.

2.4 Technology considered for the Solar Energy Facility and the Generation of Electricity

The Vrede Solar PV Facility will have a contracted capacity of 100MW and will make use of PV technology. Solar energy facilities, which utilise PV technology, use the energy from the sun to generate electricity through a process known as the Photovoltaic Effect. This effect refers to photons of light colliding with electrons, and therefore placing the electrons into a higher state of energy to create electricity (refer to **Figure 2.2**).

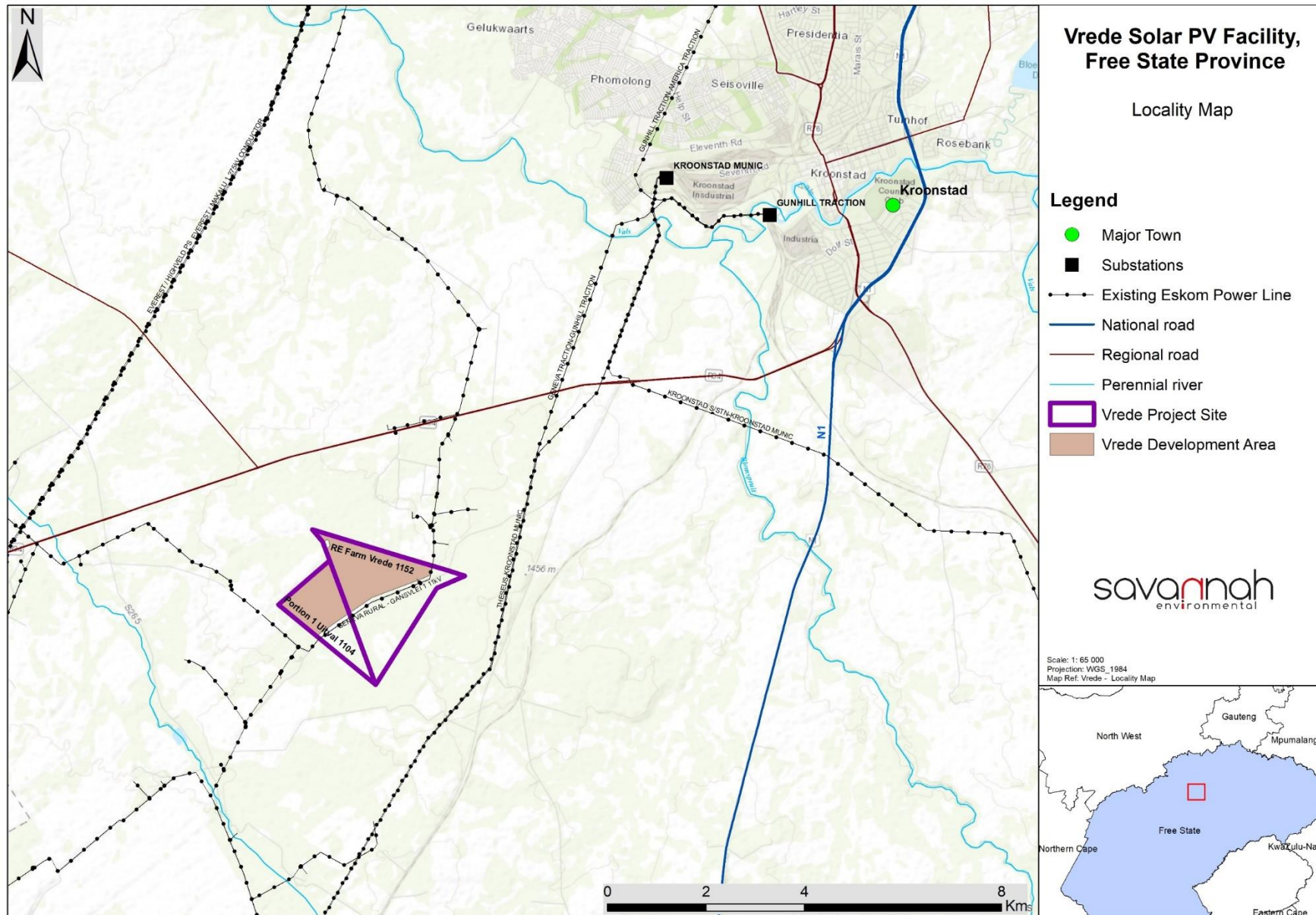


Figure 2.1: Map illustrating the development area within the project site for the Vrede Solar PV project.

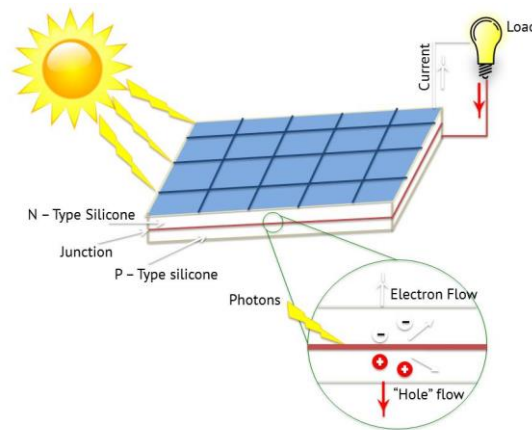


Figure 2.2: Diagram illustrating the Photovoltaic Effect (Source: Centre for Sustainable Energy)

The Photovoltaic Effect is achieved through the use of the following components:

Photovoltaic Cells

A PV cell is made of silicone that acts as a semi-conductor used to produce the Photovoltaic Effect. PV cells are arranged in multiples / arrays and placed behind a protective glass sheet to form a PV panel (refer to **Figure 2.3**). Each PV cell is positively charged on one side and negatively charged on the opposite side, with electrical conductors attached to either side to form a circuit. This circuit captures the released electrons in the form of an electric current (i.e. Direct Current (DC⁹)).

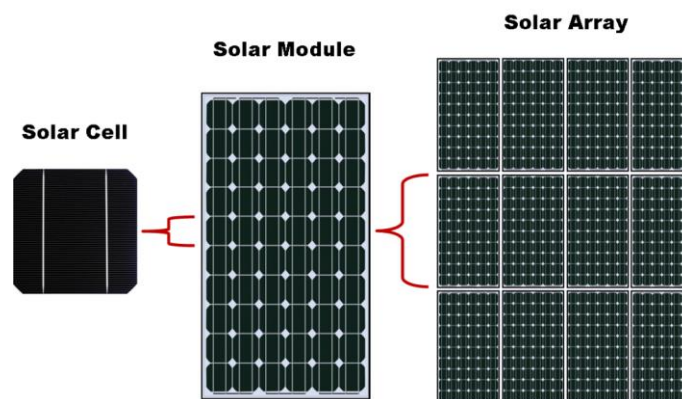


Figure 2.3: Overview of a PV cell, module and array / panel (Source: pveducation.com)

⁹ DC (direct current) is the unidirectional flow or movement of electric charge carriers (which are usually electrons). The intensity of the current can vary with time, but the general direction of movement stays the same at all times. As an adjective, the term DC is used in reference to voltage whose polarity never reverses. In a DC circuit, electrons emerge from the negative, or minus, pole and move towards the positive, or plus, pole. Nevertheless, physicists define DC as traveling from plus to minus. (sourced from <https://whatis.techtarget.com/definition/DC-direct-current>).

Support Structures

PV panels will be fixed to a support structure. PV panels can either utilise fixed/static support structures, or single or double axis tracking support structures (refer to **Figure 2.4**). PV panels which utilise fixed/static support structures are set at an angle (fixed-tilt PV system) so as to optimise the amount of solar irradiation. With fixed/static support structures the angle of the PV panel is dependent on the latitude of the proposed development and may be adjusted to optimise for summer and winter solar radiation characteristics. PV panels which utilise tracking support structures track the movement of the sun throughout the day so as to receive the maximum amount of solar irradiation.

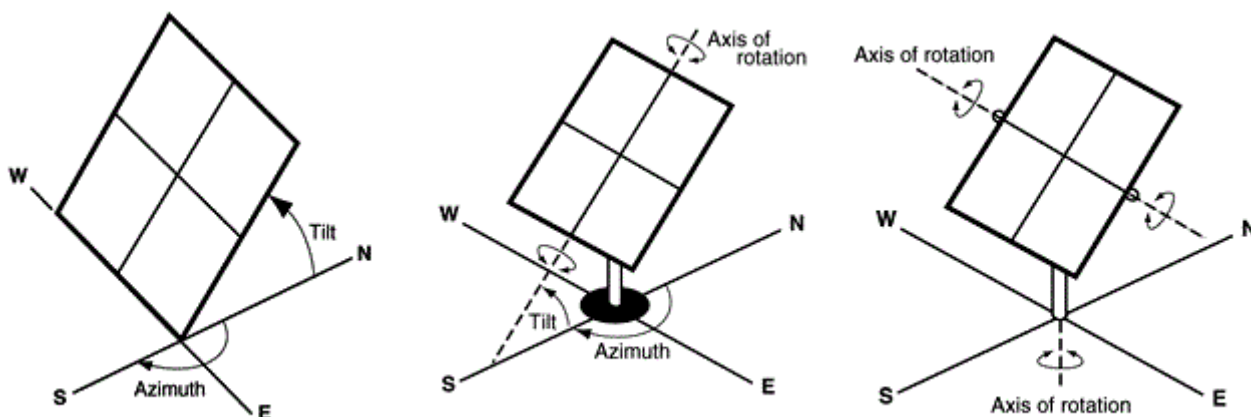


Figure 2.4: Overview of different PV tracking systems (from left to right: fixed-tilt, single-axis tracking, and double-axis tracking (Source: pveducation.com)).

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

2.5 Description of the Associated Infrastructure

A summary of the planned infrastructure proposed as part of the Vrede Solar PV facility is provided in **Table 2.2**, and described in more detail under the sub-headings below.

Table 2.2: Planned infrastructure proposed as part of the Vrede Solar PV facility. Specific details are to be confirmed in the EIA Phase.

Infrastructure	Dimensions/ Details
Solar Facility	<ul style="list-style-type: none"> » 100MW photovoltaic (PV) technology utilising solar photovoltaic (PV) modules.
Supporting Infrastructure	<ul style="list-style-type: none"> » Gate house and security building. » Batching plant. » Perimeter fencing. » Underground cabling (up to 33kV) » Centralised inverter stations or string inverters; » Power Transformers; » Operational control centre; » Operation and Maintenance Area / Warehouse / workshop; » Ablution facilities; » Battery Energy Storage Facility (BESS); » Underground cabling and overhead power lines (up to 33kV)

Infrastructure	Dimensions/ Details
	<ul style="list-style-type: none"> » Access roads and Internal gravel roads; » Fencing and lighting; » Lightning protection; » Permanent laydown area; » Temporary construction camp and laydown area; » Telecommunication infrastructure; and » Stormwater channels and water pipelines.
On-site substation	<ul style="list-style-type: none"> » 33/132kV on-site substation including associated equipment and infrastructure.
Grid Connection	<ul style="list-style-type: none"> » 132kV power line.
Access road	<ul style="list-style-type: none"> » The use of the existing S172, with minor horizontal alignment upgrades required where the S172 intersects with the P99/1.
Services required	<ul style="list-style-type: none"> » Refuse material disposal - all generated refuse material will be collected by a private contractor and will be disposed of at a licensed waste disposal site off site. This service will be arranged with the municipality when required. » Sanitation – due to the location of the site it is proposed that the project will construct and utilise its own sanitation services as Municipal services do not service the project site. All sewage/effluent water will be managed utilising temporary portable chemical toilets and conservancy/septic tanks. These facilities will be maintained and serviced regularly by an appropriate waste contractor. » Water supply – due to the location of the site it is proposed that the project will utilise and develop its own water provision services based on the fact that these services do not reach the project site. Accordingly, construction water may need to be sourced from municipal supply (by truck); or from groundwater abstraction. » Electricity supply - it is proposed that this power be sourced from the existing power lines and/or diesel generators during the construction period. The necessary applications for the connection to the grid will be submitted to Eskom for approval.

2.5.1 Project Footprint

The development area has an extent of ~279ha within which the development footprint will be placed. The confirmed extent of the development footprint can only be provided in the EIA Phase once the layout design has been undertaken. The development footprint will include PV structures/modules, and supporting infrastructure such as internal roads, auxiliary buildings, BESS and an on-site substation.

The type of technology selected for implementation, outcomes of the EIA process, and the completion of additional technical studies (e.g. geotechnical and other surveys) to be conducted as part of the detailed design phase will ultimately influence the final project layout and development footprint. The extent of the development area under investigation allows for layout design and site-specific alternatives to be identified considering the environmental sensitivities present.

2.5.2 Details of the proposed project infrastructure

The Vrede Solar PV facility will be designed to have a contracted capacity of up to 100MW. The project will make use of fixed-tilt, single-axis tracking, and/or double-axis tracking PV technology. Monofacial or bifacial

panels are both considered. PV technology forms part of the energy mix as indicated in the latest IRP for South Africa.

The project will comprise solar panels which, once installed, will stand less than 5m above ground level. The solar panels will include centralised inverter stations, or string inverters mounted above ground. If centralised inverter stations are used, mega volt (MV) distribution transformers are located internally, whereas string inverters are containerised with switchgear. The main transformer capacity varies according to detailed design and project-specific requirements.

2.5.3 Water Supply

Vrede Solar PV facility will utilise water during both the construction and operation phases of development. Water is required during construction for dust suppression, and potable water will be required on site for the construction crew. During operations, water is required to clean the PV panels, for human consumption, and for use in the auxiliary buildings (i.e. for use in the office building, ablutions, and canteen). Approximately 400 000 litres of water will be required for the construction civil works, with 225,000 litres/month for drinking and sanitation. During operation, 15,750 litres/month will be required for drinking and sanitation, whereas 275 litres/cycle will be required for module cleaning, with four cleaning cycles occurring annually (1100 litres/annum).

Due to the location of the site it is proposed that the project will utilise and develop its own water provision services based on the fact that these services do not reach the project site. Accordingly, construction water may need to be sourced from municipal supply (by truck) or groundwater abstraction. Two suitable boreholes exist on site for which water use agreements and permits will be obtained for such use.

2.5.4 Battery Energy Storage System (BESS)

The general purpose and utilisation of the Battery Energy Storage System (BESS) will be to save and store excess electrical output from the facility as it is generated, allowing for a timed release to the national grid when the capacity is required. The BESS will, therefore, provide flexibility in the efficient operation of the electricity grid through decoupling of the energy supply and demand and will allow for longer generating periods of the solar PV facility. Furthermore, the development of the BESS for the project is of importance as the system will ensure that electricity is fed into the national grid when required and excess amounts stored. This will allow for extended hours of generation from the 100MW solar energy facility. The BESS will be contained within insulated containers and will connect to the on-site facility substation via underground cabling which will follow the internal access roads of the facility. **Figure 2.5** provides a general illustration of a BESS.

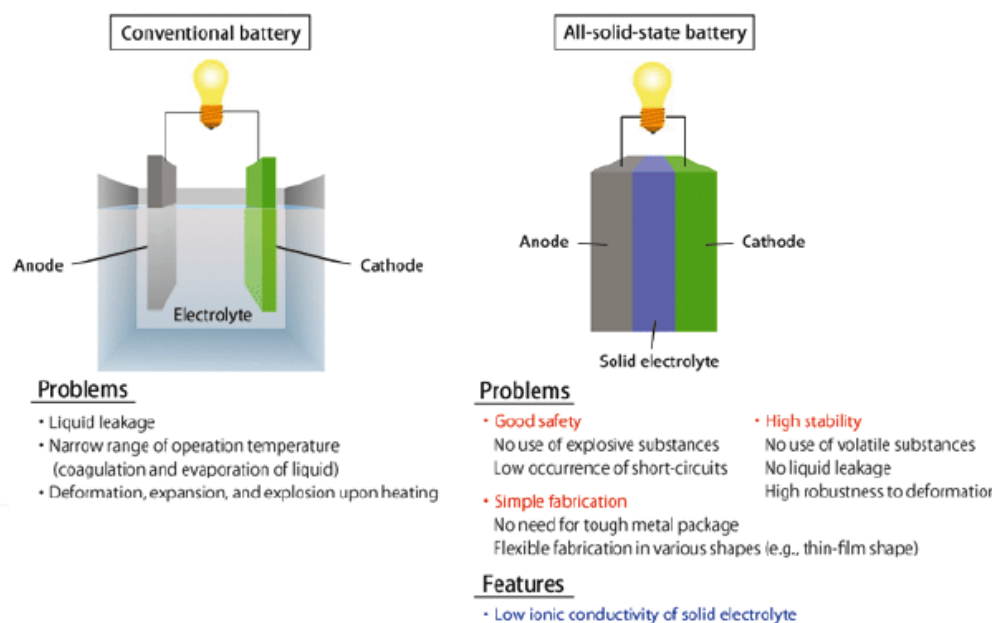


Figure 2.5: Example of battery storage units installed by Tesla (Source: fastcompany.com)

A battery storage facility will be constructed for the solar facility adjacent to or in close proximity to the on-site substation or office building. The need for a Battery Energy Storage Facility stems from the fact that electricity is only produced by the solar field while the sun is shining, while the peak demand may not necessarily occur during the day-time. Therefore, the storage of electricity and supply thereof during peak-demand will mean that the facility is more efficient, reliable and electricity supply more constant. Currently, the battery technologies being considered are either Solid State Batteries or Redox Flow Batteries.

Solid State Batteries

These energy storage units come in a range of containerised systems with size categories from 500 KWh to 4MW. The total footprint area required for the containerised systems to accommodate a 75 MW project with this type of battery is approximately 1 ha. A 100MW system would have a footprint of up to 2 ha. The figure below provides a visual representation the difference between conventional battery system and the solid-state battery as well as the advantages of using the solid-state battery technology.



(Source: South Africa Mainstream Renewable Power Developments (Pty) Ltd).

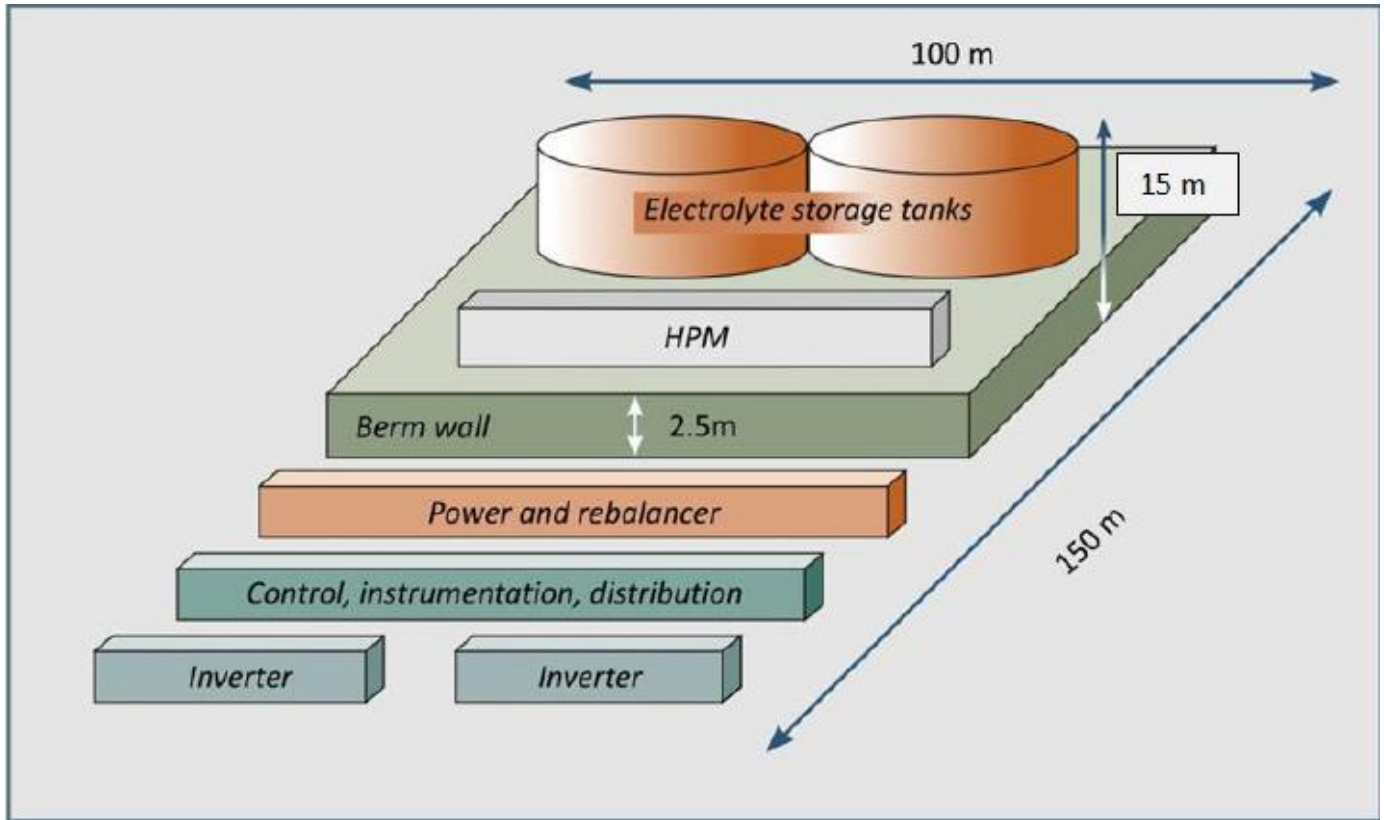
Solid state batteries consist of multiple battery cells that collectively form modules. Each cell contains an anode, cathode and a solid electrolyte. Modules are usually assembled within shipping containers and delivered to the project site. Multiple containers will be required. The container unit dimensions are approximately 17 m long, 3.5 m wide, and 4 m high. Containers will be placed on raised concrete plinths (30 cm) and may be stacked on top of each other to a maximum height of approximately 15 m. Additional instrumentation, including inverters and temperature control equipment, may be positioned between the battery containers. The typical layout of such a facility is presented below.



(Source: South Africa Mainstream Renewable Power Developments (Pty) Ltd).

Redox Flow Batteries

Flow-battery technologies are also being considered as an alternative for power smoothing purposes. For this technology, energy is stored as an electrolyte in the flow cells. Options include Sodium polysulfide/bromine (PSB) flow batteries, Vanadium Redox (VRB) flow batteries, and Zinc-Bromine (ZNBR) flow batteries which would be contained in small banded areas. Redox Flow Batteries (RFB) generally consist of two half-cells containing liquid electrolyte systems. Once supplied with electrical energy a reduction-oxidation (redox) reaction between ions of the two electrolytes, separated by a membrane, charge the electrodes with energy (anode [-] and cathode [+]). Energy discharge from a RFB is achieved by a reversed redox reaction between ions resulting in the potential for electrical energy to be drawn from the electrodes. The footprint of a RFB system is approximately 150 x 100 m, with a height of 15 m. The system consists of two electrolyte storage tanks that are contained within a 2.5 m high berm wall which prevents leakage of the electrolyte into the surrounding environment. A conceptual layout of a RFB system is presented below.



(Source: South Africa Mainstream Renewable Power Developments (Pty) Ltd).

2.5.5 On site substation

The Vrede Solar PV Facility will include an on-site facility substation to facilitate the connection between the solar PV facility and the Eskom electricity grid. A 33/132kV onsite substation including associated equipment and infrastructure will be required, comprising a footprint of up to approximately 300 x 500 (~15 ha) including the following:

- » Temporary and permanent laydown areas
- » O & M Building
- » Power lines (primary and secondary);
- » Ground wires and overhead lines
- » Transformers (various)
- » Circuit breaker
- » Lightning arrester
- » Control building
- » Security fencing

The construction of the onsite substation would require a survey of the site, site clearing and levelling and construction of access road/s (where required), construction of a level terrace and foundations, assembly, erection, installation and connection of equipment, and rehabilitation of any disturbed areas and protection of erosion sensitive areas. The precise location of the onsite substation will be determined during the EIA phase assessments and layout finalisation.

2.5.6 Panel Cleaning

It is anticipated that the PV panels will be washed four times a year during operation (approximately 275 litres/cycle will be required for module cleaning, with four cleaning cycles occurring annually (1100 litres/annum)). Only clean water (i.e. with no cleaning products), or non-hazardous biodegradable cleaning products will be utilised for the washing of panels. Wastewater generated by washing panels will either be collected and recycled for future use, or alternatively, in the event that an environmentally friendly non-hazardous biodegradable cleaning product is utilised, wastewater can be allowed to run-off under the panels.

2.5.7 Effluent and Wastewater

During construction, chemical toilets and conservancy tanks will be used. These will be serviced regularly and effluent will be disposed of at a registered wastewater treatment works. Any other effluent discharge during construction will be collected in sealed containers/tanks and collected by a registered service provider (i.e. the Local Municipality/Contractor) to be disposed of at an approved facility off-site.

Due to the location of the site it is proposed that the project will construct and utilise its own sanitation services as Municipal services do not service the project site. All sewage/effluent water will be managed utilising temporary portable chemical toilets and conservancy tanks, which will be maintained and serviced regularly by an appropriate waste contractor.

2.5.8 Waste

Solid waste generated during construction will mainly be in the form of construction material, excavated substrate and domestic solid waste. Carboard waste will be produced from panel packaging, which will be compacted on site prior to removal. Other wastes included rubber caps on panel edges, wooden pallets, plastic wrapping (all related to the panel packaging). Waste will be disposed of in either waste skips and/or scavenger proof recycling bins (where possible) and temporarily placed in a central location for removal by an appropriate contractor. Where possible, waste will be recycled. Non-recyclable solid construction waste will be temporarily held in skips or other appropriate waste containers to be disposed of at an appropriately licensed landfill site. Any other waste and excess material will be removed once construction is complete and disposed of at a registered waste facility.

During construction, use of the following hazardous substances are anticipated: paint, grease, petrol / diesel for trucks, cranes, bulldozers etc. Limited amounts of transformer oils and chemicals. Dangerous goods required to be stored during construction (e.g. limited quantities of fuel, oil, lubricants etc.) will be stored in compliance with relevant legislation (i.e. stored on covered and bunded areas / bin, and disposed of at a registered hazardous waste site). Hazardous waste will be appropriately stored and disposed of.

2.6 Activities during the Project Development Stages

A series of activities are proposed as part of the design, pre-construction, construction, operation, and decommissioning phases. These are discussed in more detail under the respective sub-headings below.

2.6.1 Design and Pre-Construction Phase

Planning: Several post-authorisation factors are expected to influence the final design of the solar energy facility and could result in small-scale modifications of the PV array and/or associated infrastructure. An objective of the Engineering, Procurement and Construction (EPC) Contractor, who will be responsible for the overall construction of the project, will be to comply with the approved facility design as far as possible. It should be understood however, that the construction process is dynamic and that unforeseen changes to the project specifications may take place. This Scoping Report therefore describes the project in terms of the best available knowledge at the time. The final facility design is required to be approved by the DEFF. Importantly, should there be any substantive changes or deviations from the original scope or layout of the project, the DEFF will need to be notified and where relevant, environmental approval obtained.

Conduct Surveys: Prior to initiating construction, a number of surveys will be required including, but not limited to, confirmation of the micro-siting footprint (i.e. the precise location of the PV panels, on-site facility substation and the associated infrastructure) and a geotechnical survey. Geotechnical surveys acquire information regarding the physical characteristics of soil and rocks underlying a proposed project site and informs the design of earthworks and foundations for structures.

2.6.2 Construction Phase

The construction phase will take approximately 18 - 24 months to complete, and will entail a series of activities including:

Procurement and employment

At the peak of construction, the project is likely to create a maximum of 503 employment opportunities. These employment opportunities will be temporary and will last for a period of approximately 18 - 24 months (i.e. the length of construction). Employment opportunities generated during the construction phase will include low skilled, semi-skilled, and skilled opportunities. Solar PV projects make use of high levels of unskilled and semi-skilled labour so there will be good opportunity to use local labour, where available. Employment opportunities will peak during the construction phase and significantly decline during the operation phase. The injection of income into the area in the form of wages will represent an opportunity for the local economy and businesses in the area.

The majority of the labour force is expected to be sourced from the surrounding towns. No on-site housing is envisaged with daily commute to and from site expected of construction staff.

Establishment of an Access Road

Access to the development area will be established for the construction and operation of the proposed development. Access to the project site is possible through the use of the existing S172 gravel road. Minor improvements to the horizontal alignment at the intersection of the S172 with the P99/1 will be required. Within the development footprint itself, access will be required from new/existing roads for construction purposes (and limited access for maintenance during operation). The final layout will be determined following the identification of site related sensitivities.

Undertake Site Preparation

Site preparation activities will include clearance of vegetation. These activities will require the stripping of topsoil which will need to be stockpiled, backfilled and/or spread on site.

Transport of Components and Equipment to Site

The national, regional, secondary and proposed internal access roads will be used to transport all components and equipment required during the construction phase. Some of the components (i.e. substation transformer) may be defined as abnormal loads in terms of the National Road Traffic Act (No. 93 of 1996) (NRTO)¹⁰ by virtue of the dimensional limitations. Typical civil engineering construction equipment will need to be brought to the project site (e.g. excavators, trucks, graders, compaction equipment, cement trucks, etc.) as well as components required for the mounting of the PV support structures, construction of the on-site facility substation and site preparation.

Establishment of Laydown Areas on Site

Laydown and storage areas will be required for typical construction equipment. Once the required equipment has been transported to site, a dedicated equipment construction camp and laydown area will need to be established adjacent to the workshop area. The equipment construction camp serves to confine activities and storage of equipment to one designated area, to limit the potential ecological impacts associated with this phase of the development. The laydown area will be used for the assembly of the PV panels, and the general placement/storage of construction equipment. It is anticipated that the temporary laydown area will be included within development footprint of the solar energy facility, and will be ~1 ha in size.

Erect PV Panels and Construct Substation and Invertors

The construction phase involves installation of the PV solar panels, structural and electrical infrastructure required for the operation of the Vrede Solar PV facility. In addition, preparation of the soil and improvement of the access roads are likely to continue for most of the construction phase. For array installations, vertical support posts will be driven into the ground. Depending on the results of the geotechnical report, a different foundation method, such as screw pile, helical pile, micropile or drilled post/piles could be used. The posts will hold the support structures (tables) on which the PV modules would be mounted. Brackets will attach the PV modules to the tables. Trenches are to be dug for the underground AC and DC cabling, and the foundations of the inverter enclosures and transformers will be prepared. While cables are being laid and combiner boxes are being installed, the PV tables will be erected. Wire harnesses will connect the PV modules to the electrical collection systems. Underground cables and overhead circuits will connect the Power Conversion Stations (PCS) to the on-site AC electrical infrastructure, and ultimately the on-site facility substation.

The construction of the on-site facility substation will require a survey of the footprint, site clearing and levelling and construction of access road(s) (where applicable), construction of a level terrace and foundations, assembly, erection, installation and connection of equipment, and rehabilitation of any disturbed areas, and protection of erosion sensitive areas.

¹⁰ A permit will be required in accordance with Section 81 of the National Road Traffic Act (No. 93 of 1996) (NRTA) which pertains to vehicles and loads which may be exempted from provisions of Act.

Establishment of Ancillary Infrastructure

The establishment of the ancillary infrastructure and support buildings will require the clearing of vegetation and levelling of the development footprint, and the excavation of foundations prior to construction. Laydown areas for building materials and equipment associated with these buildings will also be required.

Undertake Site Rehabilitation

Once construction is completed and all construction equipment has been removed, the development footprint will be rehabilitated where practical and reasonable. In addition, on full commissioning of the facility, any access points which are not required during operation must be closed and rehabilitated accordingly.

2.6.3 Operation Phase

The Vrede Solar PV Facility is expected to operate for a minimum of 20 years. The facility will operate continuously, 7 days a week, and will include battery storage. While the solar facility will be largely self-sufficient, monitoring and periodic maintenance activities will be required. Key elements of the Operation and Maintenance (O&M) plan include monitoring and reporting the performance of the solar energy facility, conducting preventative and corrective maintenance, receiving visitors, and maintaining security.

The operation phase will create approximately 93 full-time equivalent employment positions which will include low-skilled, semi-skilled and skilled personnel. Employees that can be sourced from the local municipal area include the less skilled and semi-skilled personnel (such as safety and security staff and certain maintenance crew). Highly skilled personnel may need to be recruited from outside the local area where these resources are not available within the area.

2.6.4 Decommissioning Phase

Depending on the continued economic viability of Vrede Solar PV facility following the initial 20-year operation lifespan, the solar energy facility will either be decommissioned, or the operation phase will be extended. If it is deemed financially viable to extend the operation phase, existing components would either continue to operate or be disassembled and replaced with new, more efficient technology / infrastructure available at the time. If the decision is made to decommission the facility, the following decommissioning activities will take place:

Site Preparation

Site preparation activities will include confirming the integrity of the access to the site to accommodate the required decommissioning equipment.

Disassembly and removal of existing components

When the solar energy facility is ultimately decommissioned, the equipment to be removed will depend on the land use proposed for the project site at the time. All above ground facilities that are not intended for future use will be removed. Much of the above ground wire, steel, and PV panels of which the system is comprised are recyclable materials and would be recycled to the extent feasible. The components of the solar energy facility would be de-constructed and recycled, or disposed of in accordance with applicable regulatory requirements. Where concrete footings were removed with the panels, these will be covered with soil to a depth sufficient for the re-growth of natural vegetation. The site will be rehabilitated where required and can potentially be returned to a beneficial land-use. Since it is not currently known which

disposal facilities will be available at the time of disposal (i.e. in 20 years time), it is not possible to identify specific landfill facilities at this stage. When the time comes for decommissioning, the nearest facilities registered to receive waste and recycled material from the solar facility will be identified and utilised.

Future plans for the site and infrastructure after decommissioning

Should it be decided not to extend the operational lifespan of the project beyond 20 years, the project will be decommissioned. Decommissioning involves removing the solar panels and associated infrastructures and covering the concrete footings with soil to a depth sufficient for the re-growth of natural vegetation. Components that may be reused by the landowner may remain in place, however any other supporting infrastructure no longer in use will be removed from the site and either disposed of at the registered local municipal disposal facility or recycled if possible.

CHAPTER 3 CONSIDERATION OF ALTERNATIVES

This Chapter provides an overview of the various alternatives considered for the Vrede Solar PV Facility as part of the Scoping Process.

3.1 Legal Requirements as per the EIA Regulations, 2014 (as amended) for the undertaking of an Impact Assessment Report

This chapter of the Scoping Report includes the following information required in terms of Appendix 2: Content of the Scoping Report:

Requirement	Relevant Section
(g)(i) details of all the alternatives considered	The details of the alternatives considered as part of the Vrede Solar PV Facility and as part of the Scoping Phase have been included in Section 3.2 .
(g)(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such	The details of the alternatives considered as part of the Vrede Solar PV Facility and as part of the Scoping Phase have been included in Section 3.2 . Where no alternatives are being considered a motivation has been included

3.2 Alternatives Considered during the BA Process

In accordance with the requirements of Appendix 2 of the 2014 Environmental Impact Assessment (EIA) Regulations (GNR 982, as amended¹¹), reasonable and feasible alternatives including but not limited to site and technology alternatives, as well as the “do-nothing” alternative should be considered. Another solar renewable energy facility is planned within the broader study area, supporting the suitability of the area for solar PV projects.

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

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

In this instance, 'the project' refers to the Vrede Solar PV Facility, a solar PV facility with capacity of up to 100MW_{AC} and associated infrastructure proposed to be developed by an Independent Power Producer (IPP) and intended to form part of the DMRE's REIPPP Programme.

¹¹ GNR 983, 984 and 985 (2014), as amended 2017 (GNR 324 ,325, 327).

3.2.1 **Consideration of Fundamentally Different Alternatives**

Fundamentally different alternatives are usually assessed at a strategic level and, as a result, project-specific EIAs are therefore limited in scope and ability to address fundamentally different alternatives. At a strategic level, electricity generating alternatives have been addressed as part of the DMRE's current Integrated Resource Plan for Electricity 2010 – 2030 (IRP)¹², and will continue to be addressed as part of future revisions. In this regard, the need for renewable energy power generation from solar PV facilities has been identified as part of the technology mix for power generation in the country for the next 20 years. Therefore, fundamentally different alternatives to the proposed project are not considered within this EIA process.

3.2.2 **Consideration of Incrementally Different Alternatives**

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

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

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

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

i. Property or Location Alternatives

One other solar farm, the Rondavel Solar PV Facility, is currently planned for development within the broader Kroonstad area, supporting the suitability of the broader study area for similar developments. The placement of a solar PV facility is, however, also dependent on several other factors including land suitability, climatic conditions (solar irradiation levels), topography, the location and extent of the study area, availability of grid connection infrastructure and the need and desirability of the project. South Africa Mainstream Renewable Power Developments (Pty) Ltd as the Applicant, considers the project site and preferred development area as being favourable and suitable for the establishment of a solar PV facility due to the following site-specific favourable characteristics:

- » **Land suitability:** The development area is currently lying fallow, with historical farming of the region having proven uneconomical for the landowner. Furthermore, sites that facilitate easy construction

¹² The Integrated Resource Plan (IRP) is legislated policy which regulates power generation planning.

conditions (i.e. relatively flat topography, lack of major outcrops etc.) are also favoured due to the reduced construction activities. Based on the suitability of the development area, no alternative locations are considered.

- » **Solar resource:** The economic viability of a solar PV facility is directly dependent on the annual direct solar irradiation values of the area within which it will operate. The Global Horizontal Irradiation (GHI) for the study area is between ~1972 - 2118 kWh/m²/annum. While the Free State province does not have a reputation for high solar irradiation values, these values are comparable with values for Bloemfontein and Beaufort West, and therefore enables the development of solar energy projects and the successful operation thereof. Based on the solar resource available, no alternative locations are considered.
- » **Topography:** The region within which the project site is located can be described flat and homogenous. Elevation across the development area ranges from 1402m above sea level in the west to 1419m above sea level in the east. There are no prominent hills within the project site with the highest areas of elevation situated to the east of the project site. The flat topography of the development area under investigation is considered as beneficial in terms of the construction activities that will be required. Based on the suitable and preferable topography present, no location alternatives are considered for the development.
- » **Site extent:** The affected properties (i.e. Remaining extent of the farm Vrede No. 1152 and Portion 1 of the farm Uitval No. 1104) is approximately 1074ha in extent, which is sufficient for the installation of a solar PV facility with a contracted capacity of up to 100MW_{AC}, while allowing for the avoidance of environmental site sensitivities. A development area of ~279ha has been identified within the project site within which the solar PV facility will be located. The development footprint, which represents the area of disturbance for the Vrede Solar PV facility, plus associated infrastructure is expected to be ~195ha in size, which is equivalent to 69% of the extent of the development area. The size of the development footprint within the development area will be confirmed in the EIA phase once the facility layout is available for assessment. The development area thus is sufficient for the proposed development and therefore eliminates the need to consider alternative locations for the development.
- » **Site access:** The site can be readily accessed via an existing gravel access road (S172) branching off of the P99/1 between Kroonstad and Henneman, with only minor improvements to the intersection between the S172 and P99/1 required (horizontal alignment adjustments). Based on the sufficient access available for the development no alternative locations are considered.
- » **Grid access:** A key factor in the siting of any energy generation project, is a viable grid connection. The anticipated grid connection solution (subject to a separate environmental assessment and authorisation process) is a 132kV distribution line. Two alternative routes are being considered for the Vrede Grid Connection solution. Both alternatives for the Vrede Grid Connection will loop into the Kroonstad Municipality – Kroonstad SW STN 1 132kV power line located approximately 3km from the Vrede Solar PV facility site, to connect to the national grid. Based on the nearby location and suitability of the anticipated grid connection solution, no further grid access alternatives are considered in this application.
- » **Geographic location:** The proposed project site is located within close proximity to Kroonstad, which will allow for material and labour, as well as waste servicing for the proposed facility. The development area is also currently fallow, and previously disturbed by virtue of past agricultural practices, and therefore

compliments the proposed land use by repurposing previously disturbed land with an economically viable land use.

- » **Landowner support:** The selection of a site where the landowner is supportive of the development of renewable energy is essential for ensuring the success of the project. The landowner does not view the development as a conflict with their current land use practices. The support from the landowner for the development to be undertaken on the affected property has been solidified by the provision of consent for the project to proceed on the property through the signing of a land lease agreement with the proponent as well as a landowners consent as per the requirements of the EIA Regulations, 2014. Therefore, with the affected landowner in support of the development, no location alternatives are considered.

Based on above site-specific attributes, the proponent considers the development area located within the study area as highly preferred in terms of the development of a solar PV facility, and expects that the Vrede Solar PV facility will be able to draw on synergies with the other project (Rondavel Solar PV Facility) proposed within the vicinity of the study area and the benefits obtained from the close proximity to that of Kroonstad. As a result, no property/location alternatives are proposed as part of this BA process.

ii. Design and Layout Alternatives

The affected properties (i.e. Remaining extent of the farm Vrede No. 1152 and Portion 1 of the farm Uitval No. 1104) is approximately 1074ha in extent, which is sufficient for the installation of a solar PV facility with a contracted capacity of up to 100MW, while allowing for the avoidance of environmental site sensitivities. A development area of ~279ha has been identified within the project site within which the solar PV facility will be located. The development footprint, which represents the area of disturbance for the Vrede Solar PV facility, plus associated infrastructure is expected to be ~195ha in size, which is equivalent to 68% of the extent of the development area. The size of the development footprint within the development area will be confirmed in the EIA phase once the facility layout is available for assessment. In addition, findings from specialist assessments were considered through this Scoping process in order to provide site specific information regarding the development area and development footprint considered for the Vrede Solar PV Facility.

Areas to be avoided by the development are in the process of being identified, specifically relating to ecological and hydrological features and sensitivities present within the development area. These sensitivities, once identified, will be utilised as a tool by the developer to identify and locate the development footprint of the PV facility within the development area. This will be undertaken with the aim of avoiding possible sensitive areas within the project site so as to limit impacts associated with the development which would result in unacceptable loss.

The site extent is sufficient for the proposed development and therefore reduces the need to consider alternative locations for the PV facility and the associated infrastructure. Potential environmentally sensitive areas have been identified as part of the Scoping Phase (refer to Chapter 8) for further detailed consideration (through site-specific specialist studies) during the EIA Phase. The environmental sensitivity identification process will inform the layout design for the PV facility, avoiding sensitive areas as far as possible, and thereby ensuring that the layout plan taken forward for consideration during the EIA Phase is the most optimal from an environmental perspective.

3.2.3 Technology Alternatives

Few technology options are available for solar facilities, and the use of those that are considered are usually differentiated by weather and temperature conditions that prevail in the area, so that optimality is obtained by the final site selection. Solar energy is considered to be the most suitable renewable energy technology for this area, based on the site location, ambient conditions and energy resource availability. Solar PV was therefore determined as the most suitable option for further assessment.

The IRP (2019), excludes the procurement of power from CSP facilities until 2030, whereas new additional capacity of approximately 6 000MW will be required from solar PV facilities. Therefore, PV technology was identified as being the preferred option for the study area and consists of a lower visual profile and limited water requirements when compared to the CSP technology alternative. Given the allocations in the IRP (2019), solar PV is considered as the most appropriate technology option. Furthermore, the development of the Vrede Solar PV Facility provides an opportunity to optimally use a site that is currently fallow with no agricultural or economic use, but with reduced visual intrusion and/or impacts and reduced water use requirements.

Therefore, considering the above, no other technology alternatives are being assessed for the development of Vrede Solar PV Facility. The development of the solar PV facility on the site is considered as the best option for the area considering the nature and extent of the site, as well as the solar resource available.

Several solar PV technology alternatives are available, including *inter alia*:

- » Bifacial PV panels
- » Monofacial PV panels
- » Fixed mounted PV systems (static / fixed-tilt panels).
- » Single-axis tracking or double-axis tracking systems (with solar panels that rotate around a defined axis to follow the sun's movement).
- » Monocrystalline modules, polycrystalline modules or thin film modules.

The primary difference between PV technologies available relate to the extent of the facility, as well as the height of the facility, however the potential for environmental impacts remain similar in magnitude. Fixed mounted PV systems are able to occupy a smaller extent and have a lower height when compared to tracking PV systems, which require both a larger extent of land, and are taller in height. However, both options are considered to be acceptable for implementation from an environmental perspective. Bifacial solar PV panels offer many advantages over monofacial PV panels, as power can be produced on both sides of the module, increasing total energy generation. Monocrystalline modules, polycrystalline modules or thin film modules differ mainly in their cost and efficiency values, but do not represent a fundamentally different panel design type from an environmental perspective. The preference will, therefore, be determined on the basis of technical considerations and the site conditions.

The PV panels are designed to operate continuously for more than 20 years, mostly unattended and with low maintenance. The impacts associated with the construction, operation, and decommissioning of the facility are anticipated to be the same irrespective of the PV panel selected for implementation.

Currently, the battery technologies being considered are either Solid State Batteries or Redox Flow Batteries (please refer Section 2.5.4 for a detailing of the technology types). Solid State Batteries are typically low in

cost, able to operate at subfreezing temperatures and do not require active cooling. They lack of electrolyte use also limits the potential for electrolyte loss to the environment. These batteries do however suffer from a rapid voltage drop on discharge.

Flow batteries are a technology of battery which requires mechanical systems (pumps, pipes, and tanks) and are therefore inherently more complex than a solid-state battery. The greatest advantage these batteries exhibit is their scalability and their longer duration discharge cycles which are more cost efficient when compared to solid-state batteries. The most successful and widespread of these batteries use vanadium and zinc-bromine chemistries.

Solid state batteries are mainly associated with clearance of natural habitats for the placement of these features, and handling of wastes from spent or decommissioned systems, whereas flow batteries may be associated with larger quantities of land clearance required, and the potential for electrolyte or associated chemical spills, however they do not produce significance waste during operation and maintenance as the storage system has the capability to indefinitely perform discharge cycles

Given appropriate controls, the impacts associated with the construction, operation, and decommissioning of the facility are anticipated to be similar irrespective of the BESS technology type selected for implementation.

3.2.4 The 'Do-Nothing' Alternative

The 'Do-Nothing' alternative is the option of not constructing the Vrede Solar PV Facility. Should this alternative be selected, there would be no environmental impacts or benefits as a result of construction and operation activities associated with a solar PV facility. The 'do-nothing' alternative will therefore likely result in minimising the cumulative impact on the land, although the economic utilisation of this land with the proposed solar facility represents a beneficial use to the fallow land use currently evident. This alternative will be assessed within the EIA Phase of the process.

CHAPTER 4 POLICY AND LEGISLATIVE CONTEXT

This Chapter provides an overview of the policy and legislative context within which the development of a solar PV facility, such as the Vrede Solar PV Facility, is proposed. It identifies environmental legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process which may be applicable to or have bearing on the proposed project.

4.1 Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of an Impact Assessment Report

This chapter of the Scoping Report includes the following information required in terms of Appendix 2: Content of Scoping Report:

Requirement	Relevant Section
(e) a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process.	Chapter 4, as a whole, provides an overview of the policy and legislative context which is considered to be associated with the development of the solar energy facility. The regulatory and planning context has been considered at national, provincial and local levels. A description of the policy and legislative context within which Vrede Solar PV Facility is proposed is included in sections 4.3, 4.4, 4.5 and 4.6.

4.2 Strategic Electricity Planning in South Africa

The need to expand electricity generation capacity in South Africa is based on national policy and informed by on-going strategic planning undertaken by the Department of Mineral Resources and Energy (DMRE). The hierarchy of policy and planning documentation that support the development of renewable energy projects such as a solar energy facility is illustrated in **Figure 4.1**. These policies are discussed in more detail in the following sections, along with the provincial and local policies or plans that have relevance to the development of the Vrede Solar PV Facility.

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

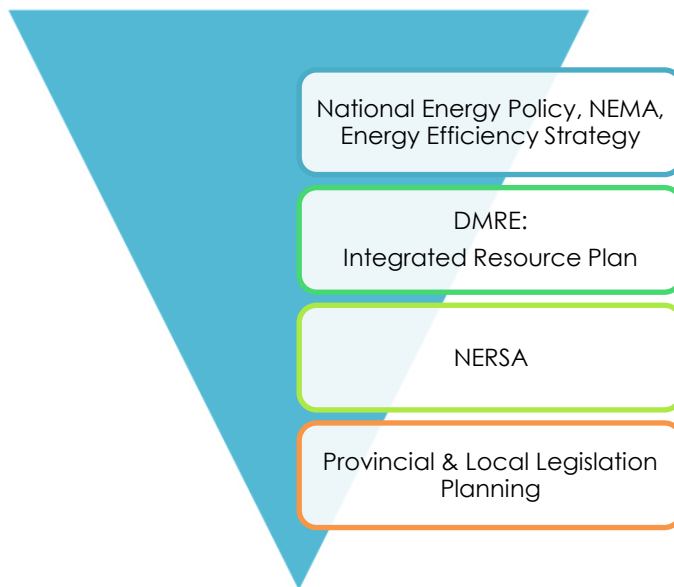


Figure 4.1: Hierarchy of electricity and planning documents

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

- » **Department of Mineral Resources and Energy (DMRE):** This Department is responsible for policy relating to all energy forms and for compiling and approving the Integrated Resource Plan (IRP) for electricity. Furthermore, the Department is also responsible for granting approvals for the use of land which is contrary to the objects of the Mineral and Petroleum Resource Development Act (Act No. 28 of 2002) (MPRDA) in terms of Section 53 of the Act. Therefore, in terms of the Act, approval from the Minister is required to ensure that proposed activities do not sterilise mineral resources that may occur within the project site and development area.
- » **National Energy Regulator of South Africa (NERSA):** NERSA is responsible for regulating all aspects of the electricity sector and will ultimately issue licenses for IPP projects to generate electricity.
- » **Department of Environment, Forestry and Fisheries (DEFF):** This Department is responsible for environmental policy and is the controlling authority in terms of NEMA and the EIA Regulations, 2014 (GN R326) as amended. DEFF is the Competent Authority for this project (as per GN R779 of 01 July 2016), and is charged with granting the EA for the project under consideration.
- » **South African Heritage Resources Agency (SAHRA):** SAHRA is a statutory organisation established under the National Heritage Resources Act (No. 25 of 1999) (NHRA), as the national administrative body responsible for the protection of South Africa's cultural heritage.
- » **South African National Roads Agency Limited (SANRAL):** This Agency is responsible for the regulation and maintenance of all national road routes.
- » **Department of Water and Sanitation (DWS)¹³:** This Department is responsible for effective and efficient water resources management to ensure sustainable economic and social development. This

¹³ The Department of Water and Sanitation (DWS) is soon to be known as the Department of Human Settlements, Water and Sanitation (DHSWS).

Department is also responsible for evaluating and issuing licenses pertaining to water use (i.e. Water Use Licenses (WUL) and General Authorisation).

- » **The Department of Agriculture, Forestry and Fisheries (DAFF)¹⁴:** This Department is the custodian of South Africa's agricultural resources and is primarily responsible for the formulation and implementation of policies governing the agriculture sector. Furthermore, the Department is also responsible for issuing permits for the disturbance or destruction of protected tree species listed under Section 15 (1) of the National Forest Act (No. 84 of 1998) (NFA).

»

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

- » **Provincial Government of the Free-State – Department of Economic Development, Tourism and Environmental Affairs (DEDTEA):** This Department is the commenting authority for the EIA process for the project and is responsible for issuing of biodiversity and conservation-related permits.
- » **Free State Department: Police, Roads and Transport:** This Department provides effective co-ordination of crime prevention initiatives, provincial police oversight, traffic management and road safety towards a more secure environment.
- » **Free State Heritage Resources Authority (FSPHRA):** This Department identifies, conserves and manages heritage resources throughout the Free State Province.

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

4.3 National Policy

Further to the South African government's commitment in August 2011 to support the development of renewable energy capacity, the DMRE initiated the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) to procure renewable energy from the private sector in a series of rounds. To date, the Department has procured 6 422MW of renewable energy capacity from 102 independent power producers (IPPs), with 3 876MW operational and made available to the grid¹⁵. National policies have to be considered for the construction and operation of the solar PV facility to ensure that the development is in line with the planning of the country.

¹⁴ The Department of Agriculture, Forestry and Fisheries (DAFF) is soon to be known as the Department of Agriculture, Rural Development and Land Reform.

¹⁵<https://www.cliffedekkerhofmeyr.com/en/news/publications/2019/Corporate/energy-alert-22-october-The-Integrated-Resource-Plan-2019-A-promising-future-roadmap-for-generation-capacity-in-South-Africa.html>

A brief review of the most relevant national policies is provided below in **Table 4.1**. The development of the Vrede Solar PV Facility is considered to align with the aims of these policies, even if contributions to achieving the goals therein are only minor.

Table 4.1: Relevant national legislation and policies for the Vrede Solar PV Facility

Relevant legislation or policy	Relevance to the Vrede Solar PV Facility
<p>Constitution of the Republic of South Africa, 1996</p>	<p>Section 24 of the Constitution pertains specifically to the environment. It states that everyone has the right to an environment that is not harmful to their health or well-being, and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation, promote conservation and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.</p> <p>The Constitution outlines the need to promote social and economic development. Section 24 of the Constitution therefore requires that development be conducted in such a manner that it does not infringe on an individual's environmental rights, health, or well-being. This is especially significant for previously disadvantaged individuals who are most at risk to environmental impacts.</p>
<p>National Environmental Management Act (No. 107 of 1998) (NEMA)</p>	<p>This piece of legislation is South Africa's key piece of environmental legislation and sets the framework for environmental management in South Africa. NEMA is founded on the principle that everyone has the right to an environment that is not harmful to their health or well-being as contained within the Bill of Rights.</p> <p>The national environmental management principles state that the social, economic and environmental impacts of activities, including disadvantages and benefits, must be considered, assessed and evaluated, and decisions must be appropriate in the light of such consideration and assessment.</p> <p>The need for responsible and informed decision-making by government on the acceptability of environmental impacts is therefore enshrined within NEMA.</p>
<p>White Paper on the Energy Policy of the Republic of South Africa (1998)</p>	<p>The White Paper on Energy Policy places emphasis on the expansion of energy supply options to enhance South Africa's energy security. This can be achieved through increased use of RE and encouraging new entries into the generation market.</p> <p>The policy states that the advantages of RE include, minimal environmental impacts during operation in comparison with traditional supply technologies, generally lower running costs, and high labour intensities. Disadvantages include, higher capital costs in some cases, lower energy densities, and lower levels of availability, depending on specific conditions, especially with sun and wind-based systems. Nonetheless, renewable resources generally operate from an unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future.</p>
<p>White Paper on the Renewable Energy Policy of the Republic of South Africa (2003)</p>	<p>The White Paper on Renewable Energy Policy supplements Government's predominant policy on energy as set out in the White Paper on the Energy Policy of the Republic of South Africa (DME, 1998). The policy recognises the potential of RE and aims to create the necessary conditions for the development and commercial implementation of RE technologies.</p> <p>The White Paper on RE sets out Government's vision, policy principles, strategic goals, and objectives for promoting and implementing RE in South Africa. The country relies heavily on coal to meet its energy needs due to its abundant, and fairly accessible</p>

Relevant legislation or policy	Relevance to the Vrede Solar PV Facility
	<p>and affordable coal resources. However, massive RE resources that can be sustainable alternatives to fossil fuels, have so far remained largely untapped.</p> <p>The White Paper on Renewable Energy of 2003 set a target of 10 000GWh to be generated from RE by 2013 to be produced mainly from biomass, wind, solar and small-scale hydro. The target was subsequently reviewed in 2009 during the RE summit of 2009. The policy supports the investment in RE facilities as they contribute towards ensuring energy security through the diversification of energy supply, reducing GHG emissions and the promotion of RE sources.</p>
<p>National Energy Act (No. 34 of 2008)</p>	<p>The purpose of the National Energy Act (No. 34 of 2008) is to ensure that diverse energy resources are available, in sustainable quantities and at affordable prices, to the South African economy in support of economic growth and poverty alleviation, while taking environmental management requirements into account. In addition, the Act also provides for energy planning, and increased generation and consumption of Renewable Energies (REs).</p> <p>The Act provides the legal framework which supports the development of RE facilities for the greater environmental and social good and provides the backdrop against which South Africa's strategic planning regarding future electricity provision and supply takes place.</p>
<p>The Electricity Regulation Act (No. of 2006)</p>	<p>The Electricity Regulation Act of 2006, replaced the Electricity Act (No. 41 of 1987), as amended, with the exception of Section 5B, which provides funds for the energy regulator for the purpose of regulating the electricity industry. The Act establishes a national regulatory framework for the electricity supply industry and introduces the National Energy Regulator (NERSA) as the custodian and enforcer of the National Electricity Regulatory Framework. The Act also provides for licences and registration as the manner in which the generation, transmission, distribution, trading, and import and export of electricity are regulated.</p>
<p>Integrated Energy Plan (IEP), 2015</p>	<p>The Integrated Energy Plan (IEP) (which was developed under the National Energy Act (No. 34 of 2008)), recognises that energy is essential to many human activities, and is critical to the social and economic development of a country. The purpose of the IEP is essentially to ensure the availability of energy resources, and access to energy services in an affordable and sustainable manner, while minimising associated adverse environmental impacts. Energy planning therefore needs to balance the need for continued economic growth with social needs, and the need to protect the natural environment.</p>
<p>Integrated Resource Plan for Electricity (IRP) 2010-2030 (2019)</p>	<p>The Integrated Resource Plan (IRP) for Electricity 2010 – 2030 is a subset of the IEP and constitutes South Africa's National electricity plan. The primary objective of the IRP is to determine the long-term electricity demand and detail how this demand should be met in terms of generating capacity, type, timing and cost. The IRP also serves as input to other planning functions, including amongst others, economic development and funding, and environmental and social policy formulation.</p> <p>On 27 August 2018, the then Minister of Energy published a draft IRP which was issued for public comment. The lengthy public participation and consultation process has culminated in the issue of the overdue IRP 2019 which updates the energy forecast from the current period to the year 2030. Since the promulgated IRP 2010, the following capacity developments have taken place:</p>

Relevant legislation or policy	Relevance to the Vrede Solar PV Facility
	<ul style="list-style-type: none"> » A total of 6 422MW has been procured thus far under the REIPPP Programme, with 3 876MW being currently operational and made available to the grid. In addition, IPPs have commissioned 1005MW from two (2) Open Cycle Gas Turbines (OCGT) peaking plants; and » Under the Eskom Build Programme, 1 332MW has been procured from the Ingula Pumped Storage Project, 1 588MW and 800MW from the Medupi and Kusile power stations and 100MW from the Sere Wind Farm. <p>Provision has been made for the following new capacity by 2030:</p> <ul style="list-style-type: none"> » 1 500MW of coal; » 2 500MW of hydro; » 6 000MW of solar PV; » 14 400MW of wind; » 1 860MW of nuclear; » 2 088MW of storage; » 3 000MW of gas/diesel; and » 4 000MW from other distributed generation, co-generation, biomass and landfill technologies. <p>Based on the IRP 2019, 1 474MW has been installed for solar PV facilities, whereas, 814MW has already been procured. In addition, 1 000MW has been allocated for solar PV facilities from 2022 to 2030. This will bring the total installed capacity of solar PV facilities by 2030 to 8 288MW. Therefore, the development of the Vrede Solar PV Facility is supported by the IRP 2019.</p>
<p>National Development Plan 2030 (2012)</p>	<p>The National Development Plan (NDP) 2030 is a plan prepared by the National Planning Commission in consultation with the South African public which is aimed at eliminating poverty and reducing inequality by 2030.</p> <p>In terms of the Energy Sectors role in empowering South Africa, the NDP envisages that, by 2030, South Africa will have an energy sector that promotes:</p> <ul style="list-style-type: none"> » Economic growth and development through adequate investment in energy infrastructure. The sector should provide reliable and efficient energy service at competitive rates, while supporting economic growth through job creation. » Social equity through expanded access to energy at affordable tariffs and through targeted, sustainable subsidies for needy households. » Environmental sustainability through efforts to reduce pollution and mitigate the effects of climate change. <p>The NDP aims to provide a supportive environment for growth and development, while promoting a more labour-absorbing economy. The development of the Vrede Solar PV Facility supports the NDP through the development of energy-generating infrastructure which will not lead to the generation of GHGs and will result in economic development and growth of the area surrounding the development area.</p>
<p>Strategic Integrated Projects (SIPs)</p>	<p>The Presidential Infrastructure Coordinating Commission (PICC) is integrating and phasing investment plans across 18 Strategic Integrated Projects (SIPs) which have 5 core functions, including to unlock opportunity, transform the economic landscape, create new jobs, strengthen the delivery of basic services and support the integration of African economies.</p>

Relevant legislation or policy	Relevance to the Vrede Solar PV Facility
	<p>SIP 8 of the energy SIPs supports the development of RE projects as follows: Green energy in support of the South African economy: Support sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the Integrated Resource Plan (IRP 2010) and supports bio-fuel production facilities.</p> <p>The development of the Vrede Solar PV Facility is aligned with SIP 8 as it constitutes a green energy initiative that would contribute clean energy in accordance with the IRP 2010 – 2030.</p>
<p>National Climate Change Response Policy, 2011</p>	<p>The Conference of the Parties (COP) 21 was held in Paris from 30 November to 12 December 2015. From this conference, an agreement to tackle global warming was reached between 195 countries. This Agreement is open for signature and subject to ratification, acceptance or approval by States and regional economic integration organisations that are Parties to the Convention from 22 April 2016 to 21 April 2017. Thereafter, this Agreement shall be open for accession from the day following the date on which it is closed for signature. The agreement can only be sanctioned once it has been ratified by 55 countries, representing at least 55% of emissions.</p> <p>South Africa signed the Agreement in April 2016 and ratified the agreement on 01 November 2016. The Agreement was assented to by the National Council of Provinces on 27 October 2016, and the National Assembly on 1 November 2016. The Agreement was promulgated on 04 November 2016, thirty days after the date on which at least 55 Parties to the Convention, which account for at least 55% of the total global greenhouse gas emissions have deposited their instruments of ratification, acceptance, approval or accession with the Depositary.</p> <p>South Africa's National Climate Change Response Policy (NCCRP) establishes South Africa's approach to addressing climate change, including adaptation and mitigation responses. The NCCRP formalises Government's vision for a transition to a low carbon economy, through the adoption of the 'Peak, Plateau and Decline' (PPD) GHG emissions trajectory whereby South Africa's emissions should peak between 2020 and 2025, plateau for approximately a decade, and then decline in absolute terms thereafter, and based on this the country has pledged to reduce emissions by 34% and 42% below Business As Usual (BAU) emissions in 2020 and 2025, respectively.</p> <p>The policy provides support for the Vrede Solar PV Facility, which will contribute to managing climate change impacts, supporting the emergency response capacity, as well as assist in reducing GHG emissions in a sustainable manner.</p>
<p>Climate Change Bill, 2018</p>	<p>On 08 June 2018, the Minister of Environmental Affairs published the Climate Change Bill ("the Bill") for public comment. The Bill provides a framework for climate change regulation in South Africa aimed at governing South Africa's sustainable transition to a climate resilient, low carbon economy and society. The Bill provides a procedural outline that will be developed through the creation of frameworks and plans.</p> <p>The Vrede Solar PV Facility consists of a renewable energy generation facility and would not result in the generation or release of emissions during its operation.</p>

4.4 Provincial Planning and Context

A brief review of the most relevant provincial policies is provided below in **Table 4.2**. The proposed development is considered to align with the aims of these policies, even if contributions to achieving the goals therein are only minor.

Table 4.2: Relevant provincial legislation and policies for the Vrede Solar PV Facility

Relevant policy	Relevance to the Vrede Solar PV Facility
<p>Free State Provincial Growth and Development Strategy (FSGDS) (2005 – 2014)</p>	<p>The overarching goal of the Free State Growth and Development Strategy (FSGDS) is to align the provincial and national policies and programmes and to guide development in terms of effective and efficient management and governance to achieve growth and development. The strategy is a living document that uses the latest business planning and evaluation tools in order to maximise the effect of all spending.</p> <p>Based on the social and economic development challenges of the Province, the Strategy identifies a few primary objectives, including stimulating economic development and developing and enhancing the infrastructure for economic growth and social development, poverty alleviation through human and social development, ensuring a safe and secure environment for all and the promotion of effective and efficient governance and administration.</p> <p>The development of the Vrede Solar PV Facility supports the overall objective of stimulating economic development and infrastructure investment towards growth and social development, by contributing to the energy mix, supply and infrastructure of the province. The development of the facility will also contribute (albeit limited) to the alleviation of poverty through the creation of direct and indirect employment opportunities and well as skills development.</p>
<p>Free State Provincial Growth and Development Strategy (FSGDS), Revised October 2007</p>	<p>The revised FSGDS refers to specific imperatives which sets the tone and pace for shared growth and development in the Province. These include:</p> <ul style="list-style-type: none"> » The need to effectively use scarce resources within the Province, while addressing the real causes of development challenges. » The need to accelerate service delivery based on a common provincial development agenda as the basis for provincial strategic direction. » The need to identify investment opportunities and provide an environment of certainty critical for private-sector investment. » The need to promote intergovernmental coordination between the three spheres of government. » The need to facilitate facilitates the implementation of the People's Contract within the Province. » The need to provide a common vision as the basis for common action amongst all stakeholders, both inside and outside government. » The need to provide a framework for budgets, implementation, performance management and spatial development. <p>The development of the Vrede Solar PV Facility will assist with the need to effectively use scarce resources and the need to identify investment opportunities, including private sector-investment. The development of a solar facility reduces the need to make use of non-renewable resources for the generation of electricity and opens up the Province to further future solar energy development.</p>

Relevant policy	Relevance to the Vrede Solar PV Facility
<p>Free State Provincial Spatial Development Framework (PSDF) - Executive Summary (Inception Report)</p>	<p>The Free State PSDF is a provincial spatial and strategic planning policy that responds to and complies with, in particular, the National Development Plan Vision 2030 and the National Spatial Development Perspective (NSDP). The latter encourages all spheres of government to prepare spatial development plans and frameworks (such as the PSDF) that promote a developmental state in accordance with the principles of global sustainability as is advocated by, among others, the South African Constitution and the enabling legislation.</p> <p>The Free State Provincial Growth and Development Strategy states that sustainable economic development is the only effective means by which the most significant challenge of the Free State, namely poverty, can be addressed. The PSDF gives practical effect to sustainable development, which is defined as development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs.</p> <p>The PSDF is prepared in accordance with bioregional planning principles that were adapted to suit the site-specific requirements of the Free State. It incorporates and complies with the relevant protocols, conventions, agreements, legislation and policy at all applicable levels of planning, ranging from the international to the local.</p> <p>The Vrede Solar PV Facility will contribute to sustainable and economic development goals of the Free State PSDF, once completed and formally adopted.</p>
<p>Free State Green Economy Strategy (2014)</p>	<p>This Green Economy Strategy for Free State Province (FSGES) was developed in alignment with the national green economy strategy elaborated in the National Green Economy Framework and Green Economy Accord, as well the Free State Provincial Growth and Development Strategy. The development process was spearheaded by the Department of Economic Development, Tourism and Environmental Affairs (DETEA).</p> <p>The objective was to develop a green economy strategy to assist the Province to, amongst others, improve environmental quality and economic growth, and to develop green industries and energy efficiency within the Province.</p> <p>The Vrede Solar PV Facility will contribute to the aim of energy efficiency and green industry while promoting economic growth, and is therefore consistent with this strategy.</p>
<p>Free State Investment Prospectus (2019)</p>	<p>The Premier of the Free State considers providing access to individual investors to accurate and pertinent information makes it easier for investors to glean investor ready opportunities that are currently available in the Free State.</p> <p>Opportunity of the development of renewable energy is considered in the key sectors overview. The prospectus states that opportunities are opening up in the Province for the energy sector, including renewable energy. Rezoning for the development of multiple solar energy facilities has already been undertaken in the Province. The development of a Solar Park in the Xhariep region is seen as a driver of growth along the banks of the Orange (Gariiep) River.</p> <p>Considering the future opportunities available for the development of renewable energy facilities (including solar PV facilities) the development of the Vrede Solar PV Facility is considered to be in-line with the Investment Prospectus of the Province.</p>

4.5 Local Policy and Planning Context

The local tiers of government relevant to the Vrede Solar PV Facility are the Moqhaka Local Municipality and the Fezile Dabi District Municipality (**Table 4.3**). Instruments and/or policies at both the district and local level contain objectives which align with the development of the Vrede Solar PV Facility. These include, economic growth, job creation, community upliftment and poverty alleviation.

Table 4.3: Relevant district and local legislation and policies for the Vrede Solar PV Facility

Relevant policy	Relevance to the Vrede Solar PV Facility
Fezile Dabi District Municipality Integrated Development Plan (IDP) 2020/2021 (Draft)	<p>The Vision of the Municipality is "Improving the lives of citizens and progressively meeting their basic, social and economic needs, thereby restoring the community confidence and trust in government". The Mission of the Municipality is to "...strive to be a more responsive and accountable municipality towards sustainable development."</p> <p>The IDP identifies Local Economic Development as a Key Performance Area (KPA4).</p> <p>Based on the fact that the proposed development is considered to be sustainable with little resource use required and that the development will encourage local economic development it is considered that the Vrede Solar Facility is in-line with the objectives of the IDP.</p>
Fezile Dabi District Municipality Climate Change Vulnerability Assessment and Response Plan (2016)	<p>The Vrede Solar PV Facility indirectly contributes to the overall climate change response plan of the district municipality by providing energy without reliance on fossil fuels and therefore exacerbating climate change at a provincial and national level.</p>
Moqhaka Local Municipality Integrated Development Plan IDP (2017 – 2022)	<p>The Moqhaka Local Municipality IDP has, under the local economic development goal, the following aims:</p> <ul style="list-style-type: none"> » Create an environment that promotes the development of the local economy and facilitate job creation » To expand the electrification programme to any remaining areas and roll out solar energy in any identified areas at prescribes standards. <p>In addition, the IDP also indicates that an Energy Master Plan is currently being developed, with the primary aim of ensuring enough energy is available to support existing and developmental needs.</p> <p>The Vrede Solar PV Facility development thus directly addresses various aims of the Moqhaka Local Municipality IDP.</p>
Moqhaka Local Municipality Spatial Development Framework (SDF) (2019/2020)	<p>The SDF identifies ten spatial related directives and objectives. Directive number 8 refers to Surface Infrastructure. The objectives of this directive specifically refers to the promotion of development of renewable energy supply schemes. The SDF also identifies the need for new bulk transmission lines based on the envisaged new development in the area.</p> <p>Considering the above, the development of the Vrede Solar Facility is in line with the SDF.</p>

4.6 International Policy and Planning Context

A brief review of the most relevant international policies relevant to the establishment of the Vrede Solar PV Facility are provided below in **Table 4.4**. The Vrede Solar PV Facility is considered to align with the aims of these policies, even if contributions to achieving the goals therein are only minor.

Table 4.4: International policies relevant to the Vrede Solar PV Facility

Relevant policy	Relevance to the Vrede Solar PV Facility
<p>United Nations Framework Convention on Climate Change (UNFCCC) and Conference of the Party (COP)</p>	<p>Following COP24 held in Katowice, Poland, and Chile's announcement that they could not host the next COP, nearly 27 000 delegates met in Madrid, Spain for COP25 with the intention to finalise the 'rulebook' of the Paris Agreement. The Conference also intended to communicate to the global community that the efforts of the United Nations (UN) to curb climate change remained relevant and that the UN recognised the yawning gap between current progress and global goals to limit global warming. The UNFCCC Secretariat announced¹⁶ on 29 May 2020 that COP 26, originally scheduled for 9 – 19 November 2020 was postponed for 1 – 12 November 2021 and will be held in Glasgow, Scotland. In the previous COP, talks between the parties were unable to reach consensus in many areas, with a lot of issues being postponed to COP26 in 2021. Although COP26 has been postponed, the provision in the 2015 Climate Treaty that each Party must take a more ambitious commitment in 2020 to reduce greenhouse emissions has not been postponed.</p> <p>The UN at COP25 expressed their dissatisfaction with the results of the Conference and that the global community lost out on an opportunity to show increased ambition on mitigation, adaptation and finance to tackle the climate crisis¹⁷.</p> <p>The policy provides support for the Vrede Solar PV Facility which will contribute to managing climate change impacts, supporting the emergency response capacity, as well as assist in reducing GHG emissions in a sustainable manner.</p>
<p>The Equator Principles III (June 2013)</p>	<p>The Equator Principles (EPs) III constitute a financial industry benchmark used for determining, assessing, and managing project's environmental and social risks. The EPs are primarily intended to provide a minimum standard for due diligence to support responsible risk decision-making. The EPs are applicable to large infrastructure projects (such as the Vrede Solar PV project) and apply globally to all industry sectors.</p> <p>Such an assessment should propose measures to minimise, mitigate, and offset adverse impacts in a manner relevant and appropriate to the nature and scale of Vrede Solar PV. In terms of the EPs, South Africa is a non-designated country, and as such the assessment process for projects located in South Africa</p>

¹⁶ <https://cei.org/blog/cop-26-un-climate-conference-delayed%C2%A0until-november-2021>

¹⁷ <https://www.carbonbrief.org/cop25-key-outcomes-agreed-at-the-un-climate-talks-in-madrid>

Relevant policy	Relevance to the Vrede Solar PV Facility
	<p>evaluates compliance with the applicable IFC Performance Standards on Environmental and Social Sustainability, and Environmental Health and Safety (EHS) Guidelines.</p> <p>The Vrede Solar PV Facility is currently being assessed in accordance with the requirements of the EIA Regulations, 2014 as amended (GN R326), published in terms of Section 24(5) of the National Environmental Management Act (No. 107 of 1998) (NEMA), which is South Africa's national legislation providing for the authorisation of certain controlled activities. Through this assessment, all potential social and environmental risks are identified and assessed, and appropriate mitigation measures proposed.</p>
<p>International Finance Corporation (IFC) Performance Standards and Environmental and Social Sustainability (January 2012)</p>	<p>The International Finance Corporation's (IFC) Performance Standards (PSs) on Environmental and Social Sustainability were developed by the IFC and were last updated on 1 January 2012.</p> <p>Performance Standard 1 requires that a process of environmental and social assessment be conducted, and an ESMS appropriate to the nature and scale of the project, and commensurate with the level of its environmental and social risks and impacts, be established and maintained. The above-mentioned standard is the overarching standard to which all the other standards relate. Performance Standard 2 through to 8 establish specific requirements to avoid, reduce, mitigate or compensate for impacts on people and the environment, and to improve conditions where appropriate. While all relevant social and environmental risks and potential impacts should be considered as part of the assessment, the standards 2 and 8 describe potential social and environmental impacts that require particular attention specifically within emerging markets. Where social or environmental impacts are anticipated, the developer is required to manage them through its ESMS consistent with Performance Standard 1.</p> <p>Given the nature of the Vrede Solar PV Facility, it is anticipated (at this stage of the process) that Performance Standards 1, 2, 3, 4, 6, and 8 may be applicable to the project.</p>

CHAPTER 5 NEED AND DESIRABILITY

Appendix 2 of the 2014 EIA Regulations (GNR 982, as amended¹⁸) requires that a Scoping Report includes a motivation for the need and desirability of the proposed development, including the need and desirability of the activity in the context of the preferred location. The need and desirability of the development needs to consider whether it is the right time and the right place for locating the type of land-use/activity being proposed. The need and desirability of a proposed development is, therefore, associated with the wise use of land, and should be able to respond to the question such as, but not limited to, what the most sustainable use of the land may be.

This Chapter provides an overview of the projected suitability of the Vrede Solar PV Facility being developed at the preferred project location from an international, national, regional, and site-specific perspective. It provides an overview of the need and desirability, and perceived benefits of the project specifically.

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

This chapter includes the following information required in terms of Appendix 2: Content of a Scoping report:

Requirement	Relevant Section
(f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	The need and desirability for the development the Vrede Solar PV Facility is included and discussed within this chapter. The need and desirability for the development of the solar PV facility has been considered from an international, national, regional and site-specific perspective.

5.2 Need and Desirability from an International Perspective

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

¹⁸ GNR 983, 984 and 985 (2014), as amended 2017 (GNR 324 ,325, 327).

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

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

The development of the Vrede Solar PV Facility would contribute positively towards Goal 7 of the SDGs through the following:

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

5.3 Need and Desirability from a National Perspective

The Vrede Solar PV Facility is proposed in specific response to a National Government initiative, the Renewable Energy Independent Power Producer Procurement (REIPPP) Programme. This programme was initiated in order to give effect to the requirements of the IRP with regards to renewable energy targets. As a result, the need and desirability of the Vrede Solar PV Facility from a national perspective can largely be linked from the project’s alignment with national government policies, plans, and programmes which have

relevance to energy planning and production (as discussed in detail in **Chapter 4**). The following key plans have been developed by National Government to consider South Africa's current energy production, projected future demands, and provides the necessary framework within which energy generation projects can be developed:

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

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

The IEP is intended to provide a roadmap of South Africa's future energy landscape and guide future energy infrastructure investments and policy development (**Figure 5.1**). The Plan considered the three pillars of sustainable development, and list the following as the eight key energy planning objectives:

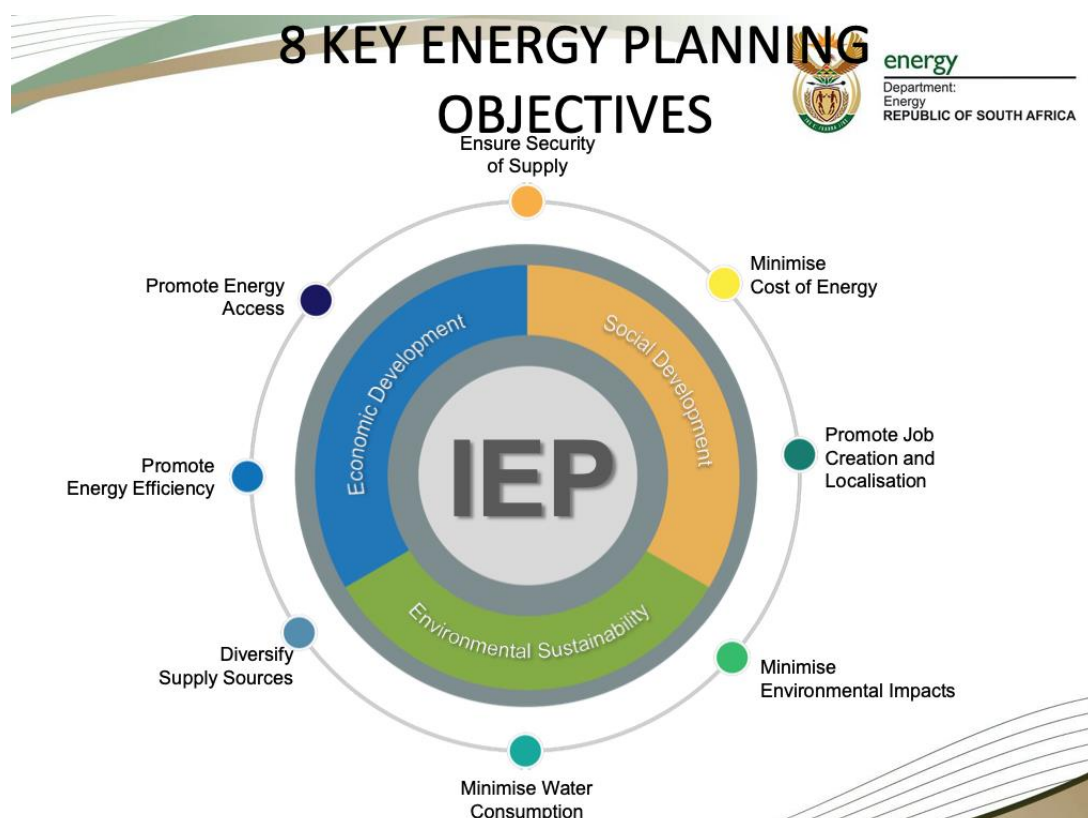


Figure 5.1: Eight key energy objectives as listed in the IEP, 2016 (extract from DOE presentation, December 2016)

The latest iteration of the IEP (25 November 2016) contained the following statement regarding solar power in South Africa:

“South Africa experiences some of the highest levels of solar radiation in the world and this renewable resource holds great potential for the country. The daily solar radiation in South Africa varies between 4.5

and 6.5 kilowatt hours per square meter (kWh/m²) (16 and 23 mega joules per square meter [MJ/m²]) (Stassen, 1996), compared to about 3.6 kWh/m² in parts of the United States and about 2.5 kWh/m² in Europe and the United Kingdom. The total area of high radiation in South Africa amounts to approximately 194 000 km², including the Northern Cape, which is one of the best solar resource areas in the world. With electricity production per square kilometre of mirror surface in a solar thermal power station being 30.2 MW, and just 1% of the high radiation area in the country being made available for solar power generation, the generation potential is approximately 64 GW. Solar energy has the potential to contribute quite substantially to South Africa's future energy needs. This would, however, require large investments in transmission lines from the areas of high radiation to the main electricity consumer centres."

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

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

The Integrated Resource Plan 2019 is South Africa's current gazetted energy plan. The purpose of the plan is to ensure sustainable electricity development which takes into consideration technical, economic, and social constraints, and identifies investments in the electricity sector which are required to meet the country's forecasted electricity demands at minimum costs. The consideration of GHG emissions in the determination of the energy generation mix indicates government's commitment to international obligations under the Paris Agreement.

A number of IPP Procurement Programmes have been initiated to secure electricity generated from a range of resources from the private sector (i.e. from Independent Power Producers, or IPPs). Under these Programmes, IPPs are invited to submit proposals for the finance, construction, operation, and maintenance of electricity generation facilities for the purpose of entering into an Implementation Agreement with the DMRE and a Power Purchase Agreement (PPA) with Eskom as the buyer. Provision has been made for new additional capacities in the IRP 2019 (refer to **Table 5.1**).

Table 5.1: Overview of the total installed capacity expected by 2030

IPP Procurement Programme	Technology	MW	Total
Renewables	Wind	17 742MW	31 320MW
	Solar CSP	600MW	

	Solar Photovoltaic	8 288MW	
	Hydro	4 600MW	
Coal	Coal	33 364MW	33 364MW
Nuclear	Nuclear	1 860MW	1 860MW
Gas & Diesel	Gas & Diesel	3 000MW	3 000MW
Other (Distributed Generation, CoGen, Biomass, Landfill)	Other (Distributed Generation, CoGen, Biomass, Landfill)	4 000MW	4 000MW

Renewable resources are valuable in contributing towards electricity generation and diversifying South Africa's electricity mix, while contributing towards South Africa's response to Climate Change. Under the REIPPPP, the DMRE intends to secure 14 725MW of electricity from renewable energy generation facilities utilising either onshore wind, concentrated solar thermal, solar photovoltaic (PV), biomass, biogas, landfill gas, or hydro across a number of bidding windows, while simultaneously contributing towards socio-economic development. A total of 1 474MW¹⁹ of PV generated electricity has been awarded to preferred bidders across four (4) rounds of bidding to date, with 814MW still remaining to be allocated in subsequent bidding rounds. Preferred bidders identified under any IPP Procurement Programme, including the REIPPP Programme, are required to satisfy a number of economic development requirements, including amongst others, job creation, local content, skills development, enterprise and supplier development, and socio-economic development. In addition to electricity generation and supply, IPP Procurement Programmes also contribute positively towards socio-economic development of a region, over and above job creation.

The need for new power generation from solar PV facilities has been identified and assessed by government at a national scale considering the national energy requirements as well as international commitments under the Paris Agreement; therefore, provision has been made for the inclusion of new PV power generation capacity in South Africa's energy mix. The implementation of the Vrede Solar PV Facility has the potential to contribute positively towards the identified need, while simultaneously contributing to job creation and socio-economic development, identified as a need for the country within the National Development Plan (NDP).

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

¹⁹ <https://www.cliffedekkerhofmeyr.com/en/news/publications/2019/Corporate/energy-alert-22-october-The-Integrated-Resource-Plan-2019-A-promising-future-roadmap-for-generation-capacity-in-South-Africa.html>

5.4 Need and Desirability of the project from a Regional Perspective

South Africa's electricity generation mix has historically been dominated by coal. However, up to 2030 a new capacity demand will be driven by the decommissioning of existing coal-fired power stations. A further 24 100MW (Figure 5.2) of coal power is expected to be decommissioned in the period 2030 to 2050. Therefore, additional capacity will be required from renewable energy sources, particularly solar with 6 000MW being allocated for the period up to 2030. In addition, the development of projects such as the Vrede Solar PV Facility in regions where grid connection is more constrained, in order to promote investment and growth into the regional connectivity and grid.

	Coal	Coal (Decommissioning)	Nuclear	Hydro	Storage	PV	Wind	CSP	Gas & Diesel	Other (Distributed Generation, CoGen, Biomass, Landfill)
Current Base	37,149		1 860	2,100	2 912	1 474	1 980	300	3 830	499
2019	2,155	-2,373					244	300		Allocation to the extent of the short term capacity and energy gap.
2020	1,433	-557				114	300			
2021	1,433	-1403				300	818			
2022	711	-844			513	400	1,000	1,600		
2023	750	-555				1000	1,600		500	
2024			1,860				1,600	1000	500	
2025						1000	1,600		500	
2026		-1,219					1,600		500	
2027	750	-847					1,600	2000	500	
2028		-475				1000	1,600		500	
2029		-1,694			1575	1000	1,600		500	
2030		-1,050		2,500		1000	1,600		500	
TOTAL INSTALLED CAPACITY by 2030 (MW)	33,364		1,860	4,600	5,000	8,288	17,742	600	6,380	
% Total Installed Capacity (% of MW)	43		2.36	5.84	6.35	10.52	22.53	0.76	8.1	
% Annual Energy Contribution (% of MWh)	58.8		4.5	8.4	12*	6.3	17.8	0.6	1.3	

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

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

Figure 5.2: A snapshot of the updated Energy Mix as per the IRP 2019

Although the majority of South Africa's electricity generation infrastructure (coal-fired power stations) is currently located within Mpumalanga due to the location of coal resources within this province, the location of the Vrede Solar PV Facility is in a region with moderate to high solar irradiation values, and therefore in an area where electricity generation from solar energy facilities is both a feasible and viable option. The location of the study area and project site is therefore considered to support the Province/Region's generation targets, from a regional perspective.

The overarching objective for the solar energy facility is to maximise electricity production through exposure to the solar resource, while minimising infrastructure, operational and maintenance costs, as well as social and environmental impacts. From a regional site selection perspective, this region is considered to be

approximately 2 240kWh/m²/annum, which is considered favourable for the development of a solar PV facility.

- » **Topography:** Sites that facilitate easy construction conditions, (i.e. relatively flat topography, lack of major rock outcrops, limited watercourse crossings, etc.) are favoured by developers during the site selection process. As a result, the development area for the Vrede Solar PV Facility consists of a flat and homogenous area. Elevation across the area across the area ranges from 1402m above sea level in the west to 1419m above sea level in the east. There are no prominent hills within the project site with the highest areas of elevation situated to the east of the project site. These characteristics are preferred for the construction and operation of a solar PV facility.
- » **Site extent and land availability:** Availability of relatively level land of sufficient extent can be a restraining factor to solar facility development, as a 100MW PV facility and associated infrastructure requires ~300ha of land space. The affected property (i.e. project site) is approximately 538ha in extent, which is sufficient for the development of a solar PV facility with a contracted capacity of up to 100MW, while allowing for the avoidance of environmental sensitivities. A development area of ~279ha has been identified within the project site within which the solar PV facility will be sited. The development footprint (within which the development footprint for the the Vrede Solar PV Facility plus associated infrastructure will be placed) is expected to occupy an area of ~195ha, which is equivalent to 68% of the extent of the development area, however the final designs will inform the exact extent of the development footprint constructed. The extent of land available for the construction and operation of the Vrede Solar PV Facility, and the opportunity provided for the avoidance of environmental sensitivities contributes to the need and desirability of the development of the Vrede Solar PV Facility in the proposed location.
- » **Access to Road Infrastructure and Site access:** The site can be readily accessed via an existing gravel access road (the S172). A normal controlled access can be provided without significant improvements using this road. In addition, the readily accessible nature of the site largely reduced the need for additional project-related access and internal roads, reducing the overall road and clearance requirement of the development site. The S172 road connects with the P99/1, which further connects with the R34 leading south-west out of the town of Kroonstad. The close proximity of the development area to the R34 road (refer to **Figure 5.4**) decreases the impact on secondary roads from traffic during the construction and operation phases. As material and components would need to be transported to the development area during the construction phase, accessibility to the project site is a key factor in determining the viability of the Vrede Solar PV Facility, particularly taking transportation costs (direct and indirect) into consideration and the impact of this on the project economics and the ability to submit a competitive bid under the DMRE's REIPPP Programme.



Figure 5.4: Existing road infrastructure within the vicinity of the development area for the Vrede Solar PV Facility. This infrastructure will primarily be used to gain access to the development area.

- » **Grid access:** Ease of access into the Eskom national electricity grid is vital to the viability of a solar energy facility, and addresses Eskom's concerns for lower cost connection alternatives given current funding constraints. The facility will loop into the existing Eskom Kroonstad Municipality – Theseus 1 132kV power line (refer to **Figure 5.5**). This line is ~3km from the proposed project site, reducing the grid connection requirements in order to allow for connection with the national grid.

- » **Land suitability and land use activities:** The current land use of the project site and development area is an important consideration in site selection in terms of limiting disruption to existing land use practices. The project site was historically used for grazing, however is currently fallow and no longer being employed for agricultural activities. There is no cultivated agricultural land in the development area, although historical cultivation is evident towards the west of the development area. This area is, however, no longer actively being cultivated and represents highly modified, fallow land. The landowner is currently considering alternative land uses based on the challenges and limitations experienced within farming the project site economically. Other land uses present within the vicinity of the development area include game and cattle farming, power line servitudes (including the Eskom Kroonstad Municipality – Theseus 1 power line into which the Vrede Solar PV facility is planned to connect to, as well as the Gansvlei 1 (11kV) line traversing the project site), and potential future development of another renewable solar energy facility (Rondavel Solar PV Facility) which is currently also subject to an environmental authorisation process. As such, the development provides opportunity for an alternative land use which will not be in conflict with the existing land use, and which will provide a productive and economically viable solution. In addition, landowner agreements are in place towards the use of these properties for the Solar PV development. The proposed development is compatible with the surrounding land uses and does not present a conflicting land use.

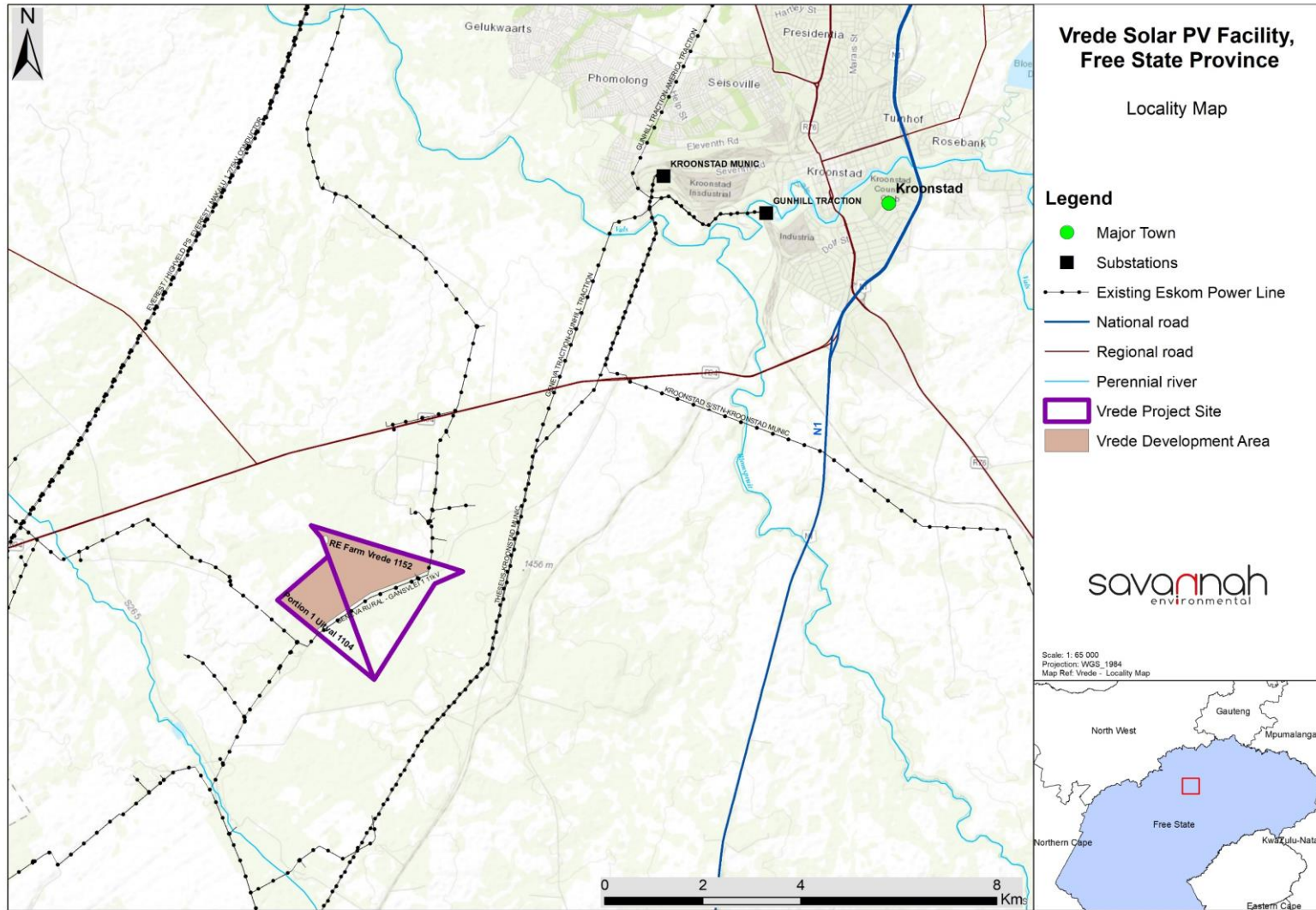


Figure 5.5: The Vrede Solar PV Facility project site in relation to the Eskom Kroonstad Municipality – Theseus 1 132kV power line (south-east) into which the facility will loop in, loop out in order to evacuate the energy to the national grid. (Refer **Appendix J** for A3 maps)

- » **Landowner Support:** The selection of a site where the landowner is supportive of the development of renewable energy is essential for ensuring the success of the project. The landowner does not view the development as a conflict with their current land use practices. The support from the landowner for the development to be undertaken on the affected properties has been solidified by the provision of consent for the project to proceed on the property through the signing of a land option to lease agreement with the proponent.

Taking into consideration the solar resource, grid access, land suitability, landowner support, access to road infrastructure, the current land use of the project site and development area, in conjunction with other large-scale solar PV projects planned within the vicinity of the project site, the development of the Vrede Solar PV Facility is, therefore, considered to be desirable and will ultimately contribute to, and further develop the successful power generation activities already being undertaken within the area.

Therefore, the development of the Vrede Solar PV Facility within the project site and development area is considered to be desirable considering the characteristics of the area.

5.6 Benefits of Renewable Energy and the Need and Desirability

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

Socio-economic upliftment of local communities: The Vrede Solar PV Facility has the potential to create much needed employment for unskilled locals during the construction phase. Training opportunities will also be afforded to qualified local people who can be upskilled to undertake certain roles during the construction and operation phases. In terms of the needs of the local community, the Local and District municipality IDPs identified the need to facilitate economic development by creating an environment that is conducive for business development, economic growth, sustainable employment opportunities and growth in personal income levels of communities; unlock opportunities to increase participation amongst all sectors of society in the mainstream economy to create decent job opportunities; promote Local Economic Development; and enhance rural development and agriculture. A study undertaken by the Department of Mineral Resource and Energy (DMRE), National Treasury and the Development Bank of Southern Africa (DBSA) in June 2017 found that employment opportunities created during the construction phase of the projects implemented to date had created 40% more jobs for South African citizens than anticipated. The study also found that significantly more people from local communities were employed during construction than was initially planned, confirming the potential benefits for local communities associated with the implementation of renewable energy projects.

The Vrede Solar PV Facility also has the potential to make a positive contribution towards the identified community needs. In terms of the economic development requirements of the REIPPPP, the project will commit benefits to the local community in the form of job creation, localisation, and community ownership. In accordance with the DMRE's bidding requirements of the REIPPPP, a percentage of the revenue generated per annum during operation will be made available to local communities through a social beneficiation scheme. Therefore, the potential for creation of employment and business opportunities, and the opportunity for skills development for local communities is significant. Secondary social benefits can be expected in terms of additional spend in nearby towns due to the increased demand for goods and services. These socio-economic benefits would include an increase in the standard of living for local residents within the area as well as overall financial and economic upliftment.

Increased energy security: Given that renewables can often be deployed in a short timeframe and in a decentralised manner close to consumers, they offer the opportunity for improving grid strength and supply quality in the short-term, while reducing expensive distribution losses. As a result of the power constraints in the first half of 2015, power generators meant to be the “barely-ever-used” safety net for the system (diesel-fired gas turbines) were running at >30% average load factor in the first half of 2015. Load shedding occurred during 82 days in the first half of 2015 (out of 181 days) and is an ongoing phenomenon. Results of a CSIR Energy Centre study for the period January to June 2015 (CSIR, August 2015), concluded that the already implemented renewable projects (wind and solar) within the country avoided 203 hours of so-called ‘unserved energy’. During these hours the supply situation was such that some customers’ energy supply would have had to be curtailed (‘unserved’) had it not been for the renewables. The avoidance of unserved energy cumulated into the effect that for 15 days, from January to June 2015, load shedding was avoided entirely, delayed, or a higher stage of load shedding prevented due to the contribution of renewable wind and PV projects²⁰. More recently, power generated from renewable energy sources have assisted Eskom in alleviating the need for rolling black-outs when aging power stations have been offline for maintenance.

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

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

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

Economics: As a result of the available renewable energy resources and the competitive renewable energy procurement process, both wind power and solar PV power have now been proven as cheaper forms of energy generation in South Africa than fossil fuel (coal) generated power. The IRP 2019 gazetted by the Minister of Mineral Resources and Energy in October 2019, updates the energy forecast for South Africa from the current period until the year 2030 and has made an allocation of 6000MW in addition to the already installed/committed capacity of 2 288MW from solar PV facilities which will be developed from 2022 – 2030.

²⁰ (http://ntww1.csir.co.za/plsql/ptl0002/PTL0002_PGE157_MEDIA_REL?MEDIA_RELEASE_NO=7526896)

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

Climate friendly development: The uptake of renewable energy offers the opportunity to address energy needs in an environmentally responsible manner and thereby allows South Africa to contribute towards mitigating climate change through the reduction of GHG emissions. South Africa is estimated to currently be responsible for approximately 1% of global GHG emissions (and circa half of those for which Africa is responsible) and is currently ranked 9th worldwide in terms of per capita carbon dioxide emissions. Since its inception, the REIPPPP has achieved carbon emission reductions²¹ of 25.3 million tonnes of CO₂ (IPP Office, March 2018). The development of the Vrede Solar PV Facility, and the associated electricity generated as a result of the facility, will result in considerable savings on tons of CO₂ emissions.

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

Employment creation: The development, procurement, installation, maintenance and management of renewable energy facilities have significant potential for job creation and skills development in South Africa. In the short 8-year period, the REIPPPP has attracted R209.4 billion in committed private sector investment, resulting in 38 701 jobs for the youth and women from surrounding communities²².

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

Support to a new industry sector: The development of renewable energy offers the opportunity to establish a new industry within the South African economy, which will create jobs and skill local communities which have potential for further renewable energy projects.

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

²¹ Carbon emission reduction is calculated based on a displacement of power, from largely coal-based to more environmentally friendly electrical energy generation, using a gross Eskom equivalent emissions factor of 1.015 tons CO₂/MWh.

²² <https://www.sanews.gov.za/south-africa/renewable-energy-programme-attracts-r2094-billion-sa-economy>

CHAPTER 6 APPROACH TO UNDERTAKING THE SCOPING PHASE

In terms of the EIA Regulations of December 2014 (as amended) published in terms of the NEMA (Act No. 107 of 1998) as amended, the construction and operation of the Vrede Solar PV Facility is a listed activity requiring Environmental Authorisation (EA). The application for EA is required to be supported by an Environmental Impact Assessment (EIA) process based on the contracted capacity of the facility being 200MW and Activity 1 of Listing Notice 2 (GNR 984, as amended²³).

An EIA process refers to the process undertaken in accordance with the requirements of the relevant EIA Regulations (the 2014 EIA Regulations (GNR 982, as amended)), which involves the identification and assessment of direct, indirect, and cumulative environmental impacts associated with a proposed project or activity. The EIA process comprises two main phases: i.e. **Scoping** and **EIA Phase**. The EIA process is illustrated in **Figure 6.1**.

South Africa is subject to the enforcement of Government Gazette 43096 which places the country in a national state of disaster limiting the movement of people to curb the spread of the COVID-19 virus. Considering the limitations in place, a comprehensive consultation process was designed and implemented to cater for the undertaking of a full-scale, innovative public participation process which included I&APs, the competent authority, directly impacted landowners/occupiers, adjacent landowners/occupiers, relevant Organs of State departments, ward councillors and other key stakeholders, while remaining within the limits as stipulated by the National Government. This chapter outlines the process that was followed during the Scoping Phase of the EIA process.



Figure 6.1: The Phases of an Environmental Impact Assessment (EIA) Process.

²³ GNR 983, 984 and 985 (2014), as amended 2017 (GNR 324, 325, 327).

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

This chapter includes the following information required in terms of Appendix 2: Content of a Scoping report:

Requirement	Relevant Section
(d)(i) a description of the scope of the proposed activity, including all listed and specified activities triggered and being applied for and (ii) a description of the activities to be undertaken, including associated structures and infrastructure.	All listed activities triggered and applied for are included in Section 6.2 .
(g)(ii) details of the public participation process undertaken in terms of Regulation 41 of the Regulations, including copies of the supporting documents and inputs.	The public participation process followed throughout the EIA process of the Vrede Solar PV Facility is included in Section 6.5.2 and copies of the supporting documents and inputs are included in Appendix C .
(g)(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them.	The main issues raised through the undertaking of the public participation process including consultation with I&APs are included in the Comments and Responses Report in Appendix C8 .
(g)(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;	The methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives are included in Section 6.5.3 .

6.2 Relevant legislative permitting requirements

The legislative permitting requirements applicable to the Vrede Solar PV Facility, as identified at this stage in the process and considered within this EIA process, are described in more detail under the respective sub-headings. Additional permitting requirements are detailed within **Section 6.2.1** and **Section 6.2.2**.

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

NEMA (No. 107 of 1998) is South Africa's key piece of national environmental legislation that provides for the authorisation of certain controlled activities known as "listed activities". In terms of Section 24(1) of NEMA, the potential impact on the environment associated with listed activities must be considered, investigated, assessed and reported on to the Competent Authority (the decision-maker) charged by NEMA with granting of the relevant Environmental Authorisation (EA). Due to the fact that the Vrede Solar PV Facility is a power generation project and therefore relates to the IRP for Electricity 2010 – 2030, the National Department of Environment, Forestry and Fisheries (DEFF) has been determined as the Competent Authority (CA) in terms of GNR 779 of 01 July 2016. The Free State provincial Department of Economic Development, Tourism and Environmental Affairs (DEDTEA) is a Commenting Authority on the project.

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

The EIA process being conducted for the Vrede Solar PV Facility is undertaken in accordance with

Section 24(5) of the NEMA, which defines the procedure to be followed in applying for EA, and requires that the potential consequences for, or impacts of, listed or specified activities on the environment be considered, investigated, assessed, and reported on to the competent authority. Listed Activities are activities identified in terms of Section 24 of the NEMA which are likely to have a detrimental effect on the environment, and which may not commence without an EA from the competent authority subject to the completion of an environmental assessment process (either a Basic Assessment (BA) or full Scoping and EIA).

Table 6.1 contains all the listed activities identified in terms of NEMA, the 2014 EIA Regulations (GNR 982, as amended), and Listing Notice 1 (GNR 983, as amended), Listing Notice 2 (GNR 984, as amended), and Listing Notice 3 (GNR 985, as amended) which may be triggered by the proposed development the Vrede Solar PV Facility, and for which EA has been applied:

Table 6.1: Listed activities identified in terms of the Listing Notices.

Notice Number	Activity Number	Description of listed activity
Listing Notice 1 (GNR 983) 08 December 2014 (as amended)	11 (i)	The development of facilities or infrastructure for the transmission and distribution of electricity – (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275kV or more. <i>Internal distribution electrical infrastructure required to connect the Vrede Solar PV Facility components, as well as the onsite substation and cabling (132kV buried or overhead) will collectively exceed 2km in length and will be between 33-132kV, and be located outside an urban area.</i>
Listing Notice 1 (GNR 983) 08 December 2014 (as amended)	12(ii)(a)(c)	The development of— (ii) or infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse; (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; <i>Internal access roads and electrical cabling required to connect the various PV facility infrastructure and components will collectively comprise more than 100m² and be located within 32m of delineated watercourses on site</i>

Notice Number	Activity Number	Description of listed activity
Listing Notice 1 (GNR 983) 08 December 2014 (as amended)	14	<p>The development and related operation of facilities and 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.</p> <p><i>Dangerous goods such as fuel will be required to be stored and handled on site. In addition, the Battery Energy Storage System required included dangerous goods in the form of chemicals and electrolytes, to be housed within the BESS. The combined capacity of storage containers (fuel and those related to the BESS) will be more than 80 cubic metres but will not exceed 500 cubic metres during the construction and operation phases.</i></p>
Listing Notice 1 (GNR 983) 08 December 2014 (as amended)	19	<p>The infilling or depositing of any material of more than 10 m³ 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.</p> <p><i>Internal access roads and electrical cabling required to connect the various PV facility infrastructure and components will collectively require the excavation, infilling or removal of soil within 32m of delineated watercourses on site</i></p>
Listing Notice 1 (GNR 983) 08 December 2014 (as amended)	24(ii)	<p>The development of a road— (ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;</p> <p><i>Access roads (of up to 12m wide) and internal roads (up to 5m wide and up to 11km long) will be developed for the Vrede Solar PV Facility during construction, and will be located outside of urban areas.</i></p>
Listing Notice 1 (GNR 983) 08 December 2014 (as amended)	28 (ii)	<p>Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1ha.</p> <p><i>The total area of land to be developed for the solar PV facility is larger than 1 hectare, on a site which was historically (after 1 April 1998) used for agricultural purposes.</i></p>
Listing Notice 1 (GNR 983) 08 December 2014 (as amended)	56(i) (ii)	<p>The widening of a road by more than 6 m, or the lengthening of a road by more than 1 km – (i) where the existing reserve is wider than 13.5 m; or (ii) where no reserve exists, where the existing road is wider than 8m.</p> <p><i>Access roads needed for the facility will require lengthening of existing roads by more than 1km, where such roads are wider than 8m.</i></p>

Notice Number	Activity Number	Description of listed activity
Listing Notice 2 (GNR 984) 08 December 2014 (as amended)	1	The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20MW or more. The project comprises a renewable energy generation facility, which will utilise photovoltaic (PV) technology and will have a generation capacity of up to 100MW. The development is located outside of an urban area.
Listing Notice 2 (GNR 984) 08 December 2014 (as amended)	15	The clearance of an area of 20ha or more of indigenous vegetation ²⁴ . The facility is located on fallow land historically used for livestock grazing and other agricultural activities and is therefore likely to comprise indigenous vegetation. In addition, the project is anticipated to require clearing of ~195ha and would therefore result in the clearance of an area of land greater than 20ha of indigenous vegetation.
Listing Notice 3 (GNR 985) 08 December 2014 (as amended)	2(b)(ii)(dd)	The development of reservoirs, excluding dams, with a capacity of more than 250 cubic metres. b. Free-State ii. Outside urban areas: (dd) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; The development of the Vrede Solar PV Facility includes storage tanks for water abstracted from the two boreholes within the development area, to be used during construction and operation. The capacity of this storage facility may be greater than 250 cubic metres, and will be located within CBA1, ESA 1 and ESA 2 classified land.
Listing Notice 3 (GNR 985) 08 December 2014 (as amended)	4(b)(i)(ee)	The development of a road wider than 4 m with a reserve less than 13.5m. b. Free State i. Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;

²⁴ "Indigenous vegetation" as defined by the 2014 EIA Regulations (GNR 982, as amended) refers to vegetation consisting of indigenous plant species occurring naturally in an area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years.

Notice Number	Activity Number	Description of listed activity
		<p>Access roads (up to 12m wide and internal roads (up to 5m wide and up to 11km long)) will be developed for the Vrede Solar PV Facility during construction. The development area is also located within CBA and ESA areas.</p>
<p>Listing Notice 3 (GNR 985) 08 December 2014 (as amended)</p>	<p>10(b)(i)(ee)</p>	<p>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 metres.</p> <p>b. Free State i. Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;</p> <p>Dangerous goods such as fuel will be required to be stored and handled on site. In addition, the Battery Energy Storage System required included dangerous goods in the form of chemicals and electrolytes, to be housed within the BESS. The combined capacity of storage containers (fuel and those related to the BESS) will exceed 30m³.</p>
<p>Listing Notice 3 (GNR 985) 08 December 2014 (as amended)</p>	<p>12(b)(ii)</p>	<p>The clearance of an area of 300 m² or more of indigenous vegetation within:</p> <p>b. Free State ii. Within critical biodiversity areas identified in bioregional plans;</p> <p>The Vrede Solar PV Facility development will require clearance in excess of 300m² of indigenous vegetation within Critical Biodiversity Areas (CBA).</p>
<p>Listing Notice 3 (GNR 985) 08 December 2014 (as amended)</p>	<p>14(ii)(a)(c)</p>	<p>The development of — (ii) infrastructure or structures with a physical footprint of 10 m² or more; where such development occurs — (a) within a watercourse; (c) if no development setback has been adopted, within 32 m of a watercourse, measured from the edge of a watercourse;</p> <p>Internal access roads and electrical cabling required to connect the various PV facility infrastructure and components will collectively comprise more than 10m² and be located within 32m of delineated watercourses on site</p>
<p>Listing Notice 3 (GNR 985) 08 December 2014 (as amended)</p>	<p>18(b)(ee)</p>	<p>The widening of a road by more than 4 m, or the lengthening of a road by more than 1 km.</p> <p>b. Free State i. Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans</p> <p>Access roads needed for the facility will require widening roads up to 8m which will be constructed within CBA 1 areas.</p>

6.2.2 National Water Act (No. 36 of 1998) (NWA)

In accordance with the provisions of the National Water Act (No. 36 of 1998) (NWA), all water uses must be licensed with the Competent Authority (i.e. the Regional Department of Water and Sanitation (DWS) or the relevant Catchment Management Agency (CMA)). Water use is defined broadly, and includes taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities (activities which impact detrimentally on a water resource), altering a watercourse, removing water found underground for certain purposes, and recreation.

Table 6.2 lists the Water Uses associated with the proposed project and identified in terms of the NWA which require licensing either in the form of a General Authorisation (GA), or in the form of a Water Use License (WUL). The table also includes a description of those project activities which relate to the applicable Water Uses.

Table 6.2: List of Water Uses published under Section 21 of NWA, as amended.

Notice No.	Activity No.	Description of Water Use
NWA (No. 36 of 1998)	Section 21 (1)	Taking water from a water resource Two boreholes are currently in use within the project site, and water for construction and O&M may be utilised from these sources. Water obtained from these sources must however be appropriately licenced/registered as per the requirements of the National Water Act.
NWA (No. 36 of 1998)	Section 21 (c)	Impeding or diverting the flow of water in a watercourse Infrastructure associated with the Vrede Solar PV Facility will be located within the GN 509 regulated area of a watercourse (100m zone surrounding the identified ephemeral drainage line or 500m from a natural wetland).
NWA (No. 36 of 1998)	Section 21 (i)	Altering the bed, banks, course or characteristics of a watercourse. Infrastructure associated with the Vrede Solar PV Facility will be located within the GN 509 regulated area of a watercourse (100m zone surrounding the identified ephemeral drainage line or 500m from a natural wetland).

Due to the development area of the Vrede Solar PV Facility being located within the regulated area of a drainage line located along the south-eastern boundary, and the intention to use water from two existing boreholes within the project site, an application for a water use authorisation in accordance with the requirements of the Regulations Regarding the Procedural Requirements for Water Use License Applications and Appeals (GN R267), or a GA registered in accordance with the GN R509 of 2016. The water use authorisation process for the Vrede Solar PV Facility will only be completed once a positive EA has been received and the project

selected as Preferred Bidder. This is in line with the requirements of the Department of Human Settlements, Water and Sanitation.

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

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

Section 38: Heritage Resources Management

- 1). *Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as –*
- a. *the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;*
 - b. *the construction of a bridge or similar structure exceeding 50m in length;*
 - c. *any development or other activity which will change the character of a site –*
 - i). *exceeding 5 000m² in extent; or*
 - ii). *involving three or more existing erven or subdivisions thereof; or*
 - iii). *involving three or more erven or divisions thereof which have been consolidated within the past five years; or*
 - iv). *the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;*

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

In terms of Section 38(8), approval from the heritage authority is not required if an evaluation of the impact of such development on heritage resources is required in terms of any other legislation (such as NEMA), provided that the consenting authority ensures that the evaluation of impacts fulfils the requirements of the relevant heritage resources authority in terms of Section 38(3) and any comments and recommendations of the relevant resources authority with regard to such development have been taken into account prior to the granting of the consent. However, should heritage resources of significance be affected by the proposed development, a permit is required to be obtained prior to disturbing or destroying such resources as per the requirements of Section 48 of the NHRA, and the South African Heritage Resources Agency (SAHRA) Permit Regulations (GNR 668).

6.3 Overview of the Scoping and EIA (S&EIA) Process being undertaken for Vrede Solar PV Facility

In terms of NEMA, the 2014 EIA Regulations (GNR 982, as amended), and Listing Notices (Listing Notice 1 (GNR 983, as amended) and Listing Notice 2 (GNR 983, as amended)) the development of the Vrede Solar PV Facility requires EA from DEFF subject to the completion of a full Scoping and Environmental Impact Assessment (S&EIA), as prescribed in Regulations 21 to 24 of the 2014 EIA Regulations (GNR 982, as amended). The need for a full S&EIA process to be conducted in support of the application for EA is based on listed activities triggered which are contained within Listing Notice 2 (GNR 983, as amended).

The S&EIA process is to be undertaken in two phases as follows:

- » The **Scoping Phase** includes the identification and description of potential issues associated with the project through a desktop study and consultation with I&APs and key stakeholders through a public participation process²⁵. The entire development area is considered within this process. Through this study, areas of sensitivity within the broader site are identified and delineated in order to identify any environmental fatal flaws, and environmentally sensitive, or no-go areas which need to be considered. In accordance with Regulation 21(1) of the 2014 EIA Regulations (GNR 982, as amended) this Scoping Report prepared for the project will be subject to a 30-day review and comment period during which any Interested and Affected Party (I&AP) or Authority are invited to review and provide comments on the findings (refer to **Figure 6.2**). Following this review period, a Final Scoping Report which incorporates all comments received during the 30-day comment period will be prepared and submitted to DEFF for its consideration. Following its receipt of the Final Scoping Report DEFF has 43 days within which to either accept the Scoping Report, and advise the applicant to proceed or continue with the tasks contemplated in the Plan of Study for EIA, or refuse the Application for EA in the event that the proposed activity is in conflict with a prohibition contained in legislation, or the Scoping Report does not substantially comply with Appendix 2 of the 2014 EIA Regulations (GNR 982, as amended).
- » The **EIA Phase** involves a detailed assessment of potentially significant positive and negative direct, indirect, and cumulative impacts identified during the Scoping Phase. This phase includes detailed specialist investigations and a public participation process, and results in the compilation of an EIA Report and Environmental Management Programme (EMPr). In accordance with Regulation 23(1)(a) of the 2014 EIA Regulations (GNR 982, as amended) the EIA Report and EMPr prepared for the project will also be subject to a 30-day public review and comment period during which members of the public, I&APs, and authorities will be invited to review and provide comment on the EIA Report and EMPr. Following the conclusion of this review period a Final EIA Report and EMPr which incorporates all comments received during the 30-day review and comments period, will be prepared and submitted to DEFF for its consideration. Following its receipt of the Final EIA Report and EMPr, DEFF has 107 days within which to either grant or refuse the EA.

²⁵ A Public Participation Plan was submitted to the DEFF, and approved on 6 October 2020.

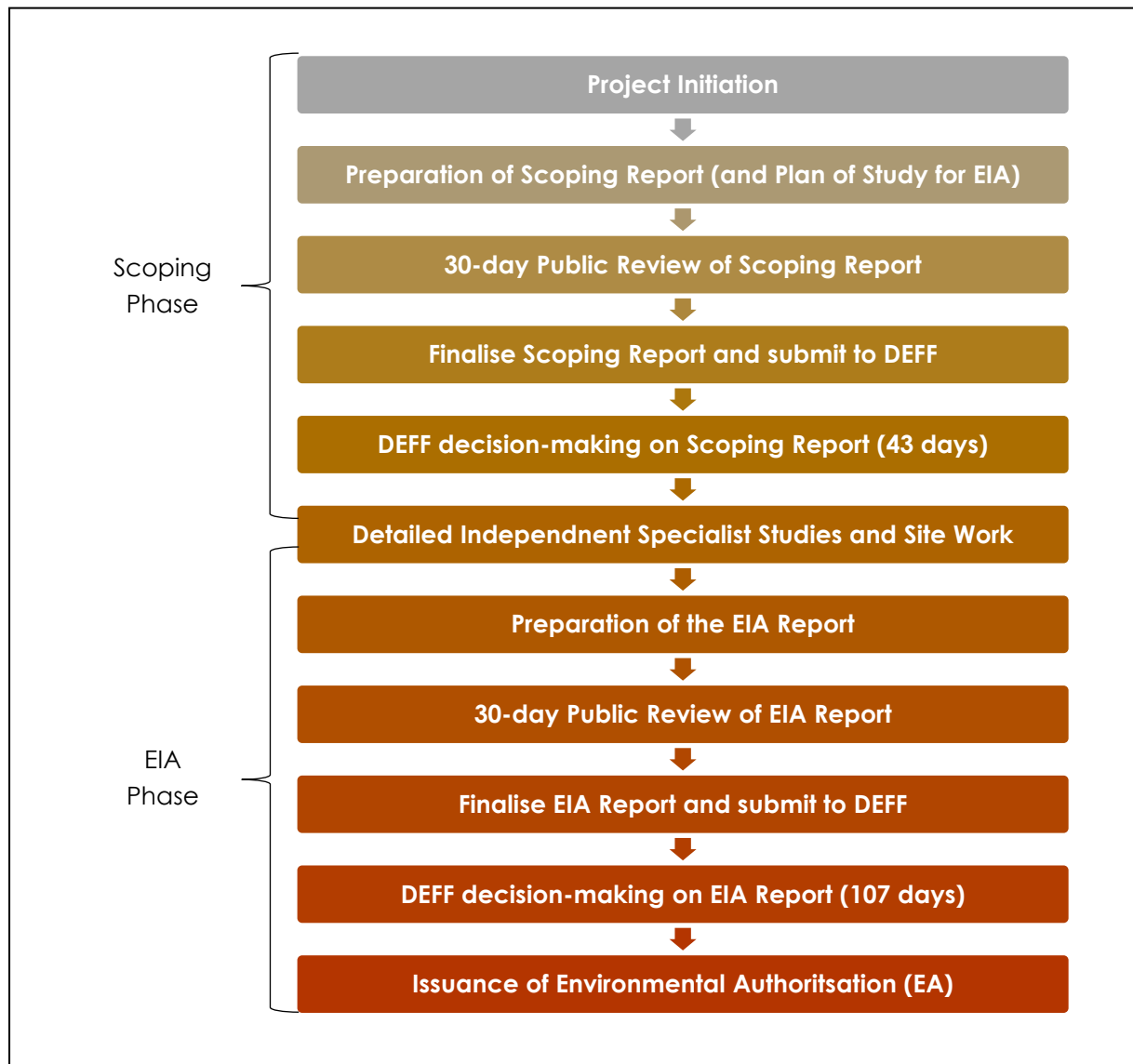


Figure 6.2: Regulated timeframe of an Environmental Impact Assessment (EIA) Process

6.4 Objectives of the Scoping Phase

This Scoping Report documents the evaluation of potential environmental impacts of the Vrede Solar PV Facility and forms part of the EIA process being conducted in support of an Application for EA for the project. The Scoping Phase has been conducted in accordance with the requirements of the 2014 EIA Regulations (GNR 982, as amended), and therefore aims to:

- » Identify and evaluate potential environmental (biophysical and social) impacts and benefits of all phases of the proposed development (including design, construction, operation and decommissioning) within the broader project site and development area through a review of existing baseline data, including specialist studies which were undertaken within the development area.
- » Identify potentially sensitive environmental features and areas within the broader development area in order to inform the preliminary design process of the facility.
- » Define the scope of studies to be undertaken during the EIA process.

- » Provide the authorities with sufficient information in order to make a decision regarding the scope of issues to be addressed in the EIA Phase, as well as regarding the scope and extent of specialist studies that will be required to be undertaken.

The following objectives of the Scoping Phase (in accordance with Appendix 2 of the 2014 EIA Regulations (GNR 982, as amended)) have been met, through the undertaking of a consultative process.

- » The identification of relevant policies and legislation regarding the activities to be undertaken have been identified and considered within this Scoping Report.
- » Activities to be undertaken for the development of the Vrede Solar PV Facility have been identified and motivated in terms of the need and desirability for the activities to take place.
- » Potential impacts associated with the undertaking of the identified activities and technology have been identified and described.
- » Identification of areas of high sensitivity to be avoided within the preferred development area.
- » Preferred areas for the development within the development area, which are areas associated with low to medium environmental sensitivity, have been identified through a desktop level impact assessment process and on-going consultative process.
- » Key issues associated with the project to be addressed during the EIA Phase for further detailed study and ground-truthing have been identified and listed within this Scoping Report.
- » The level of assessment, expertise and the extent of further consultation to be undertaken in the EIA Phase of the process, with the aim of determining the extent of impacts associated with the activities through the life cycle of the project (i.e. construction, operation and decommissioning), have been identified and included within this Scoping Report.

6.5 Overview of the Scoping Phase

Key tasks undertaken within the Scoping Phase include:

- » Consultation with relevant decision-making and regulating authorities (at National, Provincial and Local levels).
- » Submission of the completed Application for EA to the competent authority (DEFF) in terms of Regulations 5 and 16 of the 2014 EIA Regulations (GNR 982, as amended).
- » Undertaking a public participation process (in line with the approved public participation plan submitted to DEFF) in accordance with Chapter 6 of GNR 982, as amended, and the Department of Environmental Affairs (2017), Public Participation guidelines in terms of NEMA EIA Regulations, Department of Environmental Affairs, Pretoria, South Africa (hereinafter referred to as "the Guidelines") in order to identify issues and concerns associated with the proposed project.
- » Preparation of a Scoping Report and Plan of Study for EIA in accordance with the requirements of Appendix 2 of the 2014 EIA Regulations (GNR 982, as amended).
- » Preparation of a Comments and Response (C&R) Report detailing all comments raised by I&APs and responses provided as part of the Scoping Phase.
- » Submission of a Final Scoping Report, including a Plan of Study for the EIA, to DEFF for review and approval.

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

In terms of GNR 779 of 1 July 2016, the National DEFF has been determined as the competent authority for all projects which relate to the IRP and any updates thereto. As the project is proposed within the Free State Province the Free State Department of Economic Development, Tourism and Environmental Affairs (DEDTEA) is the provincial commenting authority for the project. Consultation with these authorities is being undertaken throughout the Scoping Phase. To date, this consultation has included the following:

- » Requesting of a Pre-Application Meeting with DEA on 07 August 2020 to discuss the process to be followed for the project, the proposed Public Participation Plan and project details. The DEFF determined no pre-application meeting necessary and requested that the Public Participation Plan be submitted to the Department via email for approval. Following submission of the plan, the DEFF provided approval of the submitted Plan via email on 06 October 2020.
- » Submission of the Application for Environmental Authorisation to the DEFF via the use of the DEFF Novell Filr System.
- » Submission of the Scoping Report for review and comment by:
 - * The competent and commenting authorities.
 - * State departments that administer laws relating to a matter affecting the environment relevant to an Application for EA.
 - * Organs of State which have jurisdiction in respect of the activity to which the application relates.

The submissions, as listed above, were undertaken electronically, as required by the DEFF (in line with the directions for new Applications for Environmental Authorisations provided for in GNR650 of 05 June 2020). A record of all authority correspondence undertaken during the Scoping Phase is included in **Appendix B** and **Appendix C**.

6.5.2 Public Participation Process

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

The Public Participation Process undertaken for the Vrede Solar PV Facility considers the restrictions and limitations imposed by Government through section 27 (2) of the Disaster Management Act (Act No. 57 of 2002) of 2002 and the Directions issued by the Minister of Forestry and Fisheries (DEFF) in terms of consultations with I&APs. A Public Participation Plan was prepared and submitted to DEFF for approval. Approval of the Plan was provided by the DEFF Case Officer via email on 06 October 2020 (**Appendix B**).

The alternative means of undertaking consultation have been designed and implemented by Savannah Environmental to ensure that I&APs are afforded sufficient opportunity to access project information and raise comments on the project through an interactive web-based

platform (i.e. online stakeholder engagement platform) readily available and accessible to any person registering their interest in the project, and ensures that the public participation process is undertaken in line with Regulations 41 to 44 of the EIA Regulations, 2014 as amended. The Public Participation Plan (**Appendix C9**) considers the limitations applied by the Disaster Management Act Regulations prohibiting the gathering of people, as well as limitations which certain I&APs may have in terms of access to computers and internet as well as access to public spaces currently not open for operation that inhibits access to hard copy documentation. The online stakeholder engagement platform implemented by Savannah Environmental for the project allowed the EAP to visually present details regarding the project as well as consultation documentation, including project maps and plans, presentations and posters. The platform also contains the Scoping Report available for review. The use of an online tool enables stakeholders and I&APs to explore the project-specific content in their own time, and still enables them to participate in a meaningful way in the consultation process. The online platform allows for instant feedback and comments to be submitted, in so doing saving time for the stakeholder and also giving the assurance that their comments have been submitted for inclusion in the project reporting.

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

» During the **Scoping Phase**:

- * providing an opportunity to submit comments regarding the project;
- * assisting in identifying reasonable and feasible alternatives, where required;
- * assisting in identifying issues of concern and suggestions for enhanced mitigation or management of the activity;
- * contribute relevant local information and knowledge to the environmental assessment;
- * allowing registered I&APs to verify that their comments have been recorded, considered and addressed, where applicable, in the environmental investigations;
- * fostering trust and co-operation;
- * generating a sense of joint responsibility and ownership of the environment;
- * allowing comment on the findings of the Scoping Phase results; and
- * Identify issues of concern and suggestions for enhanced benefits.

» During the **EIA Phase**:

- * contributing relevant local information and knowledge to the environmental assessment;
- * allowing for verification that issues have been considered in the environmental investigations as far as possible as identified within the Scoping Phase;
- * comment on the findings of the environmental assessments; and
- * Conducting an electronic/virtual Focus Group Meeting to be conducted for the project.

» During the **decision-making phase**:

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

The Public Participation process therefore aims to ensure that:

- » Information containing all relevant facts in respect of the application is made available to potential stakeholders and I&APs for their review;
- » The information presented during the public participation process is presented in such a manner, i.e. local language and technical issues, that it avoids the possible alienation of the public and prevents them from participating;
- » Public participation is facilitated in such a manner that I&APs are provided with a reasonable opportunity to comment on the project;
- » A variety of mechanisms are provided to I&APs to correspond and submit their comments i.e. fax, post, email, telephone, text message (SMS and WhatsApp); and
- » An adequate review period is provided for I&APs to comment on the findings of the Scoping and EIA Reports.

In terms of the requirement of Chapter 6 of the EIA Regulations of December 2014, as amended, the following key public participation tasks are required to be undertaken:

- » Fix a notice board at a place conspicuous to the public at the boundary or on the fence of—
 - (i) the site where the activity to which the application relates is or is to be undertaken; and
 - (ii) any alternative site mentioned in the application.
- » Give written notice to:
 - (i) the owner or person in control of that land if the applicant is not the owner or person in control of the land;
 - (ii) the occupiers of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
 - (iii) owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
 - (iv) the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;
 - (v) the municipality which has jurisdiction in the area;
 - (vi) any organ of state having jurisdiction in respect of any aspect of the activity; and
 - (vii) any other party as required by the competent authority.
- » Place an advertisement in one local newspaper.
- » Open and maintain a register of I&APs and Organs of State.
- » Release of a Scoping Report for a 30-day review and comment period.
- » Prepare a Comments and Responses (C&R) report which documents the comments received on the EIA process and during the 30-day review and comment period of the Scoping Report and the responses provided by the project team.

In compliance with the requirements of Chapter 6: Public Participation of the EIA Regulations, 2014 (as amended), and the approved Public Participation Plan, the following summarises the key public participation activities implemented. The schematic below provides an overview of the tools that are available to I&APs and stakeholders to access project information and interact with the public participation team to obtain project information and resolve any queries that may arise, and to meet the requirements for public participation.



i. Stakeholder identification and Register of Interested and Affected Parties

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

I&APs have been identified through a process of networking and referral, obtaining information from Savannah Environmental's existing stakeholder database, liaison with potentially affected parties in the greater surrounding area and a registration process involving the completion of a reply form. Key stakeholders and affected and surrounding landowners have been identified and registered on the project database. Other stakeholders are required to formally register their interest in the project through either directly contacting the Savannah Environmental Public Participation team via phone, text message (SMS and WhatsApp), email or fax, or registering their interest via the online stakeholder engagement platform. An initial list of key stakeholders identified and registered is listed in **Table 6.3**.

Table 6.3: Initial list of Stakeholders identified for the inclusion in the project database during the public participation process for the Vrede Solar PV Facility

Organs of State
National Government Departments
Department of Environment, Forestry and Fisheries (DEFF)
Department of Mineral Resources and Energy (DMRE)
Department of Agriculture Forestry and Fisheries (DAFF)
Department of Human Settlements, Water and Sanitation
Government Bodies and State-Owned Companies
Eskom Holdings SOC Limited
National Energy Regulator of South Africa (NERSA)
South African Civil Aviation Authority (CAA)
South African Heritage Resources Agency (SAHRA)
South African National Roads Agency Limited (SANRAL)
South African Radio Astronomy Observatory (SARAO)
Telkom SA SOC Limited
Transnet SA SOC Limited
Provincial Government Departments
Free State Department: Agriculture and Rural Development
Free State Department of Economic Development, Tourism and Environmental Affairs
Free State Department Of Public Works & Infrastructure
Free State Heritage Resources Authority (FSHRA)
Local Government Departments
Fezile Dabi District Municipality
Moqhaka Local Municipality
Commenting Stakeholders
BirdLife South Africa
Endangered Wildlife Trust (EWT)
Landowners
Affected landowners, tenants and occupiers
Neighbouring landowners, tenants and occupiers

As per Regulation 42 of the EIA Regulations, 2014 (as amended), all relevant stakeholder and I&AP information has been recorded within a register of I&APs (refer to **Appendix C1** for a listing of the recorded parties). In addition to the above-mentioned EIA Regulations, point 4.1 of the

Public Participation Guidelines has also been followed. The register of I&APs contains the names²⁶ of:

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

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

ii. **Advertisements and Notifications**

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

²⁶ Contact details and addresses have not been included in the I&AP database as this information is protected by the Protection of Personal Information Act (No 4 of 2013).

- not be complied with if an advertisement has been placed in an official Gazette referred to in paragraph (c)(ii); and
- 40.(2)(e) Using reasonable alternative methods, as agreed to by the competent authority, in those instances where a person is desirous of but unable to participate in the process due to –
- (i) Illiteracy;
 - (ii) Disability; or
 - (iii) Any other disadvantage.

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

- » Compilation of a background information document (BID) (refer to **Appendix C3**) providing technical and environmental details on the project and how to become involved in the EIA process. The BID and the process notification letter announcing the EIA process, notifying Organs of State, potentially affected and neighbouring landowners, as well as registered stakeholders/I&APs of the Vrede Solar PV Facility, and providing background information of the project and inviting I&APs to register on the project's database were distributed via email on **18 November 2020**. The evidence of the distribution is contained in **Appendix C** of the Scoping Report. The BID is also available electronically on the Savannah Environmental website (<http://www.savannahsa.com/public-documents/energy-generation/>).
- » Placement of site notices announcing the EIA process at visible points along the boundary of the development area (i.e. the boundaries of the affected property), in accordance with the requirements of the EIA Regulations on **17 November 2020**. Photographs and the GPS co-ordinates of the site notices will be contained in **Appendix C2** of the Final Scoping Report.
- » Placement of an advertisement in 'die Volksblad' newspaper on **20 November 2020** announcing the 30-day review and comment period (**Appendix C2**). This advert:
 - * announced the project and the associated EIA process,
 - * announced the availability of the Scoping report, the review period, and where it is accessible for review,
 - * invited comment on the Scoping Report, and
 - * provided all relevant details to access the Savannah Environmental online stakeholder engagement platform.
- » A copy of the newspaper advert as sent to the newspaper and the newspaper advert tear sheet is included in **Appendix C2** of the Scoping Report.
- » The Scoping Report has been made available for review by I&APs for a 30-day review and comment period from **20 November 2020** to **11 January 2020**. The full Scoping Report is available on the Savannah Environmental website. The evidence of distribution of the Scoping Report will be included in the Final Scoping Report, which will be submitted to the DEFF.

iii. **Public Involvement and Consultation**

In order to accommodate the varying needs of stakeholders and I&APs within the surrounding area, as well as capture their views, comments, issues and concerns regarding the project, various opportunities have been and will continue to be provided to I&APs to note their comments and issues. I&APs are being consulted through the following means (**Table 6.4**):

Table 6.4: Public involvement for Vrede Solar PV Facility (completed and planned)

Activity	Date
Distribution of the BID, process notification letters and stakeholder reply form announcing the EIA process and inviting I&APs to register on the project database. The BID and electronic reply form was also made available on the online stakeholder engagement platform.	18 November 2020
Placement of site notices	17 November 2020
Advertising of the availability of the Scoping Report for a 30-day review and comment period in the 'die Volksblad' newspaper, including details on how to access the Scoping Report via the online stakeholder engagement platform.	20 November 2020
Distribution of notification letters announcing the availability of the Scoping Report for a 30-day review and comment period. These letters were distributed to Organs of State, Government Departments, Ward Councillors, landowners within the surrounding area (including neighbouring landowners) and key stakeholder groups.	18 November 2020
30-day review and comment period of the Scoping Report.	20 November 2020 to 11 January 2021
Virtual meetings through the use of virtual platforms as determined through discussions with the relevant stakeholder group: <ul style="list-style-type: none"> » Landowners » Authorities and key stakeholders (including Organs of State, local municipality and official representatives of community-based organisations). » Where an I&AP does not have access to a computer and/or internet to participate in a virtual meeting telephonic discussions (including WhatsApp video call) will be set-up and minuted for inclusion. The preferred language of the I&AP has been considered when setting up these discussions. » Direct in-person consultation will only take place in limited numbers and where sanitary conditions can be maintained at all times. 	To be held during the 30-day review and comment period
On-going consultation (i.e. telephone liaison; e-mail communication) with all I&APs.	Throughout the EIA process

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

- 43.(1) A registered I&AP is entitled to comment, in writing, on all reports or plans submitted to such party during the public participation process contemplated in these Regulations and to bring to the attention of the proponent or applicant any issues which that party believes may be of significance to the consideration of the application, provided that the interested and affected party discloses any direct business, financial, personal or other interest which that party may have in the approval or refusal of the application.
- (2) In order to give effect to section 24O of the Act, any State department that administers a law relating to a matter affecting the environment must be requested, subject to regulation 7(2), to comment within 30 days.
- 44.(1) The applicant must ensure that the comments of interested and affected parties are recorded in reports and plans and that such written comments, including responses to such comments

and records of meetings, are attached to the reports and plans that are submitted to the competent authority in terms of these Regulations.

- (2) Where a person desires but is unable to access written comments as contemplated in subregulation (1) due to –
 - (a) A lack of skills to read or write;
 - (b) Disability; or
 - (c) Any other disadvantage;Reasonable alternative methods of recording comments must be provided for.

I&APs registered on the database have been notified by means of a notification letter of the release of the Scoping Report for a 30-day review and comment period, invited to provide comment on the Scoping Report, and informed of the manner in which, and timeframe within which such comment must be made. The report has been made available in soft copies to I&APs due to restrictions and limitations on public spaces and limitations in ensuring sanitary conditions of hard copy documents during the national state of disaster related to COVID-19. No hard copies of the report have been made available for review and comment.

The Scoping Report has also been made available on the Savannah Environmental website (i.e. online stakeholder engagement platform) (<https://www.savannahsa.com/public-documents/energy-generation/>). The notification was distributed prior to commencement of the 30-day review and comment period, on **18 November 2020**. Where I&APs are not able to provide written comments (including SMS and WhatsApp), other means of consultation, such as telephonic discussions are used to provide the I&APs with a platform to verbally raise their concerns and comments on the proposed development. Submission of comments has been enabled through the use of the Savannah Environmental online stakeholder engagement platform.

All comments raised as part of the discussions and written comments submitted during the 30-day review and comment period will be recorded and included in **Appendix C6** and **Appendix C7** of the Scoping Report.

v. Identification and Recording of Comments

Comments raised by I&APs over the duration of the Scoping Phase will be synthesised into a Comments and Responses (C&R) Report which will be included in **Appendix C8** of the Final Scoping Report. These will include comments raised through the use of the Savannah Environmental online stakeholder engagement platform and any other written comments received. The C&R Report will include detailed responses from members of the EIA project team and/or the project proponent to the issues and comments raised during the public participation process.

Meeting notes of all the telephonic discussions and virtual meetings conducted during the 30-day review and comment period of the Scoping Report will be included in **Appendix C7**.

The C&R Report will be updated with all comments received during the 30-day review and comment period and will be included as **Appendix C8** in the Final Scoping Report that will be submitted to the DEFF for approval.

6.5.3 Evaluation of Issues Identified through the Scoping Process

Direct, indirect, and cumulative environmental impacts associated with the project identified during the Scoping Phase have been evaluated through consideration of existing information available for the Vrede Solar PV Facility development area.

In order to evaluate issues and assign an order of priority, the following methodology was used to identify the characteristics of each potential issue/impact:

- » The **nature**, which includes a description of what causes the impact, what will be affected and how it will be affected.
- » The **extent**, wherein it is indicated whether the impact will be local (limited to the immediate area or site of development), regional or national.
- » Identify **sensitive receptors** that may be impacted on by the proposed development and the types of impacts that are most likely to occur.
- » The **significance** of potential impacts in terms of the requirements of the 2014 EIA Regulations (including (nature, significance, consequence, extent, duration and probability of the impacts, the degree to which these impacts:
 - (a) Can be reversed;
 - (b) May cause irreplaceable loss of resources; and
 - (c) Can be avoided, managed or mitigated.
- » Identify the potential impacts that will be considered further in the EIA Phase through detailed investigations.

The evaluation of the proposed project resulted in a description of the nature, significance, consequence, extent, duration and probability of the identified issues, as well as recommendations regarding further studies required within the EIA Phase.

6.5.4 Finalisation of the Scoping Report

The final stage of the Scoping Phase entails the recording and capturing of comments received from stakeholders and I&APs on the Scoping Report in order to finalise the Scoping Report for submission to DEFF for decision-making. All written comments received will be addressed within the C&R Report (**Appendix C8**).

6.6 Assumptions and Limitations of the EIA Process

The following assumptions and limitations are applicable to the EIA process of the Vrede Solar PV Facility:

- » All information provided by the Applicant and I&APs to the environmental team was correct and valid at the time it was provided.
- » It is assumed that the development area for the solar PV facility identified by the Applicant represents a technically suitable site for the establishment of the Vrede Solar PV Facility which is based on the design undertaken by technical consultants for the project.
- » The development footprint (the area that will be affected during the operation phase) will include the footprint for the PV facility and associated infrastructure (i.e. internal access roads, BESS and project ancillaries).

- » The Scoping Phase evaluation of impacts has been based entirely on desktop studies. Specialists assessments, including detailed field investigations will only be undertaken during the EIA phase for the project.
- » The grid connection solution which the Vrede Solar PV Facility will employ is being subject to a separate Basic Assessment process and is, therefore, not included in this application and assessment. It is assumed that a suitable, authorised grid connection solution will be available for the Vrede Solar PV Facility.

6.7 Legislation and Guidelines that have informed the preparation of this Scoping Report

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

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

Several other Acts, standards or guidelines have also informed the project process and the scope of issues addressed and assessed in this Scoping Report. A review of legislative requirements applicable to the proposed project is provided in **Table 6.5**.

Table 6.5: Relevant legislative permitting requirements applicable to the Vrede Solar PV Facility

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Legislation			
Constitution of the Republic of South Africa (No. 108 of 1996)	<p>In terms of Section 24, the State has an obligation to give effect to the environmental right. The environmental right states that:</p> <p><i>“Everyone has the right –</i></p> <ul style="list-style-type: none"> » <i>To an environment that is not harmful to their health or well-being, and</i> » <i>To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:</i> <ul style="list-style-type: none"> * <i>Prevent pollution and ecological degradation,</i> * <i>Promote conservation, and</i> * <i>Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.”</i> 	Applicable to all authorities	There are no permitting requirements associated with this Act. The application of the Environmental Right however implies that environmental impacts associated with proposed developments are considered separately and cumulatively. It is also important to note that the “right to an environment clause” includes the notion that justifiable economic and social development should be promoted, through the use of natural resources and ecologically sustainable development.
National Environmental Management Act (No 107 of 1998) (NEMA)	<p>The 2014 EIA Regulations have been promulgated in terms of Chapter 5 of NEMA. Listed activities which may not commence without EA are identified within the Listing Notices (GNR 983, GNR 984 and GNR 985) which form part of these Regulations (GNR 982, as amended).</p> <p>In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these listed activities must be assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation.</p> <p>Considering the capacity of the proposed the Vrede Solar PV Facility (i.e. contracted capacity of 200MW) and the triggering of Activity 1 of Listing Notice 2 (GNR 984) a full</p>	<p>DEFF – Competent Authority</p> <p>Free State Department of Economic Development, Tourism and Environmental Affairs – Commenting Authority (DEDTEA)</p>	The listed activities triggered by the proposed project have been identified and are being assessed as part of the EIA process currently underway for the project. The EIA process will culminate in the submission of a Final Scoping Report and a Plan of Study for EIA to DEFF for approval.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	Scoping and EIA process is required in support of the Application for EA.		
National Environmental Management Act (No 107 of 1998) (NEMA)	<p>In terms of the "Duty of Care and Remediation of Environmental Damage" provision in Section 28(1) of NEMA every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.</p> <p>In terms of NEMA, it is the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts.</p>	DEFF & Free State DEDTEA	While no permitting or licensing requirements arise directly by virtue of the proposed project, this section finds application through the consideration of potential cumulative, direct, and indirect impacts. It will continue to apply throughout the life cycle of the project.
Environment Conservation Act (No. 73 of 1989) (ECA)	<p>The Noise Control Regulations in terms of Section 25 of the ECA contain regulations applicable for the control of noise in the Provinces of Limpopo, North West, Mpumalanga, Northern Cape, Eastern Cape, and KwaZulu-Natal Provinces.</p> <p>The Noise Control Regulations cover the powers of a local authority, general prohibitions, prohibitions of disturbing noise, prohibitions of noise nuisance, use of measuring instruments, exemptions, attachments, and penalties.</p> <p>In terms of the Noise Control Regulations, no person shall make, produce or cause a disturbing noise, or allow it to be made, produced or caused by any person, machine, device or apparatus or any combination thereof (Regulation 04).</p>	DEFF & Free State DEDTEA Moqhaka Local Municipality	Noise impacts are expected to be associated with the construction phase of the project. Considering the location of the development area in relation to residential areas and provided that appropriate mitigation measures are implemented, construction noise is unlikely to present a significant intrusion to the local community. There is therefore no requirement for a noise permit in terms of the legislation.
National Water Act (No. 36 of 1998) (NWA)	A water use listed under Section 21 of the NWA must be licensed with the Regional DWS, unless it is listed in Schedule 1 of the NWA (i.e. is an existing lawful use), is permissible under	Regional Department of Water and Sanitation	The proposed development area is located within the regulated area of a drainage line present within the development area to the south-west. In addition, construction water is

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>a GA, or if a responsible authority waives the need for a licence.</p> <p>Water use is defined broadly, and includes consumptive and non-consumptive water uses, taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities (activities which impact detrimentally on a water resource), altering a watercourse, removing water found underground for certain purposes, and recreation.</p> <p>Consumptive water uses may include taking water from a water resource (Section 21(a)) and storing water (Section 21(b)).</p> <p>Non-consumptive water uses may include impeding or diverting of flow in a water course (Section 21(c)), and altering of bed, banks or characteristics of a watercourse (Section 21(i)).</p>		<p>proposed to be obtained from two boreholes present within the project site. As a result, a water use authorisation for the project will be required from DWS for water uses 21(a),21(c)&21(i); however, the process will only be completed once a positive EA has been received and the project selected as Preferred Bidder by the DMRE. This is in line with the requirements from DWS.</p>
<p>Minerals and Petroleum Resources Development Act (No. 28 of 2002) (MPRDA)</p>	<p>In accordance with the provisions of the MPRDA a mining permit is required in accordance with Section 27(6) of the Act where a mineral in question is to be mined, including the mining of materials from a borrow pit.</p> <p>Section 53 of the MPRDA states that any person who intends to use the surface of any land in any way which may be contrary to any object of the Act, or which is likely to impede any such object must apply to the Minister for approval in the prescribed manner.</p>	<p>Department of Mineral Resources and Energy (DMRE)</p>	<p>Any person who wishes to apply for a mining permit in accordance with Section 27(6) must simultaneously apply for an Environmental Authorisation in terms of NEMA. No borrow pits are expected to be required for the construction of the project, and as a result a mining permit or EA in this regard is not required to be obtained.</p> <p>In terms of Section 53 of the MPRDA approval is required from the Minister of Mineral Resources and Energy to ensure that the proposed development does not sterilise a mineral resource that might occur on site.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
<p>National Environmental Management: Air Quality Act (No. 39 of 2004) (NEM:AQA)</p>	<p>The National Dust Control Regulations (GNR 827) published under Section 32 of NEM:AQA prescribe the general measures for the control of dust in all areas, and provide a standard for acceptable dustfall rates for residential and non-residential areas.</p> <p>In accordance with the Regulations (GNR 827) any person who conducts any activity in such a way as to give rise to dust in quantities and concentrations that may exceed the dustfall standard set out in Regulation 03 must, upon receipt of a notice from the air quality officer, implement a dustfall monitoring programme.</p> <p>Any person who has exceeded the dustfall standard set out in Regulation 03 must, within three months after submission of the dustfall monitoring report, develop and submit a dust management plan to the air quality officer for approval.</p>	<p>DEFF & Free State DEDEA or Fezile Dabi District Municipality</p>	<p>In the event that the project results in the generation of excessive levels of dust the possibility could exist that a dustfall monitoring programme would be required for the project, in which case dustfall monitoring results from the dustfall monitoring programme would need to be included in a dust monitoring report, and a dust management plan would need to be developed.</p>
<p>National Heritage Resources Act (No. 25 of 1999) (NHRA)</p>	<p>Section 07 of the NHRA stipulates assessment criteria and categories of heritage resources according to their significance.</p> <p>Section 35 of the NHRA provides for the protection of all archaeological and palaeontological sites, and meteorites.</p> <p>Section 36 of the NHRA provides for the conservation and care of cemeteries and graves by SAHRA where this is not the responsibility of any other authority.</p> <p>Section 38 of the NHRA lists activities which require developers or any person who intends to undertake a listed activity to notify the responsible heritage resources authority and furnish it with details regarding the location, nature, and extent of the proposed development.</p>	<p>South African Heritage Resources Agency (SAHRA)</p> <p>Free State Heritage Resources Authority (FSHRA)</p>	<p>A Heritage Impact Assessment will be undertaken for the project as per the requirements Section 38 of the NHRA. The Heritage Impact Assessment will be made available in the EIA Phase.</p> <p>Should a heritage resource be impacted upon, a permit may be required from SAHRA or Free State Heritage Resources Authority (FSHRA) in accordance with of Section 48 of the NHRA, and the SAHRA Permit Regulations (GN R668).</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>Section 44 of the NHRA requires the compilation of a Conservation Management Plan as well as a permit from SAHRA for the presentation of archaeological sites as part of tourism attraction.</p>		
<p>National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA)</p>	<p>Section 53 of NEM:BA provides for the MEC / Minister to identify any process or activity in such a listed ecosystem as a threatening process.</p> <p>Three government notices have been published in terms of Section 56(1) of NEM:BA as follows:</p> <ul style="list-style-type: none"> » Commencement of TOPS Regulations, 2007 (GNR 150). » Lists of critically endangered, vulnerable and protected species (GNR 151). » TOPS Regulations (GNR 152). <p>It provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), and vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (NEM:BA: National list of ecosystems that are threatened and in need of protection, (Government Gazette 37596, GNR 324), 29 April 2014).</p>	<p>DEFF & Free State DEDTEA</p>	<p>Under NEM:BA, a permit would be required for any activity that is of a nature that may negatively impact on the survival of a listed protected species.</p> <p>An Ecological Impact Assessment will be undertaken as part of the EIA Phase to identify the presence of any listed protected species present on site which will require a permit.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
<p>National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA)</p>	<p>Chapter 5 of NEM:BA pertains to alien and invasive species, and states that a person may not carry out a restricted activity involving a specimen of an alien species without a permit issued in terms of Chapter 7 of NEM:BA, and that a permit may only be issued after a prescribed assessment of risks and potential impacts on biodiversity is carried out.</p> <p>Applicable, and exempted alien and invasive species are contained within the Alien and Invasive Species List (GNR 864).</p>	<p>DEFF & Free State DEDTEA</p>	<p>An Ecological Impact Assessment will be undertaken as part of the EIA Phase to identify the presence of any alien and invasive species present on site.</p>
<p>Conservation of Agricultural Resources Act (No. 43 of 1983) (CARA)</p>	<p>Section 05 of CARA provides for the prohibition of the spreading of weeds.</p> <p>Regulation 15 of GN R1048 published under CARA provides for the classification of categories of weeds and invader plants, and restrictions in terms of where these species may occur.</p> <p>Regulation 15E of GN R1048 published under CARA provides requirement and methods to implement control measures for different categories of alien and invasive plant species.</p>	<p>Department of Agriculture, Land Reform and Rural Development (DALRD)</p>	<p>CARA will find application throughout the life cycle of the project. In this regard, soil erosion prevention and soil conservation strategies need to be developed and implemented. In addition, a weed control and management plan must be implemented.</p> <p>In terms of Regulation 15E (GN R1048) where Category 1, 2 or 3 plants occur a land user is required to control such plants by means of one or more of the following methods:</p> <ul style="list-style-type: none"> » Uprooting, felling, cutting or burning. » Treatment with a weed killer that is registered for use in connection with such plants in accordance with the directions for the use of such a weed killer. » Biological control carried out in accordance with the stipulations of the Agricultural Pests Act (No. 36 of 1983), the ECA and any other applicable legislation. » Any other method of treatment recognised by the executive officer that

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
			<p>has as its object the control of plants concerned, subject to the provisions of sub-regulation 4.</p> <p>» A combination of one or more of the methods prescribed, save that biological control reserves and areas where biological control agents are effective shall not be disturbed by other control methods to the extent that the agents are destroyed or become ineffective.</p>
<p>National Forests Act (No. 84 of 1998) (NFA)</p>	<p>According to this Act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. Notice of the List of Protected Tree Species under the National Forests Act (No. 84 of 1998) was published in GNR 734.</p> <p>The prohibitions provide that “no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister”.</p>	<p>Department of Agriculture, Land Reform and Rural Development (DALRD)</p>	<p>A licence is required for the removal of protected trees. It is therefore necessary to conduct a survey that will determine the number and relevant details pertaining to protected tree species present in the development footprint for the submission of relevant permits to authorities prior to the disturbance of these individuals.</p> <p>An Ecological Impact Assessment will be undertaken as part of the EIA Phase to identify the presence of any protected trees present on site which will require a permit.</p>
<p>National Veld and Forest Fire Act (No. 101 of 1998) (NVFFA)</p>	<p>Chapter 4 of the NVFFA places a duty on owners to prepare and maintain firebreaks, the procedure in this regard, and the role of adjoining owners and the fire protection association. Provision is also made for the making of firebreaks on the international boundary of the Republic of South Africa. The applicant must ensure that firebreaks are wide and long enough to have a reasonable chance of preventing a veldfire from spreading to or from neighbouring land, it does not cause soil erosion, and it is reasonably free of inflammable material capable of carrying a veldfire across it.</p>	<p>DEFF</p>	<p>While no permitting or licensing requirements arise from this legislation, this Act will be applicable during the construction and operation of the Vrede Solar PV Facility, in terms of the preparation and maintenance of firebreaks, and the need to provide appropriate equipment and trained personnel for firefighting purposes.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>Chapter 5 of the Act places a duty on all owners to acquire equipment and have available personnel to fight fires. Every owner on whose land a veldfire may start or burn or from whose land it may spread must have such equipment, protective clothing and trained personnel for extinguishing fires, and ensure that in his or her absence responsible persons are present on or near his or her land who, in the event of fire, will extinguish the fire or assist in doing so, and take all reasonable steps to alert the owners of adjoining land and the relevant fire protection association, if any.</p>		
<p>Hazardous Substances Act (No. 15 of 1973) (HAS)</p>	<p>This Act regulates the control of substances that may cause injury, or ill health, or death due to their toxic, corrosive, irritant, strongly sensitising or inflammable nature or the generation of pressure thereby in certain instances and for the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger, to provide for the prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products.</p> <ul style="list-style-type: none"> » Group I and II: Any substance or mixture of a substance that might by reason of its toxic, corrosive etc., nature or because it generates pressure through decomposition, heat or other means, cause extreme risk of injury etc., can be declared as Group I or Group II substance » Group IV: any electronic product, and » Group V: any radioactive material. <p>The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.</p>	<p>Department of Health (DoH)</p>	<p>It is necessary to identify and list all Group I, II, III, and IV hazardous substances that may be on site and in what operational context they are used, stored or handled. If applicable, a license would be required to be obtained from the DoH.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
<p>National Environmental Management: Waste Act (No. 59 of 2008) (NEM:WA)</p>	<p>The Minister may by notice in the Gazette publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment.</p> <p>The Minister may amend the list by –</p> <ul style="list-style-type: none"> » Adding other waste management activities to the list. » Removing waste management activities from the list. » Making other changes to the particulars on the list. <p>In terms of the Regulations published in terms of NEM:WA (GNR 912), a BA or EIA is required to be undertaken for identified listed activities.</p> <p>Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that:</p> <ul style="list-style-type: none"> » The containers in which any waste is stored, are intact and not corroded or in » Any other way rendered unlit for the safe storage of waste. » Adequate measures are taken to prevent accidental spillage or leaking. » The waste cannot be blown away. » Nuisances such as odour, visual impacts and breeding of vectors do not arise, and » Pollution of the environment and harm to health are prevented. 	<p>DEFF – Hazardous Waste</p> <p>Free State DEDTEA</p>	<p>No waste listed activities are triggered by proposed project, therefore, no Waste Management License is required to be obtained. General and hazardous waste handling, storage and disposal will be required during construction and operation. The National Norms and Standards for the Storage of Waste (GNR 926) published under Section 7(1)(c) of NEM:WA will need to be considered in this regard.</p>
<p>National Road Traffic Act (No. 93 of 1996) (NRTA)</p>	<p>The technical recommendations for highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads" outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads</p>	<p>South African National Roads Agency (SANRAL) – national roads</p>	<p>An abnormal load / vehicle permit may be required to transport the various components to site for construction. These include route clearances and permits required for vehicles carrying abnormally heavy or abnormally</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>and the detailed procedures to be followed in applying for exemption permits are described and discussed.</p> <p>Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts.</p> <p>The general conditions, limitations, and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution, and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the National Road Traffic Act and the relevant Regulations.</p>	<p>Free State Department of Police, Roads and Transport</p>	<p>dimensioned loads and transport vehicles exceeding the dimensional limitations (length) of 22m. Depending on the trailer configuration and height when loaded, some of the on-site substation and BESS components may not meet specified dimensional limitations (height and width) which will require a permit.</p>
Provincial Policies / Legislation			
<p>The Free State Nature Conservation Bill 2007</p>	<p>The above-mentioned Nature Conservation Bill accompanied by all amendments is regarded by Free State Department of Economic, Small Business Development, Tourism & Environmental Affairs as the legally binding, provincial documents, providing regulations, guidelines and procedures with the aim of protecting game and fish, the conservation of flora and fauna and the destruction of problematic (vermin and invasive) species.</p>	<p>Free State Department of Economic, Small Business Development, Tourism & Environmental Affairs</p>	<p>Development of the Vrede Solar PV Facility must be planned with due recognition of protected species that may be present within the development footprint, and the protections afforded these species.</p> <p>An Ecological Impact Assessment will be undertaken as part of the EIA Phase to identify the presence of any listed species present on site which will require a permit.</p>
<p>The Free State Nature Conservation Ordinance (Act 8 of 1969) in its entirety</p>	<p>This Act provides for the sustainable utilisation of wild animals, biota and plants; provides for offences and penalties for contravention of the Act; and provides for the issuing of permits and other authorisations.</p>	<p>Free State DEDTEA</p>	<p>An Ecological Impact Assessment will be undertaken as part of the EIA Phase to identify the presence of any listed species present on site which will require a permit.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	Schedule 1 and 4 of the Free State Nature Conservation Ordinance (Act 8 of 1969) specify protected species and prohibition of alien species requirements.		
Free State Provincial Growth and Development Strategy (FSGDS) (2005 – 2014)	<p>The overarching goal of the Free State Growth and Development Strategy (FSGDS) is to align the provincial and national policies and programmes and to guide development in terms of effective and efficient management and governance to achieve growth and development. The strategy is a living document that uses the latest business planning and evaluation tools in order to maximise the effect of all spending.</p> <p>Based on the social and economic development challenges of the province, the Strategy identifies a few primary objectives, including stimulating economic development and developing and enhancing the infrastructure for economic growth and social development, poverty alleviation through human and social development, ensuring a safe and secure environment for all and the promotion of effective and efficient governance and administration.</p>	Free State Provincial Government	<p>No specific compliance requirements apply from this legislation.</p> <p>The development of the Vrede Solar PV Facility supports the overall objective of stimulating economic development and infrastructure investment towards growth and social development, by contributing to the energy mix, supply and infrastructure of the province. The development of the facility will also contribute (albeit limited) to the alleviation of poverty through the creation of direct and indirect employment opportunities and well as skills development.</p>
Free State Provincial Growth and Development Strategy (FSGDS), Revised October 2007	<p>The revised FSGDS refers to specific imperatives which sets the tone and pace for shared growth and development in the Province. These include:</p> <ul style="list-style-type: none"> » The need to effectively use scarce resources within the Province, whilst addressing the real causes of development challenges. » The need to accelerate service delivery based on a common provincial development agenda as the basis for provincial strategic direction. 	Free State Provincial Government	<p>No specific compliance requirements apply from this legislation.</p> <p>The development of the Vrede Solar PV Facility will assist with the need to effectively use scarce resources and the need to identify investment opportunities, including private sector-investment. The development of a solar facility reduces the need to make use of non-renewable resources for the generation of</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<ul style="list-style-type: none"> » The need to identify investment opportunities and provide an environment of certainty critical for private-sector investment. » The need to promote intergovernmental coordination between the three spheres of government. » The need to facilitate facilitates the implementation of the People's Contract within the Province. » The need to provide a common vision as the basis for common action amongst all stakeholders, both inside and outside government. » The need to provide a framework for budgets, implementation, performance management and spatial development. 		<p>electricity and opens up the Province to further future solar energy development.</p>
<p>Free State Provincial Spatial Development Framework (PSDF) - Executive Summary (Inception Report)</p>	<p>The Free State PSDF is a provincial spatial and strategic planning policy that responds to and complies with, in particular, the National Development Plan Vision 2030 and the National Spatial Development Perspective (NSDP). The latter encourages all spheres of government to prepare spatial development plans and frameworks (such as the PSDF) that promote a developmental state in accordance with the principles of global sustainability as is advocated by, among others, the South African Constitution and the enabling legislation.</p> <p>The Free State Provincial Growth and Development Strategy states that sustainable economic development is the only effective means by which the most significant challenge of the Free State, namely poverty, can be addressed is. The PSDF gives practical effect to sustainable development, which is defined as development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs.</p>	<p>Free State Provincial Government</p>	<p>No specific compliance requirements apply from this legislation.</p> <p>The Vrede Solar PV Facility will contribute to sustainable and economic development goals of the Free State PSDF, once completed and formally adopted.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>The PSDF is prepared in accordance with bioregional planning principles that were adapted to suit the site-specific requirements of the Free State. It incorporates and complies with the relevant protocols, conventions, agreements, legislation and policy at all applicable levels of planning, ranging from the international to the local.</p>		
<p>Free State Green Economy Strategy (2014)</p>	<p>This green economy strategy for Free State Province (FSGES) was developed in alignment with the national green economy strategy elaborated in the National Green Economy Framework and Green Economy Accord, as well as the Free State Provincial Growth and Development Strategy. The development process was spearheaded by the Department of Economic Development, Tourism and Environmental Affairs (DETEA).</p> <p>The objective was to develop a green economy strategy to assist the province to, amongst others, improve environmental quality and economic growth, and to develop green industries and energy efficiency within the province.</p>	<p>Free State Provincial Government</p>	<p>No specific compliance requirements apply from this legislation.</p> <p>The Vrede Solar PV Facility will contribute to the aim of energy efficiency and green industry whilst promoting economic growth, and is therefore consistent with this strategy.</p>
<p>Free State Investment Prospectus (2019)</p>	<p>The Premier of the Free State considers providing access to individual investors' to accurate and pertinent information makes it easier for investors to glean investor ready opportunities that are currently available in the Free State.</p> <p>Opportunity of the development of renewable energy is considered in the key sectors overview. The prospectus states that opportunities are opening up in the Province for the energy sector, including renewable energy. Rezoning for the development of multiple solar energy facilities has already been undertaken in the province. The development of a Solar Park in the Xhariep region is seen as a driver of growth along the banks of the Orange River.</p>	<p>Free State Provincial Government</p>	<p>No specific compliance requirements apply from this legislation.</p> <p>Considering the future opportunities available for the development of renewable energy facilities (including solar PV facilities) the development of the Vrede Solar PV Facility is considered to be in-line with the Investment Prospectus of the Province.</p>

6.7.1 Best Practice Guidelines Birds & Solar Energy (2017)

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

The guidelines are aimed at Environmental Assessment Practitioners (EAPs), avifaunal specialists, developers and regulators and propose a tiered assessment process, including:

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

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

Data collection could vary from a single, short field visit (Regime 1, for e.g. at a small or medium sized site with low avifaunal sensitivity), to a series of multi-day survey periods, including the collection of various forms of data describing avian abundance, distribution and movement and spread over 12 months (Regime 3, for e.g. at a large developments located in a sensitive habitat, or which otherwise may have significant impacts on avifauna). **Table 6.6** is taken from the best practise guidelines and provides a summary of the recommended assessment regimes in relation to proposed solar energy technology, project size, and likely risk).

Table 6.6: Recommended avian assessment regimes in relation to proposed solar energy technology, project size, and known impact risks.

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

Regime 1: One site visit (peak season); minimum 1 – 5 days.

Regime 2: Pre- and post-construction; minimum 2 – 3 x 3 – 5 days over 6 months (including peak season); carcass searches.

Regime 3: Pre- and post-construction; minimum 4 – 5 x 4 – 8 days over 12 months, carcass searches.

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

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

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

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

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

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

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

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

The bird monitoring which was conducted for the Vrede Solar PV Facility was undertaken in line with a Regime 1 classification. Consequently, only a minimum of one site visit of 1 to 5 days in duration was required. The results from the monitoring will be used to inform both the development footprint as well as Avifauna Impact Assessment report, to be completed for the EIA Report.

6.7.2 The IFC Environmental Health and Safety (EHS) Guidelines

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

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

The General EHS Guidelines are designed to be used together with the relevant Industry Sector EHS Guidelines, however no Industry Sector EHS Guidelines have been developed for PV solar power to date. The application of the General EHS Guidelines should be tailored to the hazards and risks associated with a project, and should take into consideration site-specific variables which may be applicable, such as host country context, assimilative capacity of the environment, and other project factors. In instances where host country regulations differ from the standards presented in the EHS Guidelines, whichever is the more stringent of the two in this regard should be applied.

The General EHS Guidelines include consideration of the following:

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

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

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

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

- » Construction phase impacts (i.e. OHS, temporary air emissions from dust and vehicle emissions, noise related to excavation, construction and vehicle transit, solid waste generation and wastewater generation from temporary building sites and worker accommodation).
- » Water usage (i.e. the cumulative water use requirements).
- » Land matters (i.e. land acquisition procedures and the avoidance or proper mitigation of involuntary land acquisition / resettlement).
- » Landscape and visual impacts (i.e. the visibility of the solar panels within the wider landscape and associated impacts on landscape designations, character types and surrounding communities).
- » Ecology and natural resources (i.e. habitat loss / fragmentation, impacts on designated areas and disturbance or displacement of protected or vulnerable species).
- » Cultural heritage (i.e. impacts on the setting of designated sites or direct impacts on below-ground archaeological deposits as a result of ground disturbance during construction).
- » Transport and access (i.e. impacts of transportation of materials and personnel).
- » Drainage / flooding (i.e. flood risk associated with the site).
- » Consultation and disclosure (i.e. consulting with key authorities, statutory bodies, affected communities and other relevant stakeholders as early as possible).
- » Environmental and Social Management Plan (ESMP) (i.e. compile an ESMP to ensure that mitigation measures for relevant impacts are identified and incorporated into project construction procedures and contracts).

CHAPTER 7 DESCRIPTION OF THE RECEIVING ENVIRONMENT

This chapter provides a description of the local environment. This information is provided in order to assist the reader in understanding the possible effects of the project on the environment within which it is proposed to be developed. Aspects of the biophysical, social and economic environment that could be directly or indirectly affected by, or could affect, Vrede Solar PV Facility have been described. This information has been sourced from both existing information available for the area as well as specialist consultants and aims to provide the context within which this EIA process is being conducted.

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

This chapter includes the following information required in terms of Appendix 2: Content of a Scoping report:

Requirement	Relevant Section
(g)(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects.	<p>The environmental attributes associated with the development of the Vrede Solar PV Facility is included as a whole within this chapter. The environmental attributes that are assessed within this chapter includes the following:</p> <ul style="list-style-type: none"> » The regional setting of the broader project site indicates the geographical aspects associated with the Vrede Solar PV Facility. This is included in Section 7.2. » The climatic conditions for the Kroonstad area have been included in Section 7.3. » The biophysical characteristics of the project site and the surrounding areas are included in Section 7.4. The characteristics considered are topography and terrain, geology, soils and agricultural potential and the ecological profile which includes the vegetation patterns, listed plant species, critical biodiversity areas and broad-scale processes, freshwater resources, terrestrial fauna and avifauna. » The heritage and cultural aspects (including archaeology and palaeontology) has been included in Section 7.5. » The social and socio-economic characteristics associated with the broader study area and the project site has been included in Section 7.6

A more detailed description of each aspect of the affected environment will be included in the specialist reports to be included in the EIA report.

7.2 Regional Setting

The Vrede Solar PV Facility project site is located approximately 13km south west of Kroonstad and 47km north east of Welkom in the Free State Province. Other nearby towns include Hennenman, Edenville, Steynsrus and Odendaalsrus. Kroonstad serves as a stop-over en-route between Johannesburg and Bloemfontein, as it is located approximately half way between the two towns.

Kroonstad is an important agricultural service centre in the Free State with a predominantly agricultural-orientated economy served by a modern toll-road. Kroonstad is the centre of a rich agricultural district, producing maize, wheat, dairy, meat products and wool. The Bloemhoek Dam lies just east of the town and supplies much of its water needs. Kroonstad is located on the banks of the Vals River, a tributary of the Vaal, and is situated within an area characterised by open spaces and an abundant variety of vegetation.

A regional map of the development area relative to Kroonstad town is provided in **Figure 7.1**.

The closest main access road to the proposed site is the existing gravel access road (the S172), which runs immediately to the south of the development area. The S172 is itself accessible via a turnoff from the P99/1 regional road (a tarred regional road) approximately 3km from the development area. The P99/1 is accessible from the R 34 turnoff and road leading westwards out of Kroonstad town. The location of these roads in relation to the development area is provided in **Figure 7.1**.

Land use in the broader study area is predominantly agricultural, with cattle grazing and croplands being the most prevalent. The development area itself is characterised by flat topography, comprised mainly of old, fallow croplands with the remainder of the development area comprising mixed grassland and woodlands.

Currently, no known operational renewable energy facility is located in the broader Kroonstad area, based on the DEFF Renewable Energy database produced for the first quarter of 2020. The Vrede Solar PV facility is, however, located very close to the Kroonstad Municipality Substation–Theseus 1 132kV line which is located ~ 3km to the south of the development area. An 11kV line, the Gansvlei 1 power line, traverses the project site immediately to the south of the development area. The closest substation is the Kroonstad Municipality Substation, located ~9km north-east of the development site.

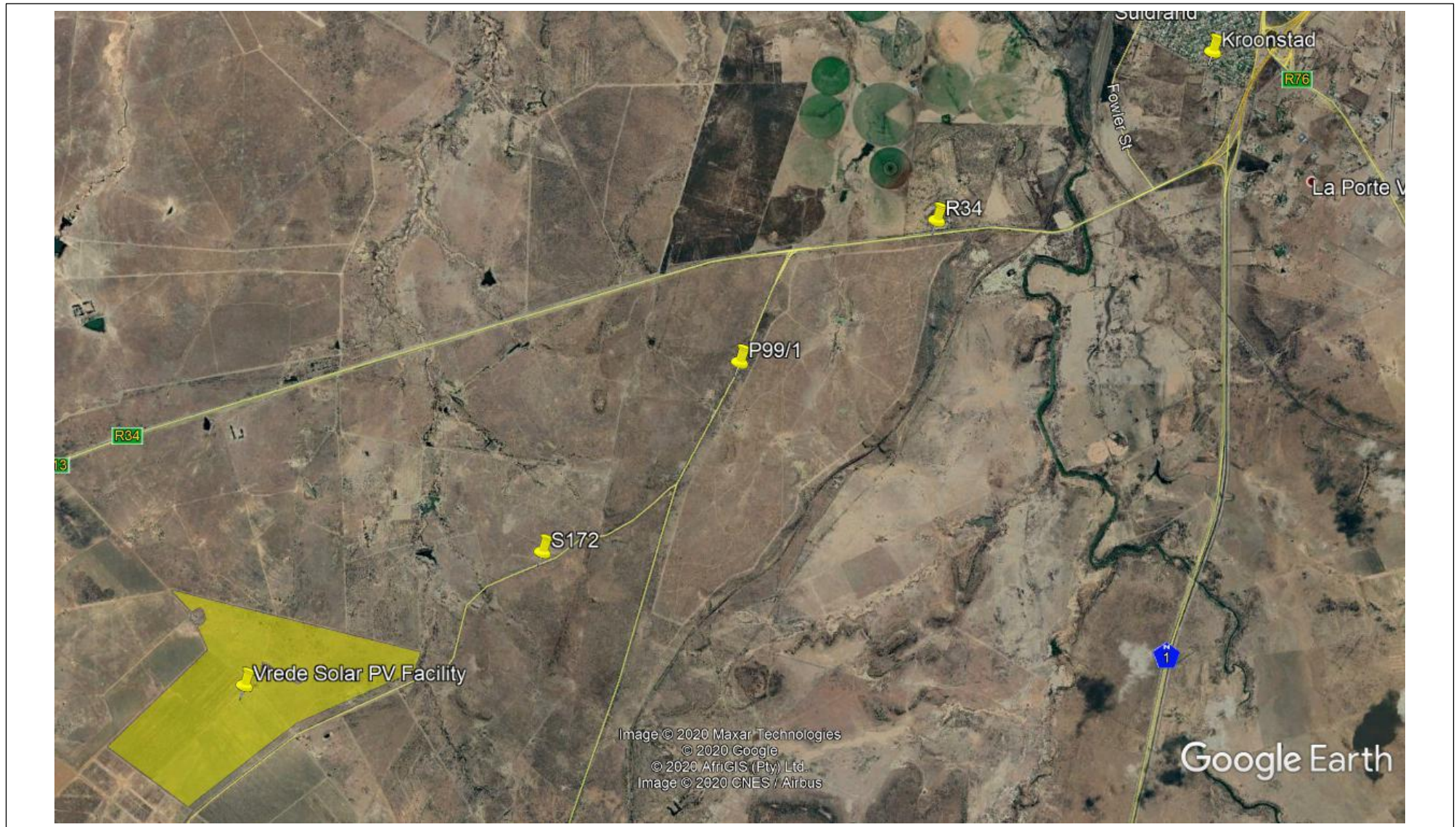


Figure 7.1: Regional map showing the location of the development area relative to Kroonstad town and the main roads in the area

7.3 Climatic Conditions

The climate for the development area is expected to be most similar to that of Kroonstad, located approximately 13km north-east of the study area. Kroonstad lies ~1374m above sea level and considered to have a local steppe climate. The area is considered semi-arid with little rainfall during the year, averaging 604mm annually, with an average temperature of 16 °C. January is the warmest month of the year (with an average temperature of 22.4 °C, with the coldest month being June, with an average of 8.8 °C. Rainfall is greatest in January (average of 99mm), whereas the least precipitation falls within June (average of 8mm).

7.4 Biophysical Characteristics of the Study Area and Development Area

7.4.1 Topographical profile

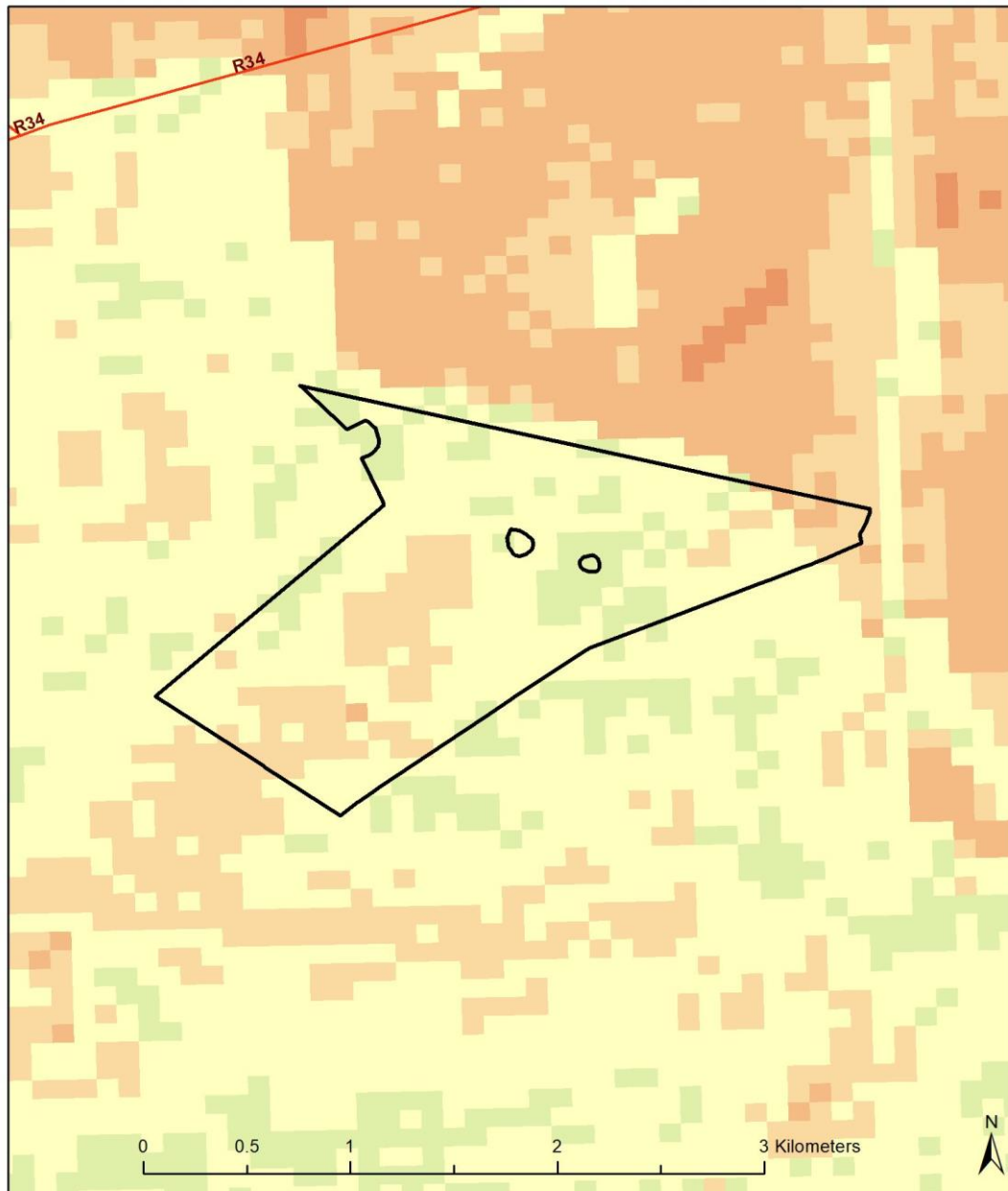
The region within which the project site is located can be described flat and homogenous. Elevation across the development area ranges from 1402m above sea level in the west to 1419m above sea level in the east. There are no prominent hills within the project site with the highest areas of elevation situated to the east of the project site.

7.4.2 Geology, Soils and Agricultural Potential

The geology of the Kroonstad region is characterised by the Beaufort Group rock, which consists of 2 subgroups, the Tarkastad subgroup and Adelaide subgroup, and is predominantly mudstone up to the upper sections of the lower Tarkastad subgroup. The Kroonstad region is predominantly Adelaide subgroup, thus giving rise to mudstone in the region. Mudstone is a type of mud rock that consists of fine grain soils. The soil particle sizes for mudstone are no larger than 0.063mm. The development area is comprised primarily of mudrock and subordinate sandstone of the Adelaide Subgroup (Beaufort Group). Occasional dolerite sills may also be present. Soil depth varies from 25mm – 45mm within the development area.

i. Soils and agricultural capability

The Vrede Solar PV Facility area includes five different land capability classes according to the land capability data (DAFF, 2017). **Figure 7.2** indicates the position of the different classes within the development area, which largely consists of land with Moderate (Class 8) to Moderate High (Class 9) land capability. Smaller patches in the centre and south-west consist of land with Low-Moderate (Classes 06 and 07) land capability. Classes 08 and 09 have potential for the production of specific crops under rainfed conditions while classes 06 and 07 are likely to be very marginal arable land that is more suitable for livestock grazing.



Legend

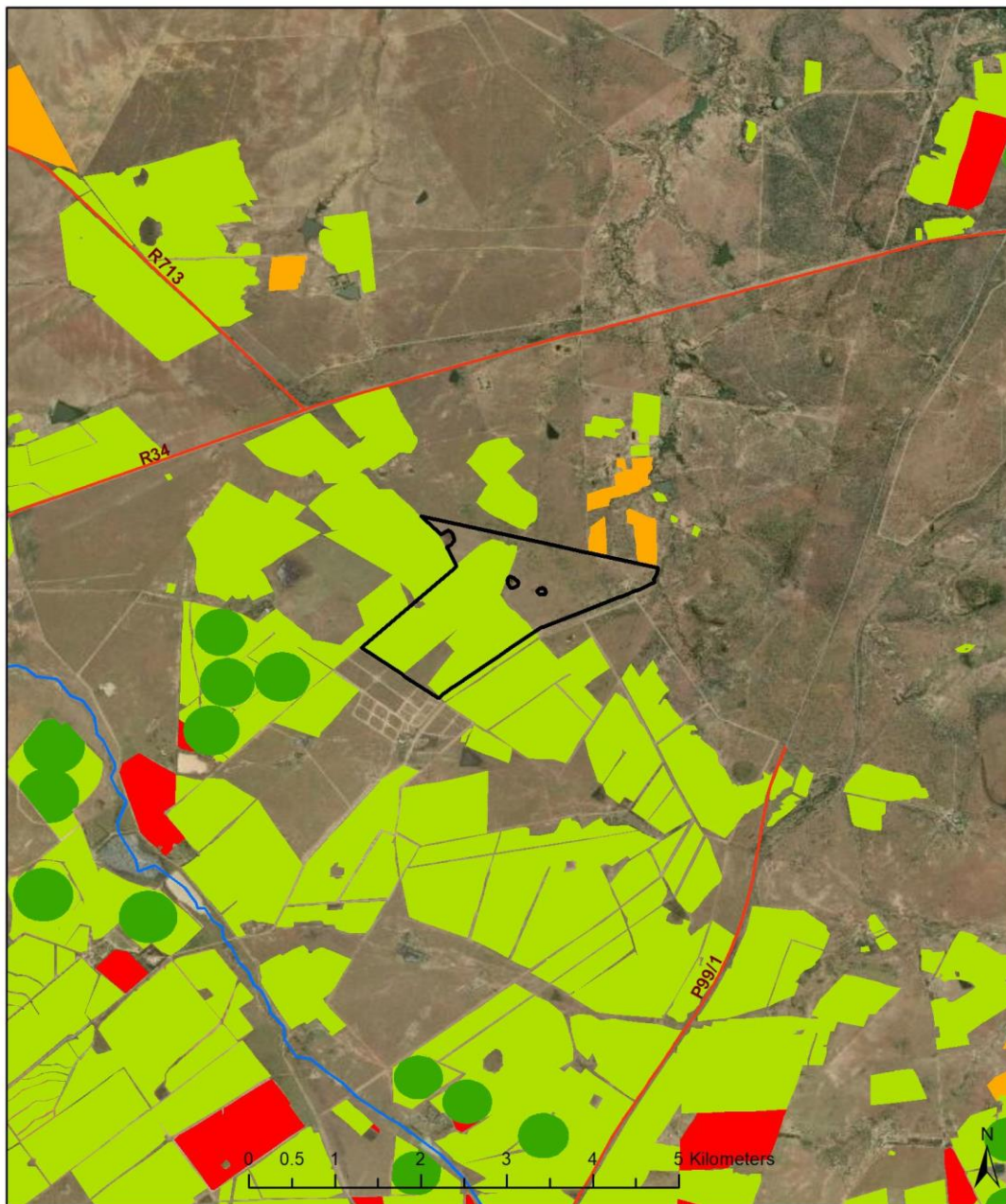
- | | |
|-------------------------------|--------------------------------|
| Land capability (DAFF) | PV development area (276.8 ha) |
| 05. Low | Road |
| 06. Low-Moderate | |
| 07. Low-Moderate | |
| 08. Moderate | |
| 09. Moderate-High | |



Figure 7.2: Land capability classes of the project development area

Based on the DAFF (2017) dataset, the Vrede Solar PV Facility development area includes areas where field crops have previously been produced. Although the DAFF data layer indicates these areas still as rainfed annual crops (or planted pastures) (refer **Figure 7.3**), the development area consists only of pasture and planted pastures since 2005. The landowner has confirmed that he could not continue to cultivate grain crops on the farm as it was economically non-viable. As such, no crops are currently in place (and have been since 2005) and all crop cultivation has been ceased by the landowner. Several pivot irrigation fields are located outside

the development area, mostly towards the south-west and south. No pivot irrigation fields are located within the development area. Large fields with rainfed crops and/or planted pastures are located to the west and south of the development area with old fields to the north.



Legend

Field crops

- Non-pivot irrigated Annual Crop Cultivation / Planted Pastures
- Old Fields
- Rainfed Annual Crop Cultivation / Planted Pastures
- Pivot Irrigation

PV development area (276.8 ha)

- Road
- Rivers



Figure 7.3: DAFF (2017) dataset for the development area and broader area. Please note, no crop cultivation has been implemented on site since 2005 due to difficulties in profitable cultivation of the development site.

The grazing capacity of the largest section of the development area, is 6 ha/LSU (refer **Figure 7.4**). A small area in the north-eastern corner of the development area, has grazing capacity of 5 ha/LSU. The ideal grazing capacity is an indication of the long-term production potential of the vegetation layer growing in an area. More specifically, it relates to its ability to maintain an animal with an average weight of 450 kg (defined as 1 Large Stock Unit (LSU)) with an average feed intake of 10 kg dry mass per day over the period of approximately a year. This definition includes the condition that this feed consumption should also prevent the degradation of the soil and the vegetation. The grazing capacity is therefore expressed in a number of hectares per LSU (ha/LSU).



Figure 7.4: Long-term grazing capacity of the development area.

Land Types across the development area consist of Land Type Bd21 (refer **Figure 7.5**), with a small section in the north-eastern corner of Land Type Dc10. The characteristics of the land types are described below and their positions in the landscape illustrated in **Figure 7.5**.

Land Type Bd21: consists of four terrain units and the landscape can be described as slightly undulating with slopes ranging between 1 and 3%. The soil formed from sandstone, mudstone and shale. The crest (Terrain unit 1) is dominated by deep Clovelly and Hutton soil forms (0.9 – 1.2m) and shallower Westleigh soil form (0.4 – 0.6m). The texture of soil in this terrain unit is dominated by sand-clay-loam with the clay fraction estimated as 10 - 20%. Terrain unit 3 (mid-slope) forms 50% of land type Bd21. The mid-slopes consist of deep Hutton and Clovelly soil forms (0.9 – 1.2m), Westleigh soil form (0.4 – 0.6m) Valsrivier soil form (0.25 – 0.35m). The toe-slopes (Terrain unit 4) is dominated by the shallow Valsrivier soil form. Sterkspruit, Bonheim and Kroonstad soil forms are also present in the toe slope. Terrain unit 5 (Valley bottom) consists of Dundee, Bonheim, Valsrivier and Sterkspruit soil forms. The soil depth ranges from 0.25m (Valsrivier) to 1.2m (Dundee). The clay content ranges from 20 – 45% and the texture ranges from sand-clay-loam to sand-clay.

Land Type Dc10: comprises five terrain units where Terrain Units 1, 3 and 4 which dominate the landscape (93%) represent an undulating landscape. Terrain Unit 5 are the areas of slight depression at the valley bottoms with a slope of 1 – 2%. Terrain unit 2 (upper slope) has steep slopes of >100% but represent only 1% of the Land Type. Terrain unit 3 (lower slope) has a slope of 4 – 12% while the slopes of the other terrain units (crest and toe slope) range between 1 and 5%. The soil originated on the crests and scarps (upper slopes) from dolerite or sandstone and the mid slopes and toe slopes mainly from mudstone and shale.

The texture of soil in this land type is dominated by sandy clay and clay on the mid slope and toe slope with the clay ranging between 15 and 30%. Terrain units 3 and 4 that represent 71% of this land type mainly consists of rock, shallow soil profiles (0.1 – 0.3m) of the Swartland and Mispah forms with an estimated 7 - 12% of areas in these terrain units consisting of deeper soil profiles (0.3 – 0.58m) of the Bonheim form. The valley bottoms are dominated by deep soil profiles (>1.2m) of the Dundee and Inhoek soil forms.



Legend







Land type	 Dc10	 PV development area (276.8 ha)
 Bd21	 Dc6	 Road
 Db1		



Figure 7.5: Land type classification of the development area.

ii. Land use

According to the Free State Province Land-Cover dataset (2009) (**Figure 7.6**), more than half of the development area (53%) is located within old, historically cultivated lands (i.e. have not been cultivated in the last 15 years), while 45% is classified as grassland. Approximately 4.2ha (1.5%) of the total development area comprises of wetland (non-pan) habitats.

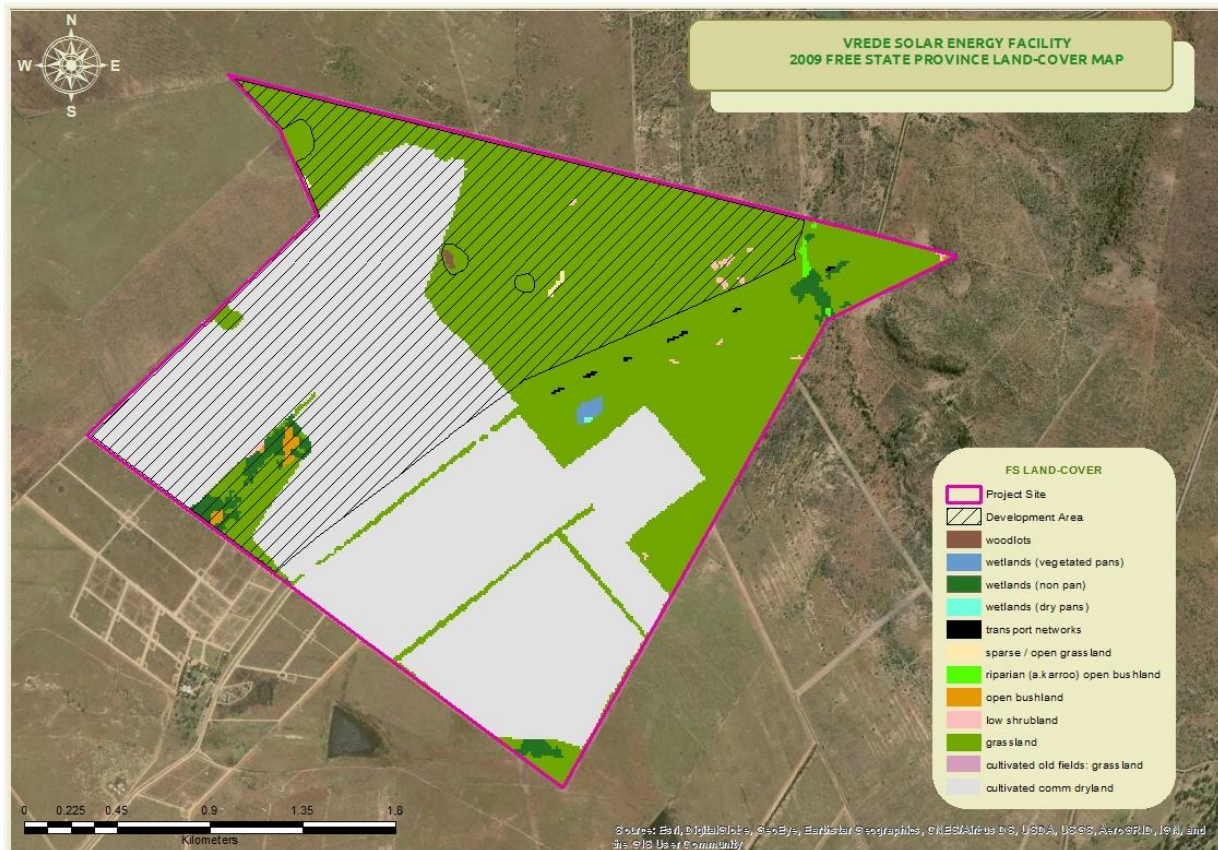


Figure 7.6: Free State Land Cover Map (2009) for the development area.

Even though in the past, cultivation within larger portions of the project site have occurred, these areas have been abandoned for a while. Relative recent abandoned areas (areas that have not been ploughed for at least the last fifteen years) covers approximately 59% of the project site and are now covered by pioneer and sub-climax grasses and weeds or permanent pastures and are now likely utilised as grazing for livestock. Historically cultivated land (> 15 years), covers an area of approximately 13% and appears to have been re-established by grasses and low shrubs (plagioclimax grassland), with the only evidence, from available spatial data, being faint ploughing contour lines. As such, large portions of the development area have been, at some time, been transformed by ploughing and cultivation (refer **Figure 7.7**). Furthermore, natural wetland features cover approximately 3% of the project area, comprising mostly of valley-bottom and depression wetlands. Numerous small earth dam structures have been created within some of the wetlands, in an attempt to concentrate and store surface water for longer periods of time within these wetland features. The land use in the broader region is predominantly agricultural, mainly cultivation of maize and sunflower, and to a lesser extent for livestock farming (predominantly cattle). Game farming has also become more prominent within the broader region over the last decade (with a wide variety of game species including rare antelope and big game such as buffalo).

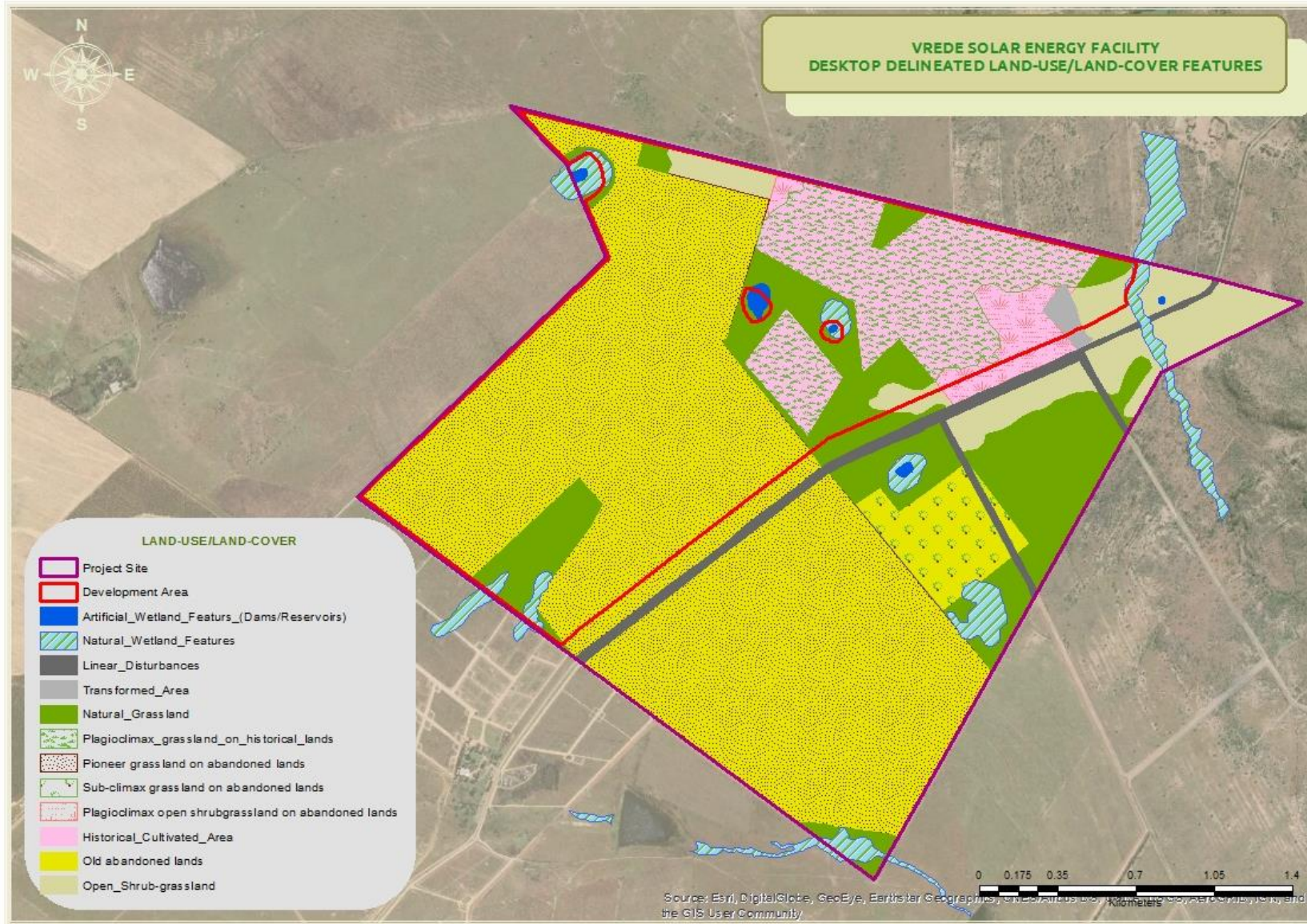


Figure 7.7: Desktop land use map of the development area, to be refined during the EIA phase assessments.

7.4.3 Ecological profile of the development area

i. Vegetation overview

The development area and broader project site is situated within the grassland biome. This biome is centrally located in southern Africa, and adjoins all except the desert, fynbos and succulent Karoo biomes (Mucina & Rutherford, 2006).

Major macroclimatic traits that characterise the grassland biome include:

- » Seasonal precipitation; and
- » The minimum temperatures in winter (Mucina & Rutherford, 2006).

Grasslands are dominated by a single layer of grasses. The amount of cover depends on rainfall and the degree of grazing. The grassland biome experiences summer rainfall and dry winters with frost (and fire), which are unfavourable for tree growth. Therefore, trees are typically absent, except in a few localised habitats. Geophytes (bulbs) are often abundant. Frosts, fire and grazing maintain the grass dominance and prevent the establishment of trees.

The grassland biome comprises many different vegetation types. The project site is situated within two vegetation types, namely the Vaal-Vet Sandy Grassland (Gh10) and Central Free State Grassland (Gh6) according to Mucina & Rutherford (2006) (refer **Figure 7.8**). The development area is, however, almost solely situated within one vegetation type, the Vaal-Vet Sandy Grassland with only a small portion extending into the Central Free State Grassland.

Vaal Vet Sandy Grassland

The Vaal Vet Sandy Grassland vegetation type is found in North-West and Free State Provinces. This vegetation type typically comprises of plains-dominated landscape with some scattered, slightly irregular undulating plains and hills and mainly low-tussock grasslands with an abundant karroid element. Dominance of *Themeda triandra* is an important feature of this vegetation unit. Locally low cover of *T. triandra* and the associated increase in *Elionurus muticus*, *Cymbopogon pospischilii* and *Aristida congesta* is attributed to heavy grazing and/or erratic rainfall (Mucina & Rutherford, 2006).

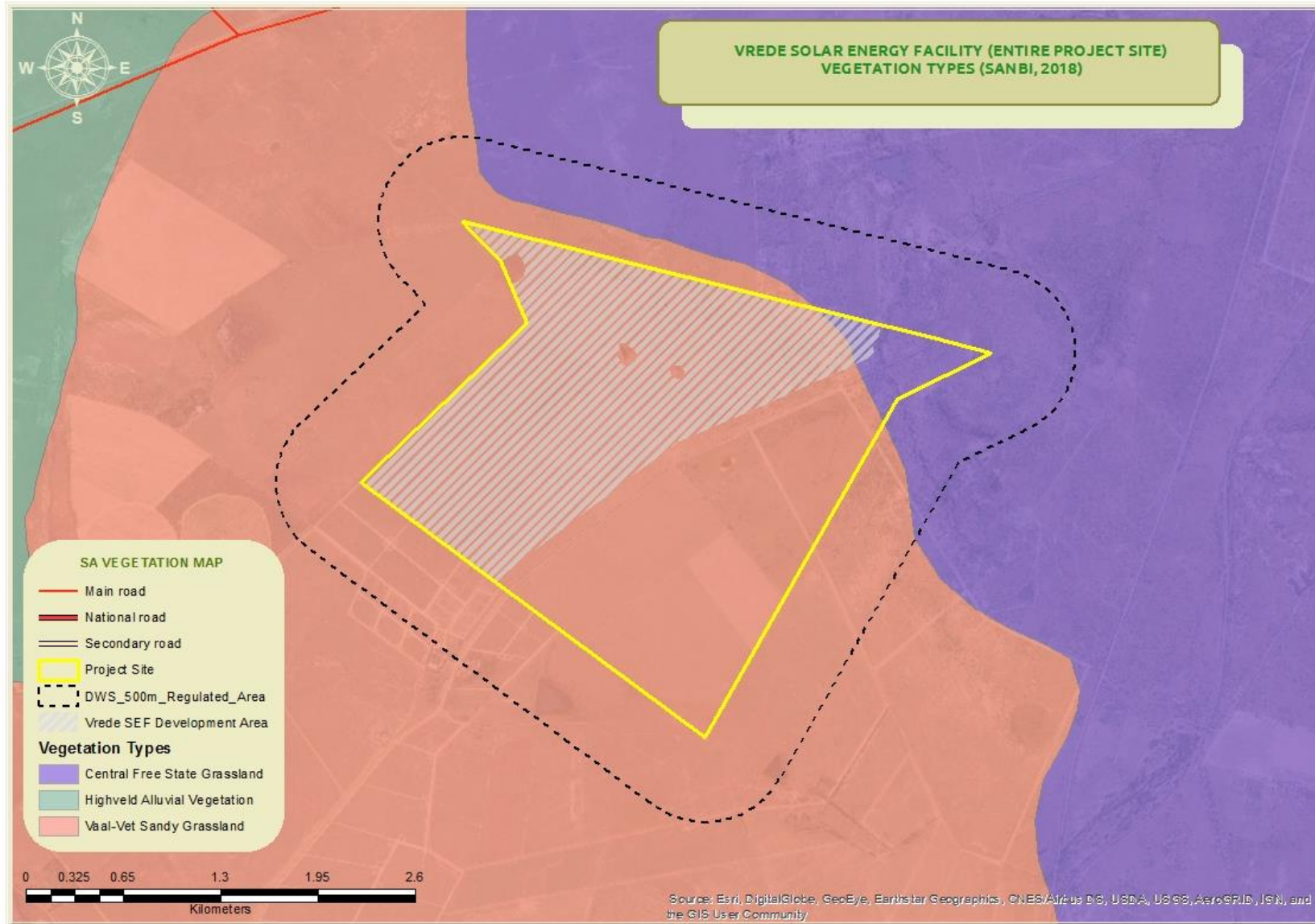


Figure 7.8: Vegetation map of the project site and development area (SANBI, 2018).

Important plant taxa are those species that have a high abundance, a frequent occurrence or are prominent in the landscape within a particular vegetation type (Mucina & Rutherford, 2006). The following species are important in the Vaal Vet Sandy Grassland.

- » Graminoids: *Antheophora pubescens* (d), *Aristida congesta* (d), *Chloris virgata* (d), *Cymbopogon caesius* (d), *Cynodon dactylon* (d), *Digitaria argyrograpta* (d), *Elionurus muticus* (d), *Eragrostis chloromelas* (d), *E. lehmanniana* (d), *E. plana* (d), *E. trichophora* (d), *Heteropogon contortus* (d), *Panicum gilvum* (d), *Setaria sphacelata* (d), *Themeda triandra* (d), *Tragus berteronianus* (d), *Brachiaria serrata*, *Cymbopogon pospischilii*, *Digitaria eriantha*, *Eragrostis curvula*, *E. obtusa*, *E. superba*, *Panicum coloratum*, *Pogonarthria squarrosa*, *Trichoneura grandiglumis*, *Triraphis andropogonoides* (Mucina & Rutherford, 2006).
- » Herbs: *Stachys spathulata* (d), *Barleria macrostegia*, *Berkheya onopordifolia* var. *onopordifolia*, *Chamaesyce inaequilatera*, *Geigeria aspera* var. *aspera*, *Helichrysum caespititium*, *Hermannia depressa*, *Hibiscus pusillus*, *Monsonia burkeana*, *Rhynchosia adenodes*, *Selago densiflora*, *Vernonia oligocephala* (Mucina & Rutherford, 2006).
- » Geophytic Herbs: *Bulbine narcissifolia*, *Ledebouria marginata*.
- » Succulent Herb: *Tripteris aghillana* var. *integrifolia* (Mucina & Rutherford, 2006).
- » Low Shrubs: *Felicia muricata* (d), *Pentzia globosa* (d), *Anthospermum rigidum* subsp. *pumilum*, *Helichrysum dregeanum*, *H. paronychioides*, *Ziziphus zeyheriana* (Mucina & Rutherford, 2006).
- » Endemic Taxon Herb: *Lessertia phillipsiana*.

Central Free State Grassland

The Central Free State Grassland vegetation type is found in the Free State and marginally into Gauteng Province. This vegetation type typically comprises of undulating plains supporting short grassland, in natural condition dominated by *Themeda triandra* while *Eragrostis curvula* and *E. chloromelas* become dominant in degraded habitats. Dwarf karoo bushes establish in severely degraded clayey bottomlands. Overgrazed and trampled low-lying areas with heavy clayey soils are prone to *Acacia karroo* encroachment (Mucina & Rutherford, 2006).

Important plant taxa are those species that have a high abundance, a frequent occurrence or are prominent in the landscape within a particular vegetation type (Mucina & Rutherford, 2006). The following species are important in the Central Free State Grassland.

- » Graminoids: *Aristida adscensionis* (d), *A. congesta* (d), *Cynodon dactylon* (d), *Eragrostis chloromelas* (d), *E. curvula* (d), *E. plana* (d), *Panicum coloratum* (d), *Setaria sphacelata* (d), *Themeda triandra* (d), *Tragus koelerioides* (d), *Agrostis lachnantha*, *Andropogon appendiculatus*, *Aristida bipartita*, *A. canescens*, *Cymbopogon pospischilii*, *Cynodon transvaalensis*, *Digitaria argyrograpta*, *Elionurus muticus*, *Eragrostis lehmanniana*, *E. micrantha*, *E. obtusa*, *E. racemosa*, *E. trichophora*, *Heteropogon contortus*, *Microchloa caffra*, *Setaria incrassata*, *Sporobolus discosporus* (Mucina & Rutherford, 2006).
- » Herbs: *Berkheya onopordifolia* var. *onopordifolia*, *Chamaesyce inaequilatera*, *Conyza pinnata*, *Crabbea acaulis*, *Geigeria aspera* var. *aspera*, *Hermannia depressa*, *Hibiscus pusillus*, *Pseudognaphalium luteo-album*, *Salvia stenophylla*, *Selago densiflora*, *Sonchus dregeanus* (Mucina & Rutherford, 2006).
- » Geophytic Herbs: *Oxalis depressa*, *Raphionacme dyeri* (Mucina & Rutherford, 2006).
- » Succulent Herb: *Tripteris aghillana* var. *integrifolia* (Mucina & Rutherford, 2006).

- » Low Shrubs: *Felicia muricata* (d), *Anthospermum rigidum* subsp. *pumilum*, *Helichrysum dregeanum*, *Melolobium candicans*, *Pentzia globosa* (Mucina & Rutherford, 2006).

Based on the Plants of Southern Africa (BODATSA-POSA, 2020) database, 491 plant species are expected to occur in the project site. The list of expected plant species is provided in the ecological specialist assessment. Of the 491 plant species, only one species is listed as being a Species of Conservation Concern (SCC), namely *Anacampseros recurvata* subsp. *buderiana*. It is likely that this individual has been wrongfully identified as this species is Endemic to the quartz plains and outcrops of the Richtersveld. As such the Likelihood of Occurrence for this species within the project area is highly unlikely.

ii. Fauna

a) Amphibians

Based on the IUCN Red List Spatial Data (IUCN, 2017) and the AmphibianMap database provided by the Animal Demography Unit (ADU, 2017), twenty (20) amphibian species are expected to occur in the development area. One amphibian species of conservation concern could be present in the project area according to the above-mentioned sources, namely *Pyxicephalus adspersus* (Giant Bullfrog). The Giant Bull Frog is listed as near threatened on a regional scale. It is a species of drier savannahs. It is fossorial for most of the year, remaining buried in cocoons. They emerge at the start of the rains, and breed in shallow, temporary waters in pools, pans and ditches (IUCN, 2017). There appears to be moderate suitable habitat for this species in the development area and, therefore, the likelihood of occurrence is regarded as moderate.

b) Reptiles

Based on the IUCN Red List Spatial Data (IUCN, 2017) and the ReptileMap database provided by the Animal Demography Unit (ADU, 2017), twenty-eight (28) reptile species are expected to occur in the development area. Two reptile species of conservation concern is expected to be present in the broader project site (and consequently the development area), namely *Smaug giganteus* (Sungazer or Ouvolk) and *Chamaesaura aenea* (Coppery Grass Lizard).

Smaug giganteus (Sungazer or 'Ouvolk') is categorised as Vulnerable on both a regional and an international scale. It is endemic to South Africa, where it is found only in the grasslands of the northern Free State and the southwestern parts of Mpumalanga (IUCN, 2017). Habitat loss due to agriculture is a continuing threat. Large portions of the grassland habitat are underlain by coal beds of varying quality and extent, and exploitation of coal for fuel has and will result in further habitat loss. The likelihood of finding the species in the development area is high.

Chamaesaura aenea (Coppery Grass Lizard) is categorised as near threatened on both an international and a regional scale. A population reduction of over 20% in the last 18 years (three generations) is inferred from the transformation of large parts of the Grassland Biome. They are threatened by transformation of land for crop farming and plantations, overgrazing by livestock, infrastructural development, frequent anthropogenic fires and use.

c) Mammals

The IUCN Red List Spatial Data lists 73 mammal species that could be expected to occur within the vicinity of the project site. Of these species, 8 are medium to large conservation dependant species, such as *Ceratotherium simum* (Southern White Rhinoceros) and *Equus quagga* (Plains Zebra) that, in South Africa, are generally restricted to protected areas such as game reserves. These species are not expected to occur in the development area and are removed from the expected Species of Conservation Concern (SCC) list. Of the remaining 65 small to medium sized mammal species, ten (10) are listed as being of conservation concern on a regional or global basis.

The list of potential species includes (refer **Table 7.1**):

- » One (1) that is listed as Endangered (EN) on a regional basis;
- » Four (4) that are listed as Vulnerable (VU) on a regional basis; and
- » Five (5) that are listed as Near Threatened (NT) on a regional scale.

Table 7.1: Mammal species of conservation concern with likelihood of occurrence within the development area.

Species	Common Name	Conservation Status		Likelihood of Occurrence
		Red Data	IUCN	
<i>Anonyx capensis</i>	Cape Clawless Otter	NT	NT	Low
<i>Atelerix frontalis</i>	South African Hedgehog	NT	LC	High
<i>Felis nigripes</i>	Black-footed Cat	VU	VU	Low
<i>Hydrictis maculicollis</i>	Spotted-necked Otter	VU	NT	Low
<i>Leptailurus serval</i>	Serval	NT	LC	High
<i>Lycaon pectus</i>	African Wild Dog	EN	EN	Low
<i>Mystromys albicaudatus</i>	White-tailed Rat	VU	EN	High
<i>Panthera pardus</i>	Leopard	VU	VU	Low
<i>Parahyaena brunnea</i>	Brown Hyena	NT	NT	Moderate
<i>Poecilogale albinucha</i>	African Striped Weasel	NT	LC	Moderate

iii. Critical Biodiversity Areas and Conservation Targets

The Vrede Solar PV Facility development area falls within the planning domain of the Free State Province Biodiversity Conservation Assessment which maps Critical Biodiversity Areas and Ecological Support Areas within the Free State Province. The assessment formed part of the Free State Provincial Spatial Development Plan (PSDP) and was intended to inform and facilitate broad scale land use classification, with the ultimate aim of facilitate land use planning for the entire province. The assessment utilised datasets available at the time of writing, in order to classify and depict areas that are important for the representation and persistence of terrestrial and aquatic species and ecosystems. The following three important classifications are made in the Free State Province Biodiversity Conservation Assessment:

- » Critical Biodiversity Area 1: The Critical Biodiversity Area 1 regions constitute the planning units which if not included in the final portfolio (selection of planning units) for the

assessment will result in the pre-defined targets not being achieved. In essence, loss of these regions may compromise achieving provincial conservation targets

- » Critical Biodiversity Area 2: Areas that represent areas of high biodiversity significance but will not necessarily result in the target not being achieved if they were excluded from the final portfolio, i.e. they represent areas for which options exist.
- » Ecological Support Area (ESA): Areas that are required to support the persistence of species.

The majority of the development area falls within degraded areas, while the north-eastern and north-western portions of the development area is located within CBA1 (refer to **Figure 7.9**).

The CBA1 regions located within the development area, have been classified as such due to fact that these areas are regarded as irreplaceable, as they are essential in meeting the targets set for the conservation of the endangered Vaal-Vet Sandy Grassland. However, during a thorough examination of available satellite imagery (including historical imagery) it was found that large portions of the regions having been classified as CBAs were in fact historical cultivated areas that have been left fallow for an extensive period of time. This allowed for vegetation succession to take place to a stage where these areas are now covered with a relative stable grass and dwarf shrub cover. Subsequently, natural/original Vaal-Vet Sandy Grassland are only confined to a few isolated patches. Due to the small extent and patchy distribution of this endangered vegetation type within the development area, it is unlikely that this development will have an impact on the status of the remaining natural Vaal-Vet Sandy Grassland. However, this statement can only be confirmed during the EIA phase when these areas will be assessed during a site visit.

The development area is further not located within any ESA classified region and will subsequently not impact this feature.

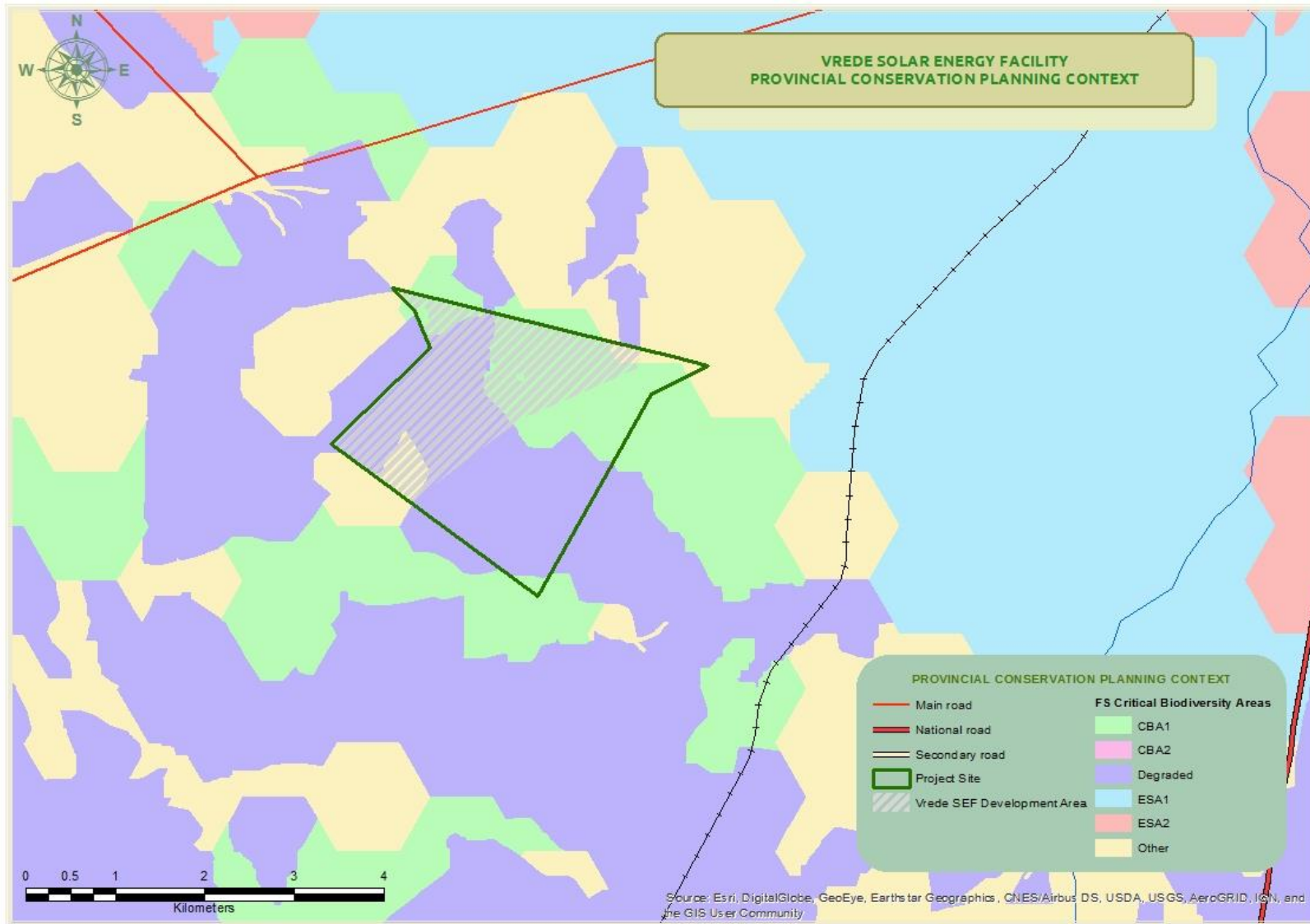


Figure 7.9: Provincial Level Conservation Planning Context – CBA Map (Free State Province Biodiversity Conservation Assessment).

iv. National Environment Management: Biodiversity Act (Act No. 10 of 2004) list of threatened ecosystems

The vegetation types of South Africa have been categorized according to their conservation status which is, in turn, assessed according to the degree of transformation and rates of conservation. The status of a habitat or vegetation type is based on how much of its original area still remains intact relative to various thresholds. On a national scale these thresholds are determined by the best available scientific approaches. The level at which an ecosystem becomes Critically Endangered differs from one ecosystem to another and varies from 16% to 36%.

The National List of Ecosystems that are Threatened and in need of protection (GN1002 of 2011), published under the National Environment Management: Biodiversity Act (Act No. 10 of 2004), lists national vegetation types that are afforded protection on the basis of rates of transformation. The threshold for listing in this legislation is higher than in the scientific literature, which means there are fewer ecosystems listed in the National Ecosystem List versus in the scientific literature. The conservation status of the vegetation types occurring in and around the project site (**Figure 7.9**) are indicated below (refer **Table 7.2**).

Table 7.2: Vegetation types represented within the project site.

Vegetation Type	Target (%)	Conserved (%)	Transformed (%)	Conservation Status	
				Driver et al., 2005; Mucina & Rutherford, 2006	National Ecosystem List (NEM:BA)
Vaal-Vet Sandy Grassland	24%	0.3%	65.2%	Endangered	Endangered
Central Free State Grassland	24%	0.8%	23.5%	Least Concerned	Not Listed

The bulk of the development area is located within the endangered Vaal-Vet Sandy Grassland (refer to **Figure 7.8**), with only a small portion of the north-eastern corner falling within the Central Free State Grassland. However, as described earlier (Land cover and Land Use Section), the majority of the development area is located within transformed areas, with a small portion of the development area being located in what appears to be grassland largely consistent to that of Vaal-Vet Sandy Grassland.

The presence, extent and condition of these remaining grasslands will be determined and assessed during the EIA phase. Furthermore, the potential impact of the development on this vegetation types and its attributed conservation target will be assessed (in isolation and cumulative with other similar projects) during the EIA phase. At this stage, due to the small extent of natural grassland within the development area as well as the fractured nature of these patches of grassland, it appears unlikely that the development will have a significant impact on this vegetation/ecosystem type.

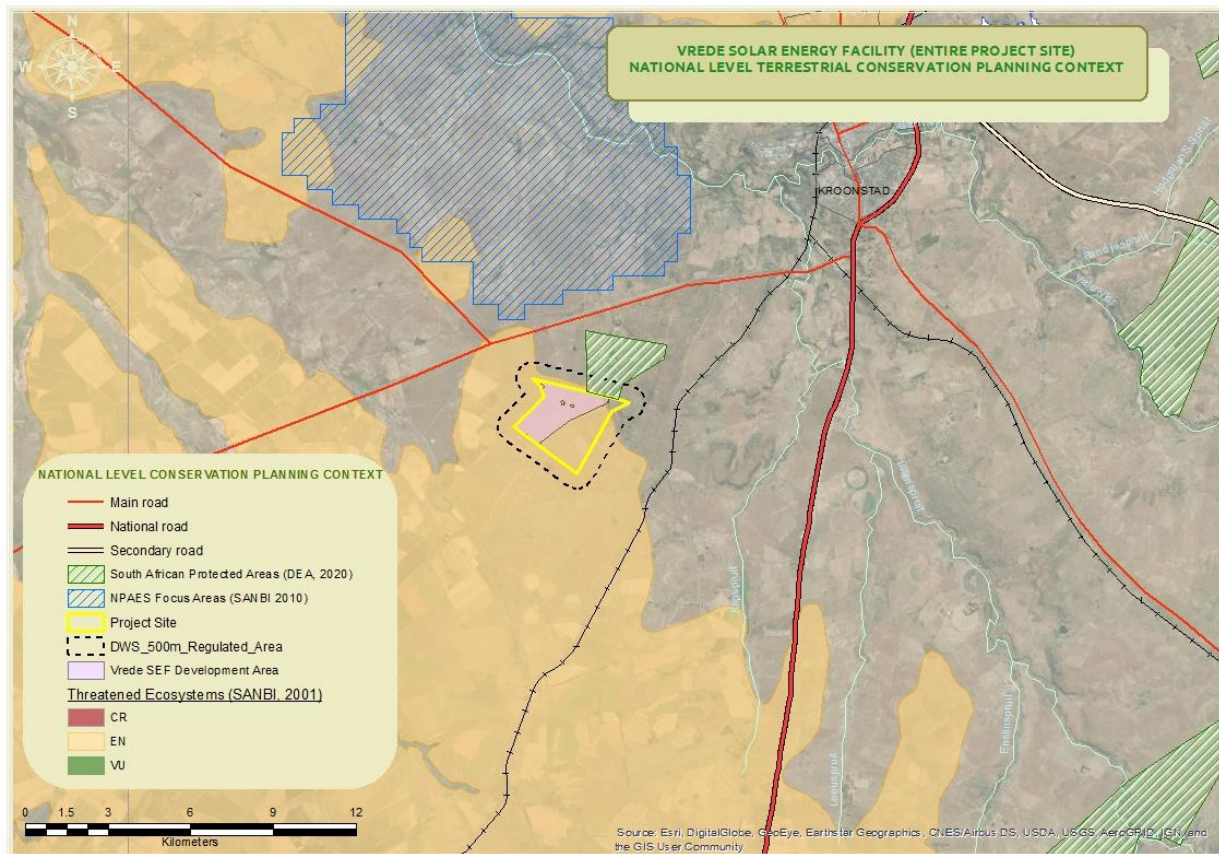


Figure 7.9: National Level Terrestrial Conservation Planning Context.

v. Freshwater overview

Strategic Water Source Areas (SWSAs)

Strategic Water Source Areas (SWSAs) are defined as areas of land that either:

- » supply a disproportionate (i.e. relatively large) quantity of mean annual surface water runoff in relation to their size and so are considered nationally important;
- » have high groundwater recharge and where the groundwater forms a nationally important resource;
- » areas that meet both criteria mentioned above.

They include transboundary Water Source Areas that extend into Lesotho and Swaziland.

The project site is located outside of any SWSA for surface water but is located within a SWSA for groundwater; namely the Kroonstad SWSA-gw. Due to the nature of solar PV developments and their associated infrastructure (limited use of chemicals, hazardous and toxic materials), it is unlikely that such a development will have a significant impact on groundwater quality. However, solar PV developments may slightly influence local infiltration and subsequently ground water recharge. This impact can however, be successfully mitigated through careful planning and with effective mitigation measures in place. This potential impact will be assessed during the EIA phase and will be accompanied with the necessary mitigation measures.

Freshwater Features

A desktop mapping exercise wherein all available Geo-spatial resources were closely analysed numerous wetland features were identified within the development area as well as the DWS 500m regulated area (refer **Figure 7.10**). A few seepage wetlands were also identified, mostly along the southern boundary of the development area. Most of the valley-bottom (VB) wetlands were naturally unchanneled, however the fairly large VB wetland identified within the north-eastern corner of the project site was predominantly channelled. All of these VB wetlands drain either in a northern or a north-western direction towards the Blomspruit River located approximately five (6) kilometres to the west of the project site. The delineated channelled VB wetland can be regarded as the primary drainage feature within the project site.

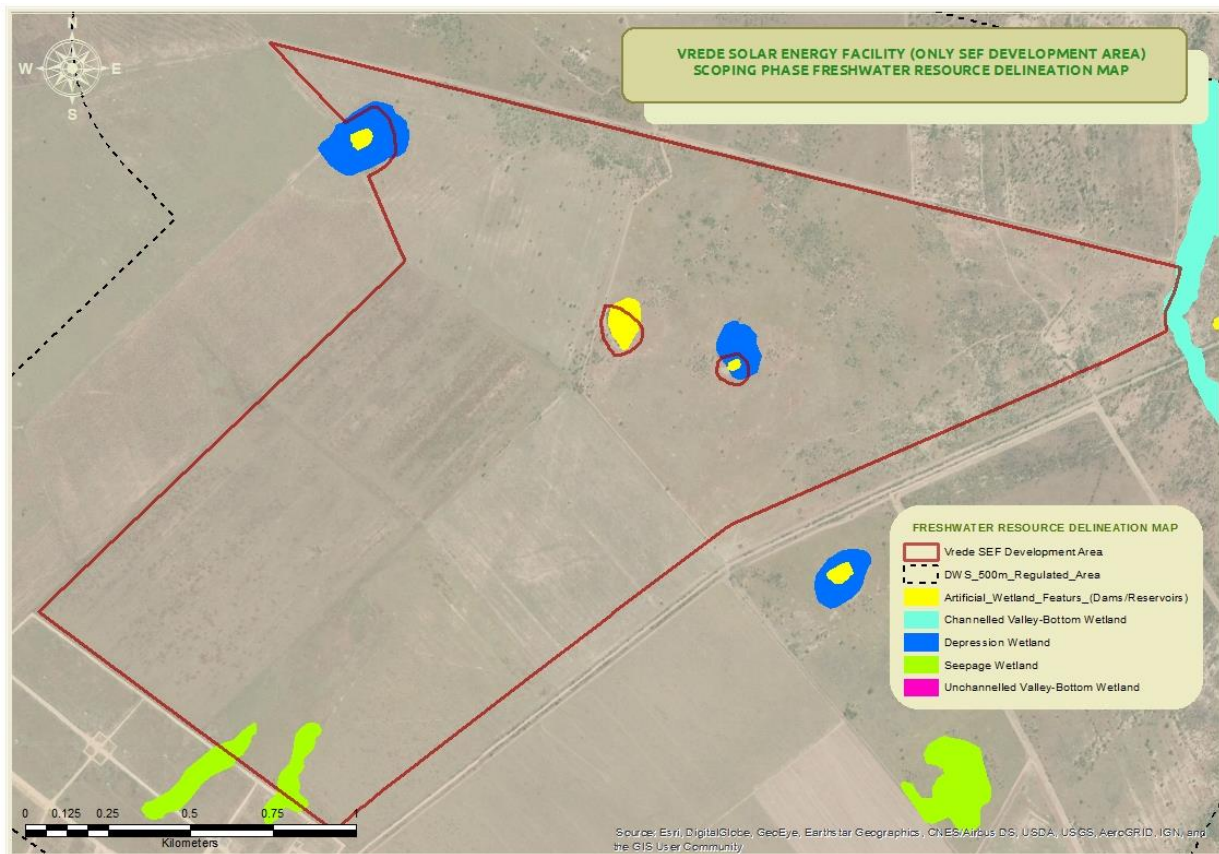


Figure 7.10: Desktop wetland delineation within the development area, to be confirmed during the EIA phase assessments.

vi. Avifauna

» **Supporting avifaunal habitat within the study area**

There are no Important Bird Areas (IBA) within a 60km radius around the Vrede Solar PV Facility. It is therefore highly unlikely that the proposed development will have a negative impact on any IBA.

Species composition, distribution and abundance within the project site is largely influenced by the broad vegetation type, however species behaviour and fine scale distribution is linked to the avifaunal habitats present. The following bird habitats were determined for the development area:

- » **Woodland:** The development area contains scattered areas of thorny shrubs and trees. One small ephemeral drainage line bisects the north-eastern corner of the development area, with a length of approximately 150m situated within the development area. Drainage lines are important corridors for woodland species because the woodland along the banks is a refuge for woodland species. The largest concentration of shrubs and a few small trees in the development area is found along the banks of the drainage line.
- » **Pans:** The development area contains three small pans. When the pans hold water (which is only likely after sustained rainfall events), it may temporarily attract a variety of waterbirds, as well as other birds which use them to drink and bath. Sources of surface water are major attractants to birds.
- » **Fences:** The development area contains a number of fences. Farm fences provide important perching substrate for a wide range of birds, as a staging post for territorial displays by small birds and also for perch hunting by some raptors.

Each of the main habitat types have been surveyed independently for bird species richness and bird abundance as required for Regime 1 development sites.

» **Avian species richness and red data species**

The SABAP2 data indicates that a total of 192 bird species could potentially occur within the development area and immediate surroundings. The avifaunal specialist study provides a comprehensive list of all the species. Of these, 67 species are classified as priority species and 2 of these are South African Red Data species. Of the priority species, 11 are likely to occur regularly at the development area, and another 17 could occur sporadically. **Table 7.3** below lists all the priority species and the possible impact on the respective species by the proposed solar energy infrastructure. The following abbreviations and acronyms are used:

- » NT = Near threatened;
- » End = South African Endemic;
- » N-End = South African near endemic;
- » H = High;
- » M = Medium;
- » L = Low.

Priority species with a high likelihood of occurrence on site included the Amur Falcon (*Falco amurensis*), Black-winged Kite (*Elanus caeruleus*), Lesser Kestrel (*Falco naumanni*), Black-headed Heron (*Ardea melanocephala*), Blacksmith Lapwing (*Vanellus armatus*), Cape White-eye (*Zosterops virens*), Egyptian Goose (*Alopochen aegyptiacus*), Fiscal Flycatcher (*Sigelus silens*), Hadedda Ibis (*Bostrychia hagedash*), Three-banded Plover (*Charadrius tricollaris*), and the Western Cattle Egret (*Bubulcus ibis*). Only these, only the Western Cattle Egret (*Bubulcus ibis*), Fiscal Flycatcher (*Sigelus silens*), Egyptian Goose (*Alopochen aegyptiacus*) and the Blacksmith Lapwing (*Vanellus armatus*) were actually observed during the avifaunal field assessment.

Of the priority species with moderate likelihood of occurrence on site, only the Pale Chanting Goshawk (*Melierax canorus*), Fairy Flycatcher (*Stenostira scita*) and South African Shelduck (*Tadorna cana*) were observed during the avifaunal field assessment.

The habitats within which each priority species is likely to utilise is also detailed in **Table 7.3** below. A strong preference for surface water habitats are shown across the priority species, with roughly equal utilisation of the grassland and woodland habitats.

Table 7.3: Priority species potentially occurring at the site and immediate surroundings

Species	Taxonomic name	Full protocol	Ad hoc protocol	Solar priority species	Red Data status: International	Red Data status: Regional	Endemic/near endemic - South Africa	Raptor	Waterbird	Possibility of regular occurrence	Recorded during surveys: Vrede	Grassland	Woodland	Surface water	Fences	PV panel collisions	Displacement - disturbance	Displacement - habitat loss	Entrapment in fences	Electrocution on 33kV OHL
Amur Falcon	<i>Falco amurensis</i>	28.07	4.76	x				x		H		x			x	x		x		
Black-winged Kite	<i>Elanus caeruleus</i>	45.61	9.52	x				x		H		x			x	x		x		
Lesser Kestrel	<i>Falco naumanni</i>	35.09	1.59	x			x	x		H		x			x	x		x		
Black-headed Heron	<i>Ardea melanocephala</i>	47.37	6.35	x					x	H		x		x					x	x
Blacksmith Lapwing	<i>Vanellus armatus</i>	87.72	11.11	x					x	H	x			x						
Cape White-eye	<i>Zosterops virens</i>	35.09	1.59	x			x			H			x		x	x	x			
Egyptian Goose	<i>Alopochen aegyptiacus</i>	49.12	1.59	x					x	H	x			x						x
Fiscal Flycatcher	<i>Sigelus silens</i>	42.11	0.00	x			x			H	x		x		x	x	x	x		
Hadeda Ibis	<i>Bostrychia hagedash</i>	84.21	11.11	x					x	H				x						x
Three-banded Plover	<i>Charadrius tricollaris</i>	26.32	0.00	x					x	H				x						
Western Cattle Egret	<i>Bubulcus ibis</i>	77.19	19.05	x					x	H	x	x		x						x
African Fish-eagle	<i>Haliaeetus vocifer</i>	1.75	0.00	x				x	x	L				x						x
African Harrier-Hawk	<i>Polyboroides typus</i>	3.51	0.00	x				x		L			x		x	x				x
Black Sparrowhawk	<i>Accipiter melanoleucus</i>	1.75	0.00	x				x		L			x					x		x
Gabar Goshawk	<i>Melierax gabar</i>	1.75	0.00	x				x		L			x			x		x		
Red-footed Falcon	<i>Falco vespertinus</i>	1.75	0.00	x				x		L		x			x	x		x		
African Black Duck	<i>Anas sparsa</i>	1.75	0.00	x					x	L				x						
African Darter	<i>Anhinga rufa</i>	10.53	0.00	x					x	L				x						
African Openbill	<i>Anastomus lamelligerus</i>	1.75	0.00	x					x	L				x						
African Snipe	<i>Gallinago nigripennis</i>	7.02	0.00	x					x	L				x						
African Spoonbill	<i>Platalea alba</i>	7.02	0.00	x					x	L				x						
Black-necked Grebe	<i>Podiceps nigricollis</i>	1.75	0.00	x					x	L				x						
Black-winged Stilt	<i>Himantopus himantopus</i>	12.28	0.00	x					x	L				x						
Blue Korhaan	<i>Eupodotis caerulescens</i>	1.75	1.59	x	NT	LC	x			L		x					x		x	
Cape Shoveler	<i>Anas smithii</i>	8.77	0.00	x					x	L				x						

Cape Teal	<i>Anas capensis</i>	1.75	0.00	x					x	L				x					
Cape Weaver	<i>Ploceus capensis</i>	1.75	0.00	x			x			L			x		x	x	x		
Common Greenshank	<i>Tringa nebularia</i>	1.75	0.00	x					x	L				x					
Common Moorhen	<i>Gallinula chloropus</i>	22.81	0.00	x					x	L				x					
Common Sandpiper	<i>Actitis hypoleucos</i>	1.75	0.00	x					x	L				x					
Fulvous Duck	<i>Dendrocygna bicolor</i>	10.53	0.00	x					x	L				x					
Glossy Ibis	<i>Plegadis falcinellus</i>	12.28	0.00	x					x	L				x					
Goliath Heron	<i>Ardea goliath</i>	1.75	0.00	x					x	L				x					
Greater Flamingo	<i>Phoenicopterus ruber</i>	1.75	1.59	x	LC	NT			x	L				x					
Kittlitz's Plover	<i>Charadrius pecuarius</i>	3.51	0.00	x					x	L				x					
Lesser Flamingo	<i>Phoenicopterus minor</i>	1.75	0.00	x	NT	NT			x	L				x					
Little Stint	<i>Calidris minuta</i>	3.51	0.00	x					x	L				x					
Maccoa Duck	<i>Oxyura maccoa</i>	1.75	0.00	x					x	L				x					
Malachite Kingfisher	<i>Alcedo cristata</i>	15.79	0.00	x					x	L				x					
Marsh Sandpiper	<i>Tringa stagnatilis</i>	1.75	0.00	x					x	L				x					
Melodious Lark	<i>Mirafra cheniana</i>	1.75	0.00	x			x			L		x			x	x	x		
Pied Avocet	<i>Recurvirostra avosetta</i>	1.75	0.00	x					x	L				x					
Pied Kingfisher	<i>Ceryle rudis</i>	1.75	0.00	x					x	L				x					
Purple Heron	<i>Ardea purpurea</i>	8.77	0.00	x					x	L				x					
Reed Cormorant	<i>Phalacrocorax africanus</i>	43.86	3.17	x					x	L				x					
Southern Pochard	<i>Netta erythrophthalma</i>	10.53	0.00	x					x	L				x					
Whiskered Tern	<i>Chlidonias hybrida</i>	3.51	0.00	x					x	L				x					
White Stork	<i>Ciconia ciconia</i>	1.75	0.00	x					x	L		x		x				x	x
White-breasted Cormorant	<i>Phalacrocorax carbo</i>	28.07	1.59	x					x	L				x					
Common Buzzard	<i>Buteo vulpinus</i>	7.02	0.00	x			x	x		M		x			x	x		x	x
Greater Kestrel	<i>Falco rupicoloides</i>	3.51	0.00	x				x		M		x			x	x		x	x
Marsh Owl	<i>Asio capensis</i>	7.02	0.00	x				x		M		x			x	x	x	x	x
Pale Chanting Goshawk	<i>Melierax canorus</i>	5.26	0.00	x				x		M	x	x	x		x	x	x	x	x
African Sacred Ibis	<i>Threskiornis aethiopicus</i>	26.32	0.00	x					x	M				x					
Fairy Flycatcher	<i>Stenostira scita</i>	5.26	0.00	x			x			M	x		x			x	x	x	
Grey Heron	<i>Ardea cinerea</i>	14.04	1.59	x					x	M				x					x
Little Egret	<i>Egretta garzetta</i>	12.28	0.00	x					x	M				x					
Little Grebe	<i>Tachybaptus ruficollis</i>	38.60	1.59	x					x	M				x					

Pied Starling	<i>Spreo bicolor</i>	5.26	1.59	x			x			M		x			x	x			
Red-billed Teal	<i>Anas erythrorhyncha</i>	28.07	0.00	x					x	M				x					
Red-knobbed Coot	<i>Fulica cristata</i>	59.65	7.94	x					x	M				x					
South African Cliff-swallow	<i>Hirundo spilodera</i>	26.32	6.35	x			x			M		x				x			
South African Shelduck	<i>Tadorna cana</i>	7.02	0.00	x			x		x	M	x			x					
Spur-winged Goose	<i>Plectropterus gambensis</i>	24.56	3.17	x					x	M				x					x
White-faced Duck	<i>Dendrocygna viduata</i>	33.33	0.00	x					x	M				x					
Yellow-billed Duck	<i>Anas undulata</i>	68.42	1.59	x					x	M				x					

» **Species recorded through on-site surveys**

On-site surveys were conducted from 20 - 22 July 2020 by means of transect counts. The Index of Kilometre Abundance (IKA) indicated in **Figure 7.11** expresses the ratio of the total number of individuals (or of signs of presence) observed along a transect by the total transect length covered, and is a common measure used in avifaunal studies as it allows a straightforward comparison of species abundance in different sites or at different times. The species of greatest abundance as determined by on site observations, was that of the Egyptian Goose, followed by the Fiscal Flycatcher, following which the South African Shelduck and the Fairy Flycatcher shared equal abundance values. Furthermore, the Egyptian Goose and Fiscal Flycatcher distribution was fairly widespread across the development area. Transect counts recorded the greatest number of Egyptian Goose individuals on site, as compared to all other priority species, which was therefore the most abundant priority species on site. Incidental counts indicated 25 counts of Greater Flamingo in the broader project area, however these were not observed within the development area.

The abundance of avifauna recorded during the transect and incidental counts are displayed below (refer to **Figure 7.11**, **Figure 7.12** and **Figure 7.13**). The location of all recorded priority species is displayed in **Figure 7.14**.

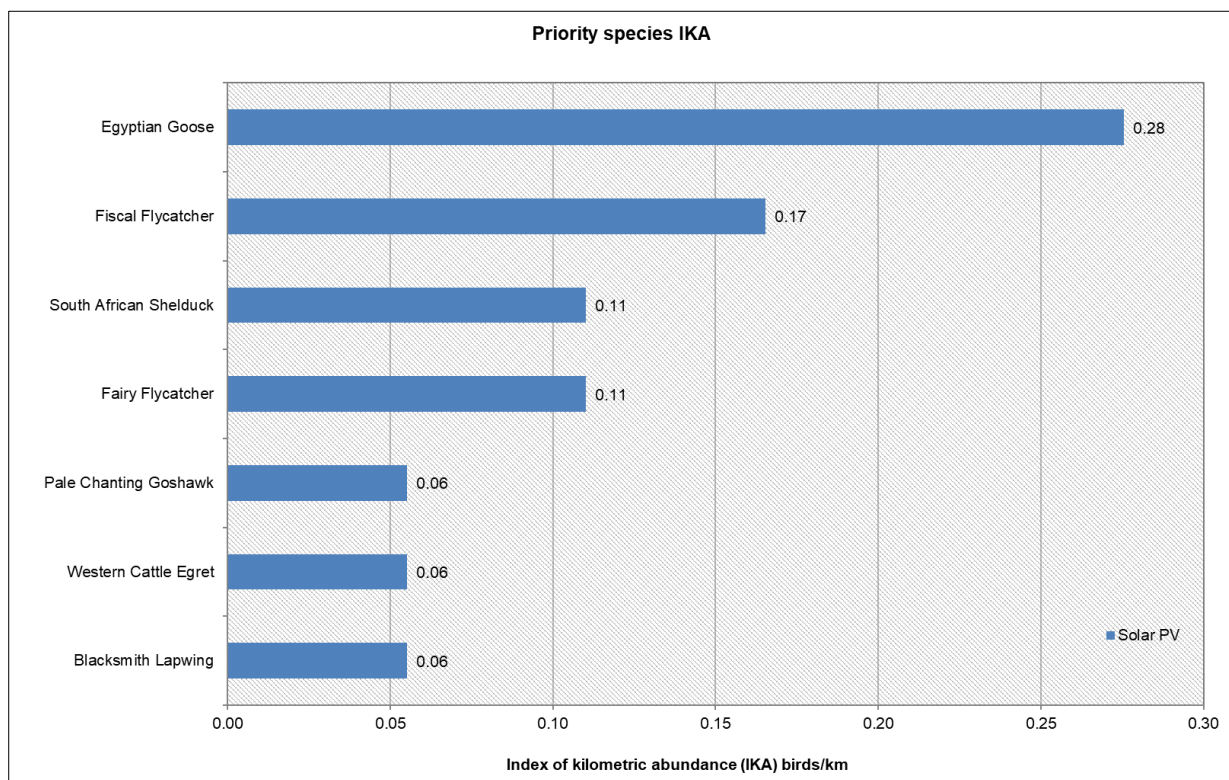


Figure 7.11: Index of kilometric abundance (IKA) for all priority species recorded by means of transect counts during the surveys in the study area conducted in July 2020.

The number of incidental records of priority species within a 10km radius around the development area is listed in **Figure 7.12** below.

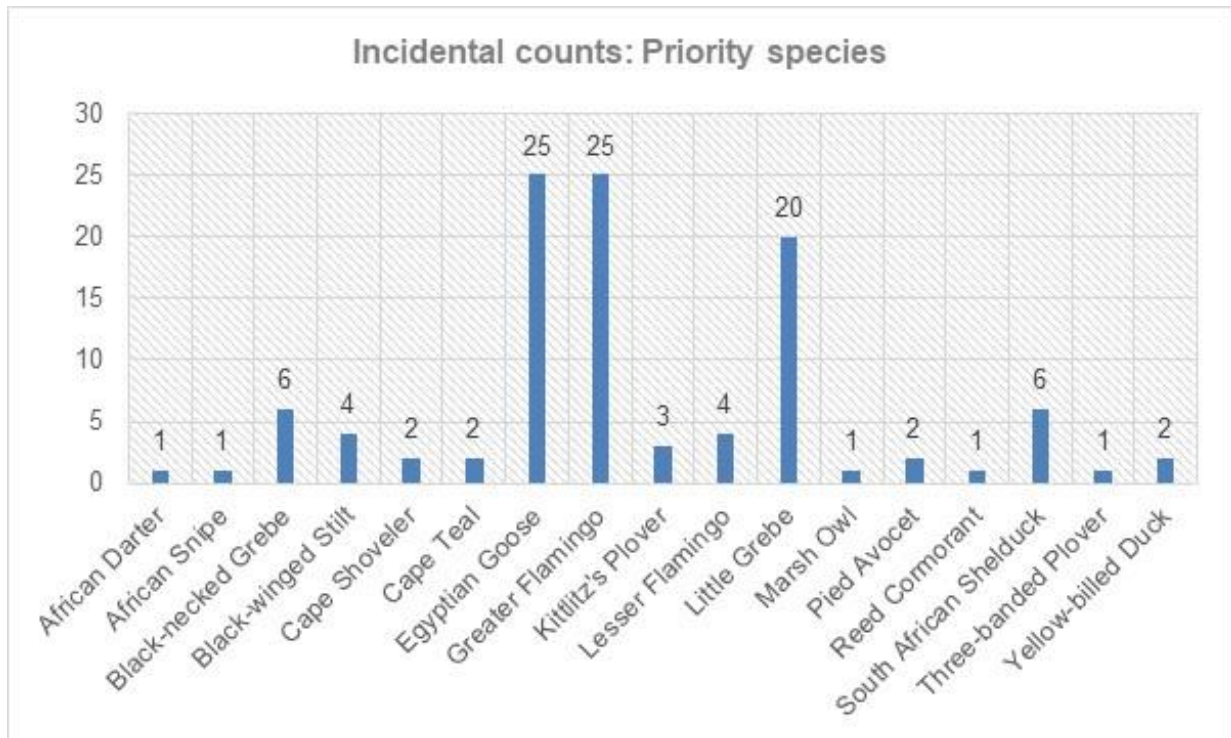


Figure 7.12: Incidental counts of priority species within a 10km radius around the development area.

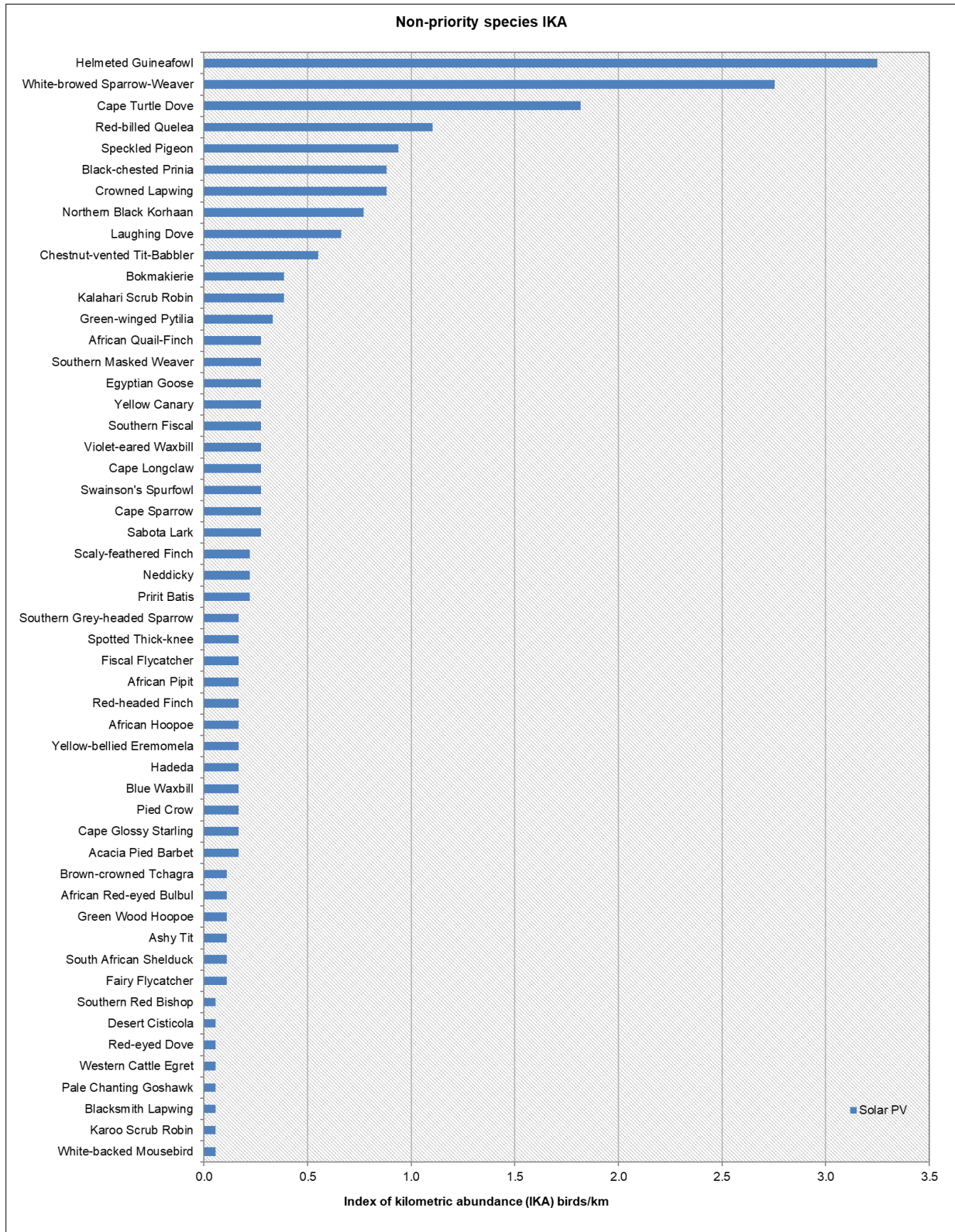


Figure 7.13: Index of kilometric abundance (IKA) for all non-priority species recorded by means of transect counts during the surveys, conducted in July 2020.

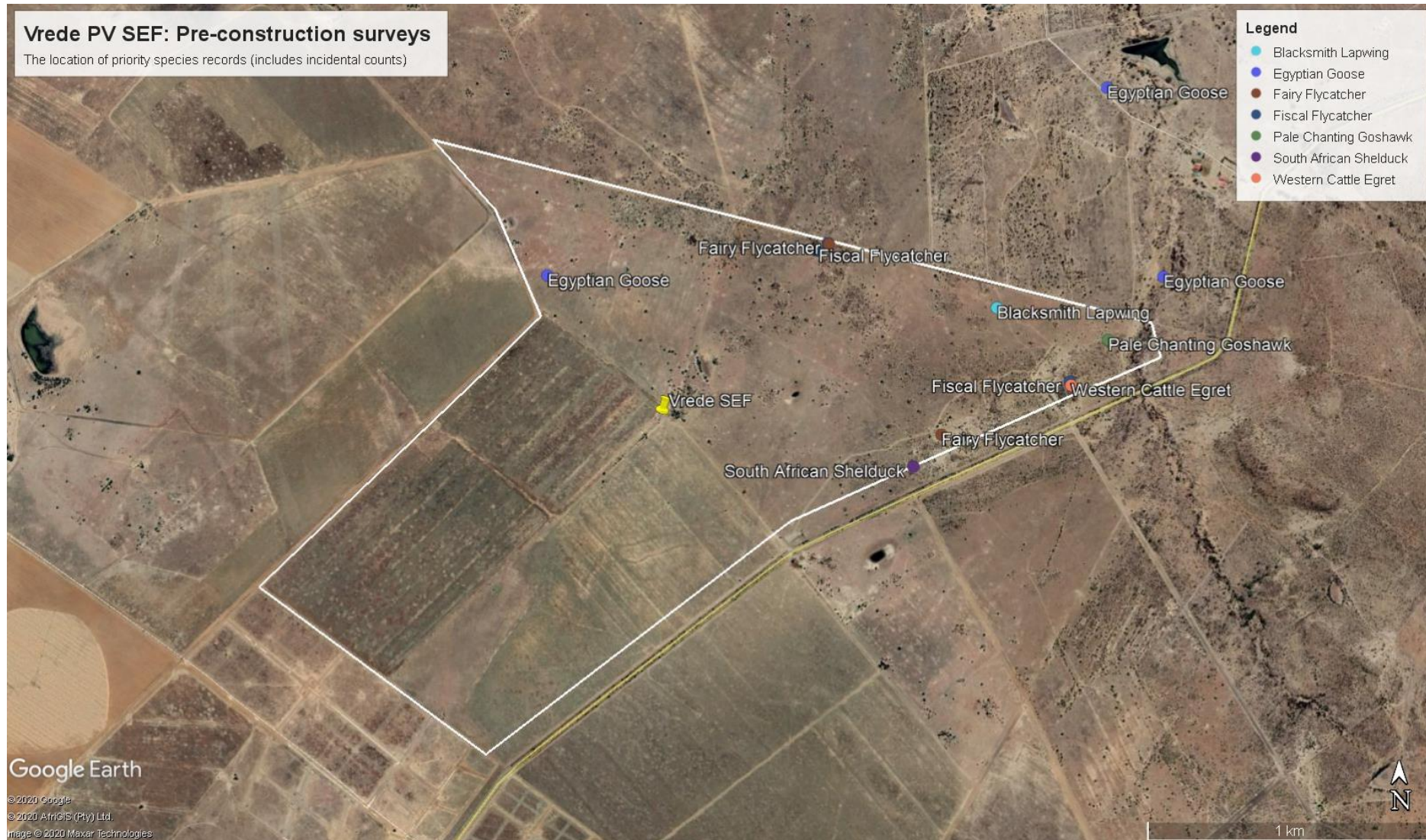


Figure 7.14: The location of priority species recorded during transect and incident counts.

7.5 Integrated Heritage including Archaeology, Palaeontology and the Cultural Landscape

7.5.1 Historical and Archaeological Background

Known heritage resources within the broader study area were determined as part of the heritage assessment, with no known heritage features being located near the project site (refer to **Figure 7.15**).

Kroonstad was established as a town in 1855. During the Second Boer War, from 13 March to 11 May 1900, the city became the capital of the Orange Free State, and subsequently the site of a British concentration camp to contain Boer women and children. Kroonstad still boasts much of the inherent rugged beauty which led the Voortrekkers to establish the town where they did, and it is situated in an area characterised by open spaces and an abundant variety of vegetation that makes it particularly beautiful. According to Van Schalkwyk (2013), "Most farmsteads were burned down during the Anglo-Boer War, with the result that very little of the built environment dates to the 19th century." According to Matenga (2019), the Black and Coloured townships are significant as landscapes of segregation occupying the north-western fringe of the CBD, while the exclusive white suburbs were located northeast of the town and south of the Valsch River.

The cultural landscape qualities of the region essentially consist of a rural setup. In this the human occupation is made up of a pre-colonial element consisting of limited Stone Age and Iron Age occupation, as well as a much later colonial (farmer) component. This was soon followed by the development of a number of urban centres or towns. Originally these mostly served the surrounding farming communities, but with the discovery of the Free State Gold Fields, they expanded rapidly in order to serve this industry as well. The proposed development is located some distance from the historic core of Kroonstad town. Furthermore, the area proposed for development is located more than 5km away from the site of the Boer War concentration camps and associated burial grounds.

Prior to colonial settlement in 1855, the area proposed for development formed part of a landscape that was occupied by indigenous Khoe herders and San hunter-gatherers. These indigenous communities were displaced by Bantu-speaking people who began to occupy the area in the Iron Age. According to Van Schalkwyk (2013), "Sites dating to the Late Iron Age are known to occur in the region, especially... in the vicinity of the Sandrivier, whereas some are known to occur to the northwest of Ventersburg. These are typical stone walled sites that are linked with Sothospeakers and date to the period after 1600." As such, it is possible that Early, Middle or Later Stone Age artefacts may be located within the proposed development area. Furthermore, it is possible that evidence of Iron Age settlement may also be located within the proposed development area.

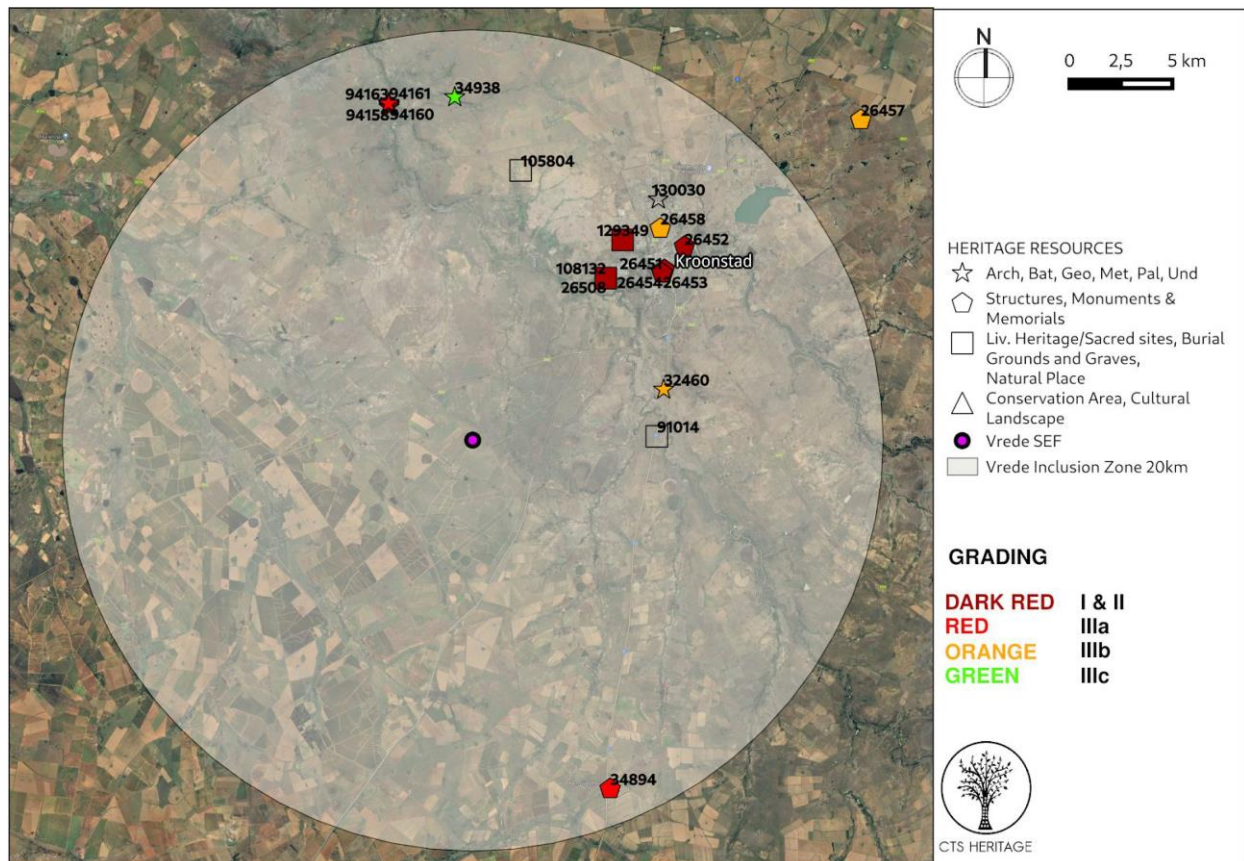


Figure 7.15: Heritage Resources previously identified within the study area, with SAHRIS Site IDs indicated in the insets below.

7.5.2 Palaeontology

According to the SAHRIS Palaeosensitivity Map (refer to **Figure 7.16**), the area proposed for development is underlain by sediments of moderate to very high palaeontological sensitivity. According to the Council of GeoScience 2726 Kroonstad Map, the development area for the Vrede Solar PV Facility are underlain by sediments of the Karoo Supergroup including the Adelaide Subgroup (Pa) as well as Jurassic Dolerite (Jd) and Quaternary Sands (Qs). The most palaeontologically sensitive formation underlying the development area is the Adelaide Subgroup of the Beaufort Group. This formation forms part of the Dickeynodon and Lystrosaurus assemblage zones and is known to include fossils of fish, amphibians, reptiles, therapsids and vertebrate burrows. Diverse terrestrial and freshwater tetrapods of Pristerognathus to Dickeynodon Assemblage Zones (amphibians, true reptiles, synapsids – especially therapsids) have been found in this formation, as well as, palaeoniscoid fish, freshwater bivalves, trace fossils (including tetrapod trackways), sparse to rich assemblages of vascular plants (Glossopteris Flora, including spectacular petrified logs) and insects. Based on the known palaeontological sensitivities of the Adelaide Subgroup, it is recommended that a palaeontological assessment of the area proposed for development is completed and anticipated impacts to such resources assessed.

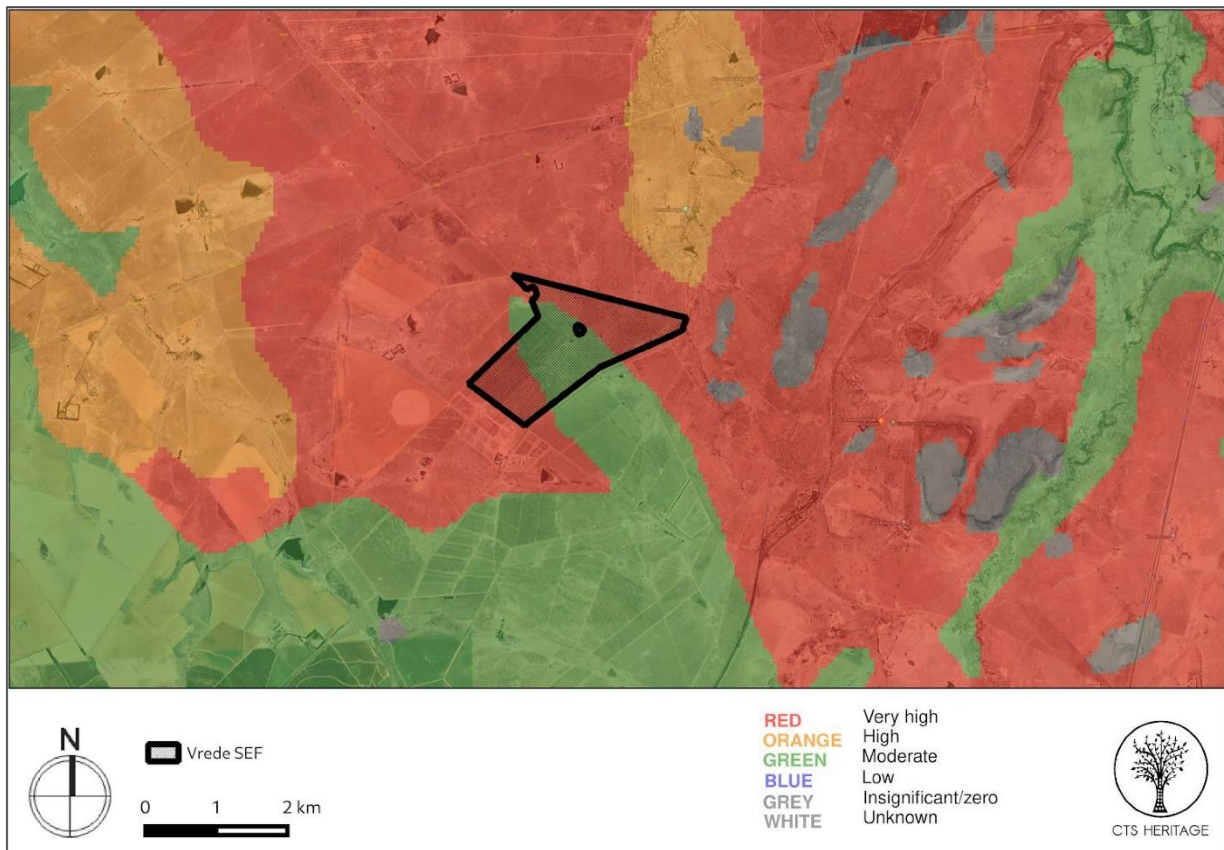


Figure 7.16: Heritage Resources previously identified within the study area, with SAHRIS Site IDs indicated in the insets below.

7.6 Social Context

The Free State Province lies in the centre of South Africa, located between the Vaal River in the north and the Orange River in the south. The region is one of flat, rolling grassland and fields of crops, rising to mountains in the north-east. The Province is the granary of South Africa, with agriculture central to its economy, while mining in the goldfield reefs is its largest employer.

Economic towns include Welkom, Kroonstad, Parys, QwaQwa, and Bethlehem. The Free State is the third-largest Province in South Africa, but it has the second-smallest population and the second-lowest population density. The culture is centred on traditional cultures but built on the influences of the early European settlers.

Close to 2.8-million people live in the Free State, with two-thirds speaking Sesotho, followed by Afrikaans, Zulu, Tswana, Xhosa and English.

The Free State is strategically placed to take advantage of the national transport infrastructure. Two corridors are of particular importance: the Harrismith node on the N3 corridor between Gauteng and KwaZulu-Natal, and the N8. The N1 connects Gauteng to the Western Cape. Bram Fischer International Airport in Bloemfontein handles about 250 000 passengers and 221 000 tons of cargo a year. Manufacturing also features in the provincial economic profile. This sector makes up 14% of the provincial output, with petrochemicals (via Sasol) accounting for more than 85% of the output.

The Free State Province comprises four (4) Districts, of which the Vrede Solar PV Facility is located within the Fezile Dabi District Municipality. This is a Category C municipality, formerly known as the Northern Free State District Municipality, situated in the north of the Free State. It is bordered by the North West, Gauteng and Mpumalanga Provinces to the north, Thabo Mofutsanyana District to the south, and Lejweleputswa District to the west. The municipality is the smallest district in the Province, making up 16% of its geographical area. The main attraction site, the Vredefort Dome, being the third-largest meteorite site in the world, is located within the district.

Various towns are situated within the municipal area which includes Cornelia, Deneysville, Edenville, Frankfort, Heilbron, Koppies, Kragbron, Kroonstad, Oranjeville, Parys, Renovaal, Sasolburg, Steynsrus, Tweeling, Vierfontein, Viljoenskroon, Villiers and Vredefort.

The main economic sectors of the area includes trade (22%), community services (20%), manufacturing (13%), households (13%), agriculture (12%), finance (7%), construction (6%) and transport (5%).

Fezile Dabi District comprises four Local Municipalities (LMs) namely, Moqhaka, Metsimaholo, Ngwathe and Mafube LMs, where the project site is located within the Moqhaka Local Municipality.

7.6.1 Demographic Profile of the Moqhaka Local Municipality

The Moqhaka Local Municipality is a Category B municipality situated within the southern part of the Fezile Dabi District, and covers an area of land 7 925km² in extent. It is the largest of four municipalities in the district, making up over a third of its geographical area. The former Kroonstad, Steynsrus and Viljoenskroon Transitional Local Councils and sections of the Riemland, Kroonkop and Koepel Transitional Rural Councils are included in the municipality. The seat of local government is Kroonstad. The Moqhaka LM has a total population of 154 735, with a total of 53 601 households. In terms of the age structure 24.5% of the population is under 15 years of age, 67.8% of the population falls between 15 and 64, with 7.7% of the population being over 65. The Municipality is female dominated, with females comprising approximately 50.49% of the LM population, while the Fezile Dabi DM is comprised of 50% males and 50% females.

In terms of race, Africans are 87.19% and Coloured 2.86% of the total population. Indian/Asian are 0.33% and whites make out 9.32% of the total population of the Moqhaka LM.

The most spoken language is Setsotho, followed by Afrikaans, Isixhosa, Isizulu, English and Setswana. The Moqhaka LM, Fezile Dabi DM, Free State provincial, and South African national population age structures are all youth dominated. A considerable proportion of the respective populations therefore comprise individuals within the economically active population between the ages of 15 and 64 years of age.

The Moqhaka LM has a dependency ratio of 47.6, which correlates to some extent with the Fezile Dabi DM (48.1). Education levels within the Moqhaka LM are low with approximately 31.5% of the population over 20 years of age not having completed Grade 12 / Matric. This means that the majority of the population can be expected to have a relatively low-skill level and would either require employment in low-skill sectors, or skills development opportunities in order to improve the skills level of the area. The unemployment rate of the Moqhaka LM is high (35.2%) which places strain on the municipal services delivery as people cannot afford to pay for

municipal services. The unemployment rate of the Feliz Dabi DM is 33.9%. The Moqhaka LM has approximately 39.5% females as household heads, and the primary economic activities within the Moqhaka LM comprise agriculture, commercial transport, business services and mining. The majority of households within the Moqhaka LM comprise formal dwellings (85.9%) and the average household size is 2.9.

7.6.2 Economic Profile of the Moqhaka Local Municipality

The Greater Kroonstad area is the centre of a large agricultural community that plays an important role in the economy of the district. Subsequently, industrial activities contribute significantly to the district's economy. The Department of Correctional Services and the School of Engineers military bases are situated in the town. The urban area is situated adjacent to the N1 National Road and located adjacent to one of the largest and most important four-way railway junctions in South Africa.

The Viljoenskroon/Rammulotsi urban area is located within an area of extreme agricultural significance. The urban area plays a significant role in providing residential opportunities to the adjacent goldfields and mining activities in the North West Province. The Provincial Roads P15/1 and P15/2 from Kroonstad to Klerksdorp in the North West Province extend through the area from north to south and plays a significant role.

The Steynsrus/Matlwangtlwang urban area is situated approximately 45km east of Kroonstad and 92km west of Bethlehem. The major link road between Bethlehem and Kroonstad stretches adjacent to the urban area. The main economic sectors in the area include agriculture, commercial transport, business services and mining.

7.6.3 Settlement and infrastructure

The project development area is located on Remaining extent of the farm Vrede No. 1152 and Portion 1 of the farm Uitval No. 1104. The nearest homestead is Valsvlei which is unoccupied. The next nearest homestead is a farmhouse further south along the access road, approximately 500m from the development area. A further homestead is located ~600m north along the access roads. There are no built up areas, towns or mining land uses within the immediate study area.

There are two Eskom distribution power lines in the vicinity of the proposed project, namely the 132kV distribution line between Theseus Substation and Kroonstad Municipality Substation and the 88kV Rural/Traction distribution line between Gunhill Traction and Gineva Rural/Traction as well as Gunhill Traction and Amerika Rural/Traction (which is not considered a feasible option for connection). A further 11kV line running parallel to the S172 gravel road is also located near the development area.

In addition, two hospitals are available within the Moqhaka LM, which includes the Boitumelo Hospital and the Kroon Private Hospital. Ten clinics area available within the municipal area .

The majority of households within the Moqhaka LM are well serviced with regards to flush toilets connected to sewage, refuse removal and electricity. However, only 48.6% of households have piped water inside the dwelling.

CHAPTER 8 SCOPING OF POTENTIAL ISSUES

This Chapter provides an overview of the potential impacts and risks associated with the establishment of the Vrede Solar PV Facility, including the BESS and associated infrastructure, identified at this stage of the process through a desktop review of available existing information.

Potential environmental impacts and risks associated with the development of PV solar energy generation facilities, as described in the IFC's Project Developer's Guide to Utility-Scale Solar Photovoltaic Power Plants (2015), include:

- » Construction phase impacts, such as temporary air emissions (dust and vehicle emissions), noise, solid waste and wastewater generation, and Occupational Health and Safety (OHS) issues such as the risk of preventable accidents leading to injuries and/or fatalities.
- » Water usage, such as the cumulative water use requirements in arid areas where local communities rely on scarce groundwater resources.
- » Land matters, such as land acquisition procedures and in particular involuntary land acquisition/resettlement.
- » Landscape and visual impacts, such as the visibility of the project within the wider landscape and associated impacts on landscape designations, character types and surrounding communities.
- » Ecology and natural resources, such as habitat loss / fragmentation, impacts on designated areas and disturbance or displacement of protected or vulnerable species.
- » Heritage, such as impacts on the setting of designated sites or direct impacts on below-ground archaeological deposits as a result of ground disturbance during construction.
- » Transport and access, such as impacts associated with the transportation of materials and personnel on project-affected communities.
- » Drainage/flooding, such as the potential for high flood risk associated with the project site.

This chapter serves to describe and evaluate the identified potential environmental impacts relevant and specific with the construction and operation phases of the Vrede Solar PV Facility (up to 100MW in capacity) and to make recommendations for further studies required to be undertaken in the EIA phase.

The project site considered for the proposed the Vrede Solar PV Facility includes the remaining extent of the farm Vrede No. 1152 and portion 1 of the farm Uitval No. 1104 (with a total extent of approximately 538ha). A development area of ~279ha within this project site has been investigated during this Scoping Phase to determine the environmental suitability of the site. This will provide an indication of the areas of sensitivity that the developer would need to take into consideration in the planning of the location of the proposed the Vrede Solar PV Facility.

The majority of the environmental impacts are expected to occur during the construction phase. Environmental issues associated with construction and decommissioning activities of the PV facility and associated infrastructure are similar and include, among others:

- » Impact on ecology, including flora and fauna.
- » Impact on avifauna.
- » Impact on soils, geology, agricultural potential and land use.

- » Impact on heritage resources (including archaeology and palaeontology).
- » Social impacts (positive and negative).
- » Visual impacts.

Environmental issues specific to the operation of the PV facility and associated infrastructure could include, among others:

- » Long-term loss of protected species (flora, fauna, avifauna) or conservation-worthy habitats.
- » Change in land-use for the footprint of the facility.
- » Visual impacts (negative viewer perceptions and visibility of the facility).
- » Social impacts (positive and negative).

Section 8.3 provides a summary of the findings of the desktop scoping study undertaken for the construction, operation and decommissioning phases of the Vrede Solar PV Facility. Those impacts associated with construction can also be expected to be associated with the decommissioning phase (however, to a lesser extent as the project site would have previously undergone transformation and disturbance during construction). Potential impacts associated with the project are evaluated, and recommendations are made regarding further studies required within the EIA phase. The evaluations in **Section 8.3** are based on available desktop data as well as specialist scoping assessments and provide the basis of what is required to be assessed in further detail during the EIA phase.

A summary of the potential cumulative impacts that may be associated with the project is provided in **Section 8.4**. These impacts are associated with the scale of the project when considered together with other similar developments (if any) within the region, and will be confirmed and assessed within the EIA phase of the project.

8.1 Legal Requirements as per the EIA Regulations, 2014 (as amended) for the undertaking of an Impact Assessment Report

This chapter serves to identify the potential environmental impacts associated with the development of the Vrede Solar PV Facility from a desktop level. This chapter includes the following information required in terms of the EIA Regulations, 2014 - Appendix 2: Content of the Scoping Report:

Requirement	Relevant Section
(g)(v) the impacts and risks which have informed the identification of each alternative, including the nature, significance, consequence, extent, duration and probability of such identified impacts, including the degree to which these impacts (aa) can be reversed (bb) may cause irreplaceable loss of resources and (cc) can be avoided, managed or mitigated.	The impacts and risks identified to be associated with the construction and operation phase of the Vrede Solar PV Facility have been included in Section 8.3 . Impact tables have been included for each field of study which considers the nature, significance, consequence, extent, duration and probability of the impacts, as well the reversibility of the impacts, the loss of resources and avoidance, management or mitigation.
(g)(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical,	The positive and negative impacts associated with the Vrede Solar PV Facility have been included in Section 8.3 .

Requirement	Relevant Section
biological, social, economic, heritage and cultural aspects.	
(g)(viii) the possible mitigation measures that could be applied and level of residual risk	Possible mitigation (specifically relating to the avoidance of sensitive areas) has been included in Section 8.3 .

8.2 Assumptions made during the Evaluation of Potential Impacts

While evaluating potential impacts associated with the proposed project, the Scoping evaluation assumed the following:

- » All information provided by the developer and I&APs to the environmental team was correct and valid at the time it was provided.
- » It is assumed that the development area for the solar PV facility identified by the developer represents a technically suitable site for the establishment of the Vrede Solar PV Facility which is based on the design undertaken by technical consultants for the project.
- » The development footprint (the area that will be affected during the operation phase) will include the footprint for the PV facility and associated infrastructure (i.e. internal access roads, BESS and grid connection infrastructure).
- » The Scoping Phase evaluation of impacts has been based on desktop datasets and specialist scoping studies. This information has been used to inform this Scoping report and will be verified by specialists in the EIA phase to assess the project development footprint for the Vrede Solar PV Facility.
- » A separate grid connection solution will be developed for the Vrede Solar PV Facility, and that this solution will be feasible for the connection to the national grid. It is therefore assumed that this is not required to be assessed through this process.

8.3 Evaluation of Potential Impacts associated with the Construction Phase, Operation and Decommissioning phases

8.3.1 Impacts on ecology (including flora and fauna)

» Impacts on vegetation and protected plant species

The most likely and significant impact will be on vegetation. The proposed development may lead to direct loss of vegetation. Consequences of the impact occurring may include:

- general loss of habitat for sensitive species;
- loss in variation within sensitive habitat due to a loss of portions thereof;
- general reduction in biodiversity;
- increased fragmentation (depending on the location of the impact);
- disturbance to processes maintaining biodiversity and ecosystem goods and services; and
- loss of ecosystem goods and services.

The largest portion of the development area is located within Vaal-Vet Sandy Grassland which is classified as Endangered within the National List of Ecosystems that are Threatened and in need of protection (GN1002 of 2011), published under the National Environment Management: Biodiversity Act (Act No. 10 of 2004). Although the development will impact at a local scale it is highly unlikely that this development will impact the status of this vegetation type. Furthermore, the development will be, although long term, not permanent and by only mowing of lower plant layers instead of total clearance of the vegetation within the footprint area, the original lower strata vegetation will be allowed to somewhat persist within most of the development footprint area. With the absence of grazing activities taking place within the development footprint some areas may even progress into a more natural state.

At species level, even though only one species of conservation concern (SCC) has previously been recorded within the region, there is a potential for SCC to occur within the development footprint due to suitable habitat. Such species are especially vulnerable to infrastructure development due to the fact that they cannot move out of the path of the construction activities but are also affected by overall loss of habitat. SCC (red data species) include those listed as critically endangered, endangered or vulnerable. For any other species a loss of individuals or localised populations is unlikely to lead to a change in the conservation status of the species. However, in the case of threatened plant species, loss of a population or individuals could lead to a direct change in the conservation status of the species and possible extinction. This may arise if the proposed infrastructure is located where it will impact on such individuals or populations. Consequences may include:

- fragmentation of populations of affected species;
- reduction in the area of occupancy of affected species; and
- loss of genetic variation within affected species.

These may all lead to a negative change in the conservation status of the affected species, which implies a reduction in the chances of the species' overall survival.

The impacts can be largely mitigated through avoidance of potential sensitive areas and listed species by allowing a minimum clearance of vegetation (restricted to the absolute necessary areas) etc.

» Direct Faunal impacts

Faunal species will primarily be affected by the overall loss of habitat. Increased levels of noise, pollution, disturbance and human presence will be detrimental to fauna. Sensitive and shy fauna would move away from the area during the construction phase as a result of the noise and human activities present, while some slow-moving species and species confined and dependant on specified habitats would not be able to avoid the construction activities and might be killed. Some mammals and reptiles would be vulnerable to illegal collection or poaching during the construction phase as a result of the large number of construction personnel that are likely to be present. This impact is highly likely to occur during the construction phase and would also potentially occur with resident fauna within the facility after construction.

SCC (red data species) include those listed as critically endangered, endangered or vulnerable. For any other species a loss of individuals or localised populations is unlikely to lead to a change in the conservation status of the species. However, in the case of threatened animal species, loss of a population or individuals could lead to a direct change in the conservation status of the species, possible extinction. This may arise if the proposed infrastructure is located where it will impact on such individual or populations. Consequences may include:

- fragmentation of populations of affected species;
- reduction in area of occupancy of affected species; and
- loss of genetic variation within affected species.

These may all lead to a negative change in the conservation status of the affected species, which implies a reduction in the chances of the species' overall survival.

Disturbance of faunal species can be maintained to a minimum and low significance by implanting effective mitigation measures.

» Soil erosion and associated degradation of ecosystems

Soil erosion is a frequent risk associated with the development of PV facilities on account of the vegetation clearing and disturbance associated with the construction phase of the development and may continue occurring throughout the operational phase. Service roads and panels will generate an increase in runoff during intense rainfall events and may exaggerate the effects of erosion. These eroded materials may enter the nearby streams and rivers and may potentially impact these systems through siltation and change in chemistry and turbidity of the water.

With effective mitigation measures in place including regular monitoring the occurrence, spread and potential cumulative effects of erosion may be limited to an absolute minimum.

» Alien Plant Invasions

Major factors contributing to invasion by alien invader plants includes habitat disturbance and associated destruction of indigenous vegetation. Consequences of this may include:

- further loss and displacement of indigenous vegetation;
- change in vegetation structure leading to a change in various habitat characteristics;
- change in plant species composition;
- change in soil chemistry properties;
- loss of sensitive habitats;
- loss or disturbance to individuals of rare, endangered, endemic and/or protected species;
- fragmentation of sensitive habitats;
- change in flammability of vegetation, depending on alien species;
- hydrological impacts due to increased transpiration and runoff; and
- impairment of wetland function.

Although the potential severity of this impact may be high, it can be easily mitigated through regular alien control.

» Impacts on Critical Biodiversity Areas and Broad-Scale Ecological Processes

The north-eastern and north-western portion of the Vrede Solar PV facility development area is located within a CBA1, due to its location within the endangered Vaal-Vet Sandy Grassland Ecosystem. The loss of and transformation of intact, habitats could compromise the status and ecological functioning of these habitats and may fracture and disrupt the connectivity of these CBAs, impacting the Province's ability to meet its conservation targets

Impact on these Critical Biodiversity Areas can be maintained to an absolute minimum or even avoided by restricting the development to disturbed and transformed areas within the CBA's. By furthermore implementing effective mitigation measures the functionality of these areas and connectivity between these areas may be maintained.

During a thorough examination of available satellite imagery (including historical imagery) it was found that large portions of which had been classified as CBAs were in fact historical cultivated areas that have been left fallow for an extensive period of time allowing for succession to take place to a stage where these areas are now covered with a relative stable grass and dwarf shrub cover. Subsequently, natural/original Vaal-Vet Sandy Grassland are only confined to a few isolated patches. Due to the small extent

and patchy distribution of this endangered vegetation type within the development area, it is unlikely that this development will have an impact on the status of the remaining natural Vaal-Vet Sandy Grassland. However, this statement can only be confirmed during the EIA phase when these areas will be assessed during a site visit.

Sensitivity Analysis of the Site

An ecological sensitivity map has been compiled using available Geo-spatial information as well as existing information such as Critical Biodiversity Areas in combination with NFEPA Wetlands (refer to **Figure 8.1**). This ecological sensitivity map is preliminary in nature, and will be revised during in the EIA phase as required. The following sensitivity classes were assigned to the various ecological features identified within the development area:

Very High Sensitivity

- » Wetland Features: Wetland features that feed into important downstream watercourses, are associated with natural Vaal-Vet Sandy Grassland and CBA1, provide various unique habitats and niches (contribute to habitat and species diversity), are a potential suitable habitat for *Pyxicephalus adspersus* – Giant Bullfrog (Near Threatened), and fulfil vital ecological functions and services such as flood attenuation, stream flow augmentation, erosion control and the enhancement of water quality (sediment trapping, removal and storage of phosphates, nitrates and toxicants).
- » Natural Grassland and Open Shrub Grassland: Natural grassland features that are representative of Vaal-Vet Sandy Grassland (Endangered), are located within CBA1, and provide potential habitat for species of conservation concern, especially *Smaug giganteus* – Sungazer (Vulnerable).
- » Koppie/outcrop: This isolated koppie is situated within a CBA1 and appears to be natural. Furthermore, this feature is regarded as a unique habitat type within the grassland plains and agricultural landscape, and subsequently contribute to habitat and niche diversity.

High Sensitivity

- » Natural Wetland Features: All natural wetland features that are located outside of natural Vaal-Vet Sandy Grassland and CBA1 but are still regarded as relative natural capable of providing important functions and services such as flood attenuation, erosion control, the removal and storage of Nitrates and toxicants (enhancement of water quality) and the contribution to habitat and niche diversity. Wetland located within ESA1 have also been classified as high
- » Artificial Wetland Features: All dam/reservoir features associated with natural wetlands regarded as very high sensitive.

Medium Sensitivity

- » Artificial Wetland Features: Dams and reservoirs located outside of any sensitive natural wetland features. Even though regarded as a form of disturbance, these dams/reservoirs provide and store surface water for the natural fauna of the area as well as livestock.
- » Grassland and Open Shrub Grassland: Small isolated and fractured natural to near natural grassland patches that are representative of Vaal-Vet Sandy Grassland but due to their size as well as fractured and isolated nature (surrounded by highly transformed areas), are not regarded as important for the conservation of this endangered vegetation type. Furthermore, all grassland features located outside of CBAs or which represent Central Free State Grassland have also been classified as medium sensitive. These grassland features also provides potential habitat for *Smaug giganteus* – Sungazer (Vulnerable).
- » Re-established grassland on historical cultivated areas: These areas have been left fallow for an extended period of time and the re-establishment of mostly indigenous vegetation have been allowed to such an extent that the vegetation can be regarded as stable (plagioclimax), providing most of the functions and services associated with natural grassland. These areas are also potential habitat for *Smaug giganteus* – Sungazer (Vulnerable).

Low Sensitivity

- » All transformed and disturbed area: This includes access roads and disturbed road shoulders, farm roads, fire breaks, trampled and overgrazed grassland, woodlots and small plantations as well as fallow and old cultivated areas.

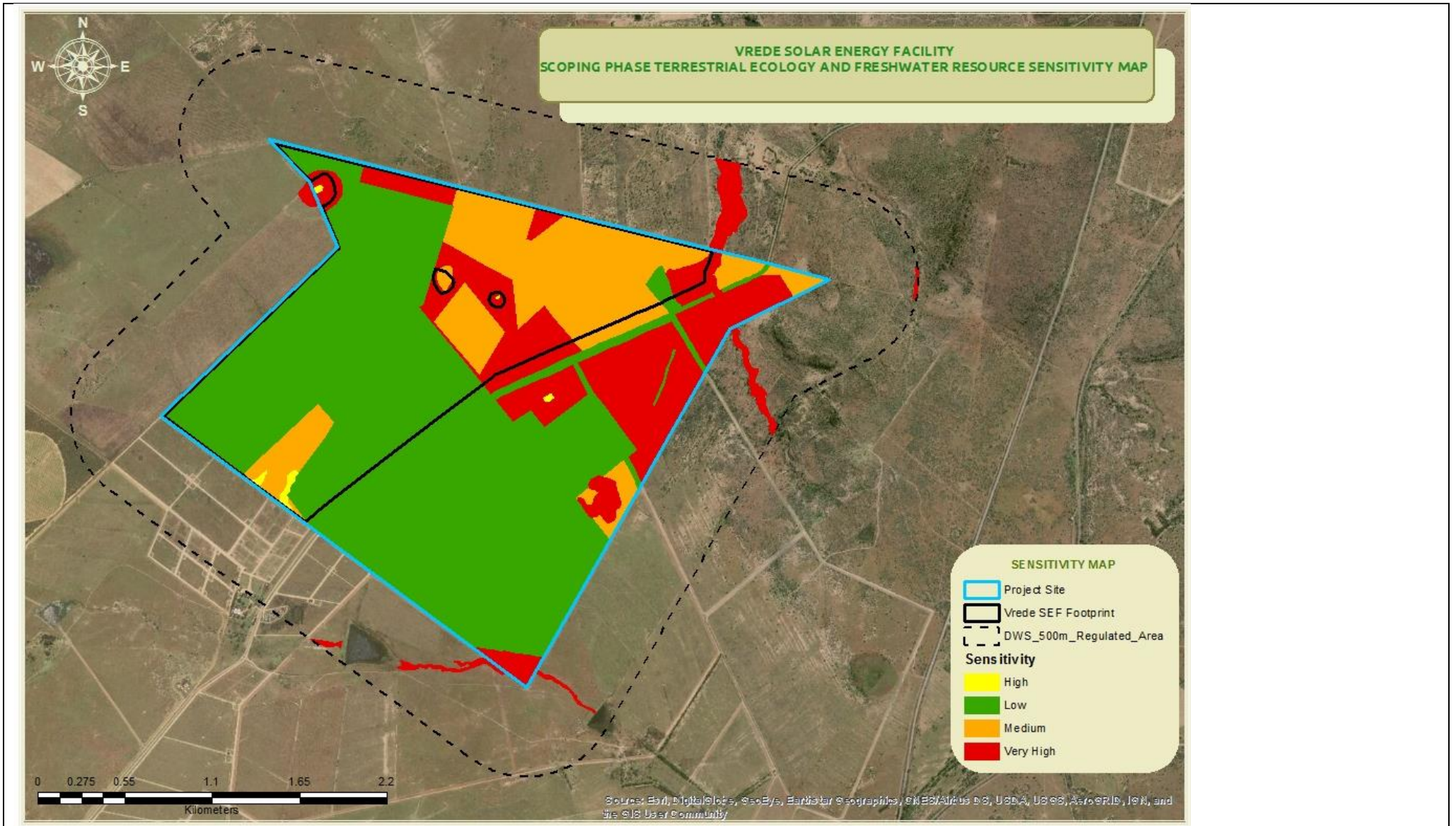


Figure 8.1. Preliminary ecological sensitivity map of the project site.

Overview of the most significant impacts of the proposed facility			
<ul style="list-style-type: none"> » Disturbance to and loss of indigenous natural vegetation. » Disturbance or loss of threatened/protected plants. » Loss of habitat for fauna species of conservation concern. » Disturbance to migration routes and associated impacts to species populations. » Impact on Critical Biodiversity Areas. » Establishment and spread of declared weeds and alien invader plants. 			
Issue	Nature of Impact	Extent of Impact	No-Go Areas
During Construction: Disturbance to and loss of indigenous natural vegetation.	<p>Construction of infrastructure will lead to direct loss of vegetation, causing a localised or more extensive reduction in the overall extent of vegetation. Consequences of the clearing and loss of indigenous semi – to near-natural vegetation occurring may include:</p> <ul style="list-style-type: none"> » Increased vulnerability of remaining vegetation to future disturbance, including extreme climatic events; » General loss of habitat for sensitive fauna and flora species; » Loss in variation within sensitive habitats due to loss of portions of it; » General reduction in biodiversity; » Increased fragmentation (depending on the location of the impact) and associated reduced viability of species populations; » Alteration of the habitat suitable for plant populations by altering surface structure. This will change species composition and associated species interactions; » Disturbance to processes maintaining biodiversity and ecosystem goods and services; and » Loss of ecosystem goods and services. 	Local	<p>No 'no-go' areas identified.</p> <p>During the EIA Phase natural and undisturbed forms of Vaal-Vet Sandy Grassland and areas containing SCC may be identified which will subsequently be upgraded to a higher sensitivity and will be accompanied with additional mitigation measures to avoid any potential detrimental impacts.</p>
During Construction: Disturbance or loss of threatened/protected plants.	<p>SCC could potentially occur in the study area. Flora is affected by an overall loss or alteration of habitat and due to its limited ability to extend or change its distribution range.</p> <p>In the case of SCC, a loss of a population or individuals could lead to a direct change in the conservation status of the species, possibly extinction. This may arise</p>	Local	<p>SCC species have a distribution that include the project site and may potentially occur within the development area; this requires further investigation in the EIA phase.</p>

	<p>if the proposed infrastructure is located where it will impact on such individuals or populations. Consequences of this may include:</p> <ul style="list-style-type: none"> » Fragmentation and decline of populations of affected species; » Reduction in the area of occupancy of affected species; » Loss of genetic variation within affected species; » Alteration of the habitat suitable for plant associations by altering of the surface structure. This will change species composition and associated species interactions and species ability to persist; and » Future extinction debt of particular species of flora and fauna. <p>These may all lead to a negative change in conservation status of the affected species, which implies a reduction in the chance of survival of the species.</p>		<p>However, due to present and past transformation of a large part of the area and surroundings, the presence of critical/restricted habitats for SCC are regarded as unlikely.</p>
<p>During Construction: Loss of habitat for fauna species of conservation concern.</p>	<p>Fauna species of conservation concern are indirectly affected primarily by a loss of or alteration of habitat and associated resources. Animals are mobile and, in most cases, can move away from a potential threat, unless they are bound to a specific habitat that is also spatially limited and will be negatively impacted by a development. Nevertheless, the proposed development will reduce the extent of habitat available to fauna.</p> <p>For any species, a loss of individuals or localised populations is unlikely to lead to a change in the conservation status of the species. However, in the case of threatened animal species, loss of a suitable habitat, population, or individuals could lead to a direct change in the conservation status of the species. This may arise if the proposed infrastructure is located where it will impact on such individuals or populations or the habitat that they depend on. Consequences may include:</p> <ul style="list-style-type: none"> » Loss of populations of affected species; » Reduction in area of occupancy of affected species; » Loss of genetic variation within affected species; and » Future extinction debt of a particular species. <p>There are a number of red data species that have been recorded for the wider area within which the development area is located. Their presence and the</p>	<p>Local</p>	<p>No 'no-go' areas identified.</p> <p>During the EIA Phase natural and undisturbed grassland features containing conservation important faunal populations may be identified which will subsequently be upgraded to a higher sensitivity and will be accompanied with additional mitigation measures to avoid any potential detrimental impacts.</p>

	necessity to keep their habitats intact in the development area needs to be confirmed during a field survey in the EIA phase.		
During Construction: Disturbance to migration routes and associated impacts to species populations.	<p>Site preparation and construction activities may interfere with the current migration routes of fauna species. This may lead to:</p> <ul style="list-style-type: none"> » Reduced ability of species to move between breeding and foraging grounds, reducing breeding success rates; » Reduced genetic variation due to reduced interaction amongst individuals or populations as a result of fragmentation effects caused by the proposed developments 	Site and surroundings	No 'no-go' areas have been identified.
During Construction: Impact on Critical Biodiversity Areas.	Development within the CBAs may negatively impact biodiversity and the ecological functioning of the CBA.	Local and Regional	The CBA located in the development area may be a potential no-go area, following a survey of the area during the EIA phase, wherein the natural state and contribution to the CBA unit as a whole will be determined.
During Construction: Establishment and spread of declared weeds and alien invader plants.	<p>Major factors contributing to invasion by alien invader plants include excessive disturbance to vegetation, creating a window of opportunity for the establishment of alien invasive species. In addition, regenerative material of alien invasive species may be introduced to the site by machinery traversing through areas with such plants or materials that may contain regenerative materials of such species. Consequences of the establishment and spread of invasive plants include:</p> <ul style="list-style-type: none"> » Loss of indigenous vegetation; » Change in vegetation structure leading to change in or loss of various habitat characteristics; » Change in plant species composition; » Altered and reduced food resources for fauna; » Change in soil chemical properties; » Loss or disturbance to individuals of rare, endangered, endemic and/or protected species; » Fragmentation of sensitive habitats; » Change in flammability of vegetation, depending on alien species; 	Local and Regional	<p>No 'no-go' areas have been identified, but the potential for alien invasive species present in or around the development area is regarded as moderate.</p> <p>A number of alien invasive species have been recorded in the wider area according to the SANBI database.</p> <p>The extent to which the development area contains alien plants will be determined in the EIA phase through detailed investigation and field-survey.</p>

	<ul style="list-style-type: none"> » Hydrological impacts due to increased transpiration and runoff; » Increased production and associated dispersal potential of alien invasive plants, especially to lower-lying wetland areas, and » Impairment of wetland function. 		
During operation: Disturbance or loss of indigenous natural vegetation.	<p>PV panels create large areas of altered surface characteristics, rainfall interception patterns, and intense shade that will not be tolerated by most of the species present on site, as these have evolved with a high daily irradiance. Consequently, it can be expected that within the Solar Energy Facility development footprint, the species composition and topsoil characteristics will change significantly. No equivalent experiments have been undertaken in similar environments up to date, thus the nature and density of vegetation that may persist cannot be predicted at this stage. A sparser or less stable vegetation beneath the PV panels, together with the altered surface and runoff characteristics may lead to:</p> <ul style="list-style-type: none"> » Increased vulnerability of the remaining vegetation to future disturbance, including erosion; » General loss or significant alteration of habitats for sensitive species; » Loss in variation within sensitive habitats due to a loss of portions of it; » General reduction in biodiversity; » Increased fragmentation (depending on location of impact); » Future extinction debt of a particular species; » Disturbance to processes maintaining biodiversity and ecosystem goods and services; and » Loss of ecosystem goods and services. 	Local	<p>No 'no-go' areas identified.</p> <p>During the EIA Phase natural and undisturbed forms of Vaal-Vet Sandy Grassland and areas containing SCC may be identified which will subsequently be upgraded to a higher sensitivity and will be accompanied with additional mitigation measures to avoid any potential detrimental impacts.</p>
During operation: Establishment and spread of declared weeds and alien invader plants.	<p>The envisaged altered vegetation cover after construction and during the operation phase of the proposed development will create a window of opportunity for the establishment of alien invasive species. In addition, regenerative material of alien invasive species may be introduced to the site by machinery or persons traversing through areas with such plants or materials that may contain regenerative materials of such species. Consequences of the establishment and spread of invasive plants include:</p> <ul style="list-style-type: none"> » Loss of indigenous vegetation or change in vegetation structure leading to an even more significant change in or loss of various habitat characteristics; 	Local to regional	<p>No 'no-go' areas have been identified, but the potential for alien invasive species present in or around the study area is regarded as moderate.</p> <p>A number of alien invasive species have been recorded in the wider area according to the SANBI database.</p>

	<ul style="list-style-type: none"> » Loss of plant resources available to fauna; » Change in soil chemical properties; » Loss or fragmentation of sensitive or restricted habitats; » Loss or disturbance to individuals of rare, endangered, endemic and/or protected species; » Change in flammability of vegetation, depending on alien species; » Hydrological impacts due to increased transpiration and runoff; » Increased production and associated dispersal potential of alien invasive plants, especially to lower-lying wetland areas, and » Impairment of wetland function. 		<p>The extent to which the development site contains alien plants will be determined in the EIA phase through detailed investigation and field-survey.</p>
<p>Description of expected significance of impact</p>			
<ul style="list-style-type: none"> » Most of the above-mentioned impacts are probable, although the extent, duration, and magnitude of these impacts can be minimalised to levels where these impacts can be regarded as low significance by having the necessary mitigation measures implemented. By exclusion of certain sensitive areas (e.g. wetlands, drainage lines and other sensitive habitats) from the development footprint, the probability of some of these above-mentioned impacts occurring within these habitats can be avoided. » The duration of the project is expected to be long term (~20-25 years) and subsequently most of the impacts are also expected to be long term. However, some impacts are expected to be of short term and confined to the construction phase. For example the disturbance of some animal species will be confined to the construction phase and as human movement decreases during the operation phase some species may return to the site. Furthermore, impacts such as erosion and invasion of alien invasive species, with effective mitigation measures including regular monitoring in place, can be retained to a medium to short duration although monitoring and implementation of mitigation measures will have to be implemented throughout the lifespan of the proposed development. » Although most impacts associated with the proposed development are expected to be local, affecting mainly the immediate environment, the potential does exist for some impacts to be exacerbated and even spread outside the development footprint if left unattended, eventually posing a potential threat to important environmental processes and functionality. Impacts that may potentially pose a threat to the magnitude and duration, if left unattended or not mitigated accordingly, include invasion by invasive alien species, soil erosion, significant disturbance and alteration of important wetland habitats and watercourses. » The most significant cumulative impact that the proposed development will have is the potential impact on broad-scale ecological processes and the impact on Critical Biodiversity Areas. 			
<p>Gaps in knowledge & recommendations for further study</p>			
<ul style="list-style-type: none"> » The initial desk-top investigation of the project site indicates that a few protected and red-data species as well as sensitive habitats potentially occur. However, once the final layout has been designed in accordance to the findings of a field investigation, the likelihood that the development will compromise the survival of any species of conservation concern is expected to be limited. The presence or absence of these species must therefore be determined with a field survey during the EIA phase. » Plant species of conservation concern will only be identifiable during the growing season; therefore, any field survey of vegetation should only commence from November and be completed by April. 			

- » Although previous collection records from the Kroonstad area exist, the development area itself may not have been previously surveyed and there may be additional species that have not yet been captured in the existing species databases. A detailed ecological survey and sensitivity assessment must therefore be undertaken during the EIA phase.
- » The largest opportunity for mitigating any negative impacts exists during the design phase, are if layouts adhere to the findings and recommendations of detailed field studies and investigations carried out during the EIA phase. Therefore, the ecological report produced during the EIA phase must provide suitable mitigation measures and delineate any exclusion areas in order to inform the design phase.
- » Limited knowledge exists on the potential and ease with which vegetation can be re-established after construction given the variable rainfall regime of the region; which species would be able to persist in the altered environment on and around the proposed development; and what effect this altered species composition and – density will have on ecosystem intactness and – functionality.
- » Regular monitoring of a minimum set of environmental parameters throughout the operational phase, coupled with an adaptive environmental management program, will thus be essential to prevent any environmental degradation and any cumulative effects of the development beyond its periphery. The ecological assessment report must therefore provide an indication as to the monitoring required for the operational phase as it relates to ecological impacts.

8.3.2 Impacts on freshwater resources

Construction and operation may lead to potential indirect loss of / or damage to potential wetland habitats. This may potentially lead to localised loss of wetland habitat and may lead to downstream impacts that affect a greater extent of wetlands or impact on wetland function and biodiversity. Where these habitats are already stressed due to degradation and transformation, the loss may lead to increased vulnerability (susceptibility to future damage) of the habitat. Physical alteration to wetlands can have an impact on the functioning of those wetlands. Consequences may include:

- » increased loss of soil;
- » loss of/or disturbance to indigenous wetland vegetation;
- » loss of sensitive wetland habitats;
- » loss or disturbance to individuals of rare, endangered, endemic and/or protected species that occur in wetlands;
- » fragmentation of sensitive habitats;
- » impairment of wetland function;
- » change in channel morphology in downstream wetlands, potentially leading to further loss of wetland vegetation; and
- » reduction in water quality in wetlands downstream

A number of wetland features have been identified from desktop analysis of the project site. The extent, condition as well as functions and services of these wetlands will be determined during the EIA phase Assessment and final appropriate buffers will be recommended. Preliminary buffer size, based on the desktop survey of these wetland features have been determined to be 35m. Following the field survey (EIA Phase) and buffer size recommendations as provided within the DWS's Buffer Tool, this size may be amended within the EIA Phase.

Sensitivity Analysis of the Site

An ecological sensitivity map - including consideration of freshwater features and freshwater sensitivity - has been compiled using available Geo-spatial information as well as existing information such as Critical Biodiversity Areas in combination with NFEPA Wetlands (refer to **Figure 8.1**). This ecological sensitivity map is preliminary in nature, and will be revised during in the EIA phase as required. The following sensitivity classes were assigned to the various freshwater features identified within the development area:

Very High Sensitivity

- » Wetland Features: Wetland features that feed into important downstream watercourses, are associated with natural Vaal-Vet Sandy Grassland and CBA1, provide various unique habitats and niches (contribute to habitat and species diversity), are a potential suitable habitat for *Pyxicephalus adspersus* – Giant Bullfrog (Near Threatened), and fulfil vital ecological functions and services such as flood attenuation, stream flow augmentation, erosion control and the enhancement of water quality (sediment trapping, removal and storage of phosphates, nitrates and toxicants).

High Sensitivity

- » Natural Wetland Features: All natural wetland features that are located outside of natural Vaal-Vet Sandy Grassland and CBA1 but are still regarded as relative natural capable of providing important functions and services such as flood attenuation, erosion control, the removal and storage of Nitrates and toxicants (enhancement of water quality) and the contribution to habitat and niche diversity. Wetland located within ESA1 have also been classified as high
- » Artificial Wetland Features: All dam/reservoir features associated with natural wetlands regarded as very high sensitive.

Medium Sensitivity

- » Artificial Wetland Features: Dams and reservoirs located outside of any sensitive natural wetland features. Even though regarded as a form of disturbance, these dams/reservoirs provide and store surface water for the natural fauna of the area as well as livestock.

Low Sensitivity

- » All transformed and disturbed area: This includes access roads and disturbed road shoulders, farm roads, fire breaks, trampled and overgrazed grassland, woodlots and small plantations as well as fallow and old cultivated areas.

Based on the freshwater sensitivity assessment, all Very High and High Sensitive wetland features should be regarded as 'no-go' areas.

Issue	Nature of Impact	Extent of Impact	No-Go Areas
During Construction: Disturbance to and loss of wetland vegetation	Construction of infrastructure may lead to direct loss of vegetation, causing a localised or more extensive reduction in the overall extent of vegetation. Potential consequences include:	Local	All Very High and High Sensitive wetland features should be regarded as 'no-go' areas

	<ul style="list-style-type: none"> » General loss of habitat for sensitive fauna and flora species; » General reduction in biodiversity; » Reduction in the ability of the wetlands to fulfil their ecological services and functions such as flood attenuation and the enhancement of water quality through the precipitation and storage of nitrates and toxicants; » Disturbance to processes maintaining biodiversity and ecosystem goods and services; and » Exposure of soil to erosion. 		<p>A preliminary buffer area of 35m is recommended, however the final buffer size will be determined within the EIA Phase. These buffer areas should also be considered as a 'no-go' area.</p>
During Construction: Impact on wetland systems through the possible increase in surface water runoff	An increase in the surface water budget of the wetlands, due to an increase in volume and velocity of surface water flow from the cleared construction areas into the wetlands, may result in the loss of natural wetland vegetation and potentially expose the wetland soils to erosion.	Local and immediate surroundings	<p>All Very High and High Sensitive wetland features should be regarded as 'no-go' areas.</p> <p>A preliminary buffer area of 35m is recommended, however the final buffer size will be determined within the EIA Phase. These buffer areas should also be considered as a 'no-go' area.</p>
During Construction: Increase sedimentation and erosion	<p>Activities associated with the construction phase may potentially lead to some direct or indirect loss of or damage to the identified wetlands and watercourses. Impacts on these systems will most likely be:</p> <ul style="list-style-type: none"> » Vegetation clearing within the development area may result in an increase in surface water flow and expose areas prone to erosion and these areas may expand/spread into the wetlands. » The eroded material may enter the wetlands and may potentially impact these systems through siltation. 	Local and immediate surroundings	<p>All Very High and High Sensitive wetland features should be regarded as 'no-go' areas.</p> <p>A preliminary buffer area of 35m is recommended, however the final buffer size will be determined within the EIA Phase. These buffer areas should also be considered as a 'no-go' area.</p>

<p>During Construction: Impact on localised surface water quality</p>	<p>Chemical pollutants (hydrocarbons from equipment and vehicles, cleaning fluids, cement etc.) could potentially be washed downslope into the wetlands and potentially affect water quality.</p>	<p>Local and immediate surroundings</p>	<p>All Very High and High Sensitive wetland features should be regarded as 'no-go' areas.</p> <p>A preliminary buffer area of 35m is recommended, however the final buffer size will be determined within the EIA Phase. These buffer areas should also be considered as a 'no-go' area.</p>
<p>During Construction: Loss of habitat for fauna dependent on such habitats.</p>	<p>Fauna species of conservation concern are indirectly affected primarily by a loss of or alteration of habitat and associated resources. Animals are mobile and, in most cases, can move away from a potential threat, unless they are bound to a specific habitat that is also spatially limited, such as isolated, endorheic pans, and will be negatively impacted by a development.</p> <p>For any species, a loss of individuals or localised populations is unlikely to lead to a change in the conservation status of the species. However, in the case of threatened animal species, loss of a suitable habitat, population, or individuals could lead to a direct change in the conservation status of the species. This may arise if the proposed infrastructure is located where it will impact on such individuals or populations or the habitat that they depend on. Consequences may include:</p> <ul style="list-style-type: none"> » Loss of populations of affected species; » Reduction in area of occupancy of affected species; » Loss of genetic variation within affected species; and » Future extinction debt of a particular species. 	<p>Local</p>	<p>All Very High and High Sensitive wetland features should be regarded as 'no-go' areas.</p> <p>A preliminary buffer area of 35m is recommended, however the final buffer size will be determined within the EIA Phase. These buffer areas should also be considered as a 'no-go' area.</p>

	There is SCC that may potentially utilized these habitat types, namely the Giant Bull Frog. Some of the wetlands identified within the study area may potentially be suitable habitat. However, this will be confirmed during the EIA Phase.		
During operation: Impact on wetland systems through the possible increase in surface water runoff	<p>An increase in the surface water budget of the wetlands, due to an increase in volume and velocity of surface water flow from the cleared areas and from any compacted and hard surface (including PV panels).</p> <p>This may result in:</p> <ul style="list-style-type: none"> » a change in vegetation composition and structure, » the exposure of wetland soils leaving these areas prone to soil erosion; » increase in sedimentation and subsequently a reduction in water quality; and » reduction in the ability of the wetlands to fulfil vital ecological functions and services such as flood attenuation and precipitation of minerals such as nitrates and toxicants. 	Local to immediate surroundings	<p>All Very High and High Sensitive wetland features should be regarded as 'no-go' areas.</p> <p>A preliminary buffer area of 35m is recommended, however the final buffer size will be determined within the EIA Phase. These buffer areas should also be considered as a 'no-go' area.</p>
During operation: Impact on localised surface water quality	Chemical pollutants (hydrocarbons from service equipment and vehicles etc.) could potentially be washed downslope into these wetlands and potentially affect water quality.	Local to immediate surroundings	<p>All Very High and High Sensitive wetland features should be regarded as 'no-go' areas.</p> <p>A preliminary buffer area of 35m is recommended, however the final buffer size will be determined within the EIA Phase. These buffer areas should also be considered as a 'no-go' area.</p>
<p>Description of expected significance of impact</p> <p>The duration of the project is expected to be long term (~20 years) and subsequently most of the impacts are also expected to be long term. However, some impacts are expected to be of short term and confined to the construction phase. For example, the disturbance of some animal species will be confined to the construction phase and as human movement decreases during the operation phase some species may return to the site. Furthermore, impacts such as erosion and invasion of alien invasive species, with effective mitigation measures including regular monitoring in place, can be retained to a medium to short duration although monitoring and implementation of mitigation measures will have to be implemented throughout the lifespan of the proposed development.</p>			

Due to the fact that these identified wetlands have been subjected to very long term (>12 years) historical cultivation practices, as well as other forms of disturbances these wetlands have lost some of their functions and services with the remainder occurring in a limited and highly altered manner. Subsequently, their value (ecological importance and sensitivity) has been significantly reduced. It is also probable that this value will only slightly increase if rehabilitated to a satisfactory level (will never be able to rehabilitate to original form). Taking the current state, value and rehabilitation potential into account, the potential significance, magnitude, extent of the above described impacts is regarded as very low. Furthermore, with the necessary mitigation measures, the significance of these impacts can be even further reduced.

Furthermore, potential cumulative impacts are:

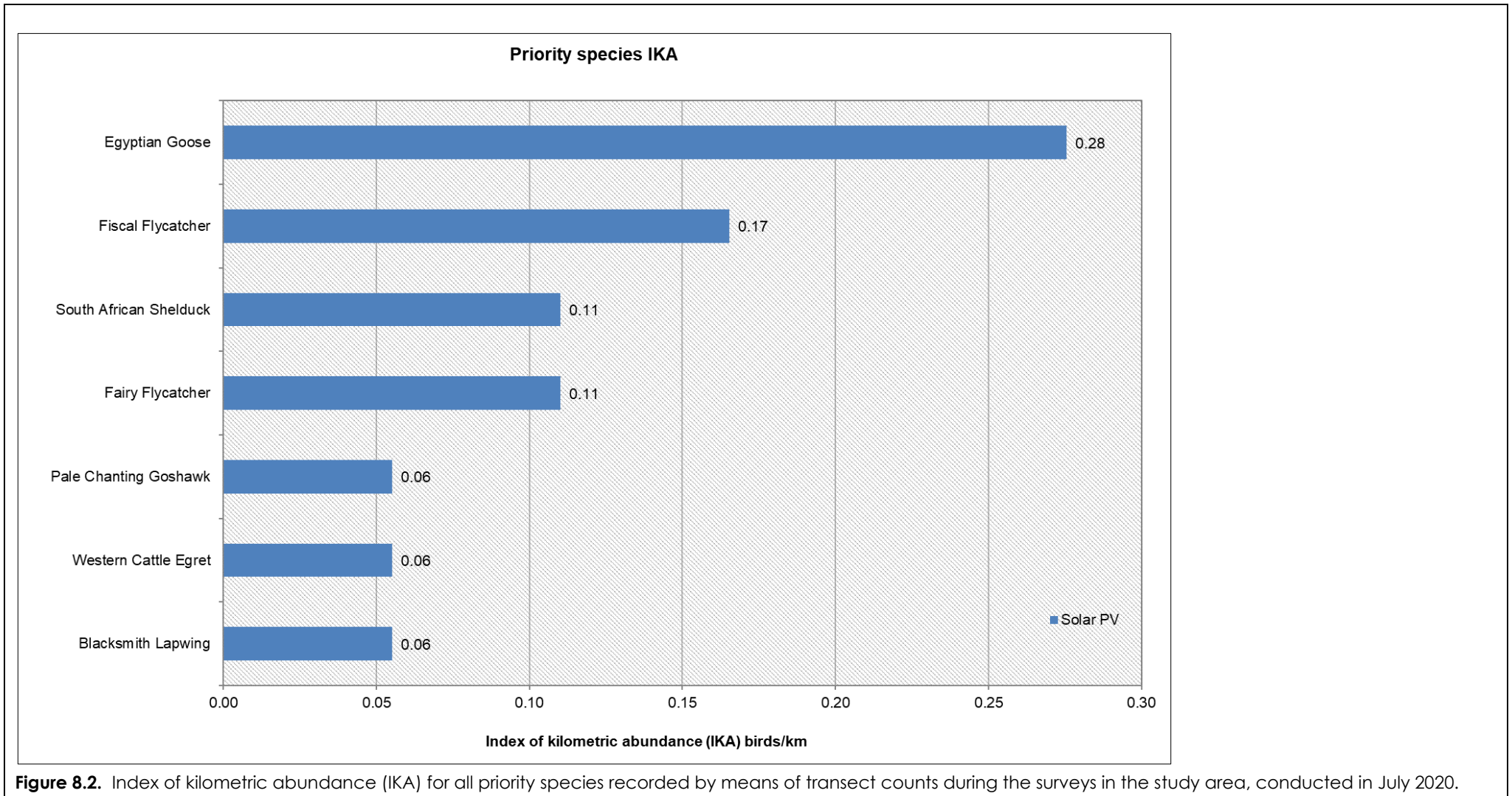
- » The compromise of ecological processes as well as ecological functioning of these important freshwater resource habitats
- » Transformation of intact habitat could potentially compromise ecological processes as well as ecological functioning of important habitats and would contribute to habitat fragmentation and potentially disruption of habitat connectivity and furthermore impair their ability to respond to environmental fluctuations. This is especially of relevance for larger watercourses and wetlands serving as important groundwater recharge and floodwater attenuation zones, important microhabitats for various organisms and important corridor zones for faunal movement

Gaps in knowledge & recommendations for further study

- » A detailed freshwater impact assessment will be undertaken during the EIA phase.
- » Some important freshwater habitat features may be impacted on by the development, and the potential impact on the loss of connectivity of these features and the landscape will need to be considered against the final layout of the development. The EIA will assess the provisional layout of the facility to ensure that important movement corridors are not disrupted by the development.
- » The affected freshwater habitats must will be considered in the local context and the potential for cumulative impact on these areas, once the provisional layout is available.
- » Statement of any mitigation strategy to be implemented considering the nature of the area impacted by the development footprint and the extent of this habitat in the larger area.
- » Assessment of the density and distribution of sensitive habitats of conservation concern within the development footprint to better inform the EIA Phase and the final sensitivity map.
- » The determination of habitat integrity and sensitivity (during EIA phase), especially towards the impacts associated with such a PV development; appropriate buffers will be recommended as well as activities which may be acceptable within the buffer areas without threatening the integrity of the wetland areas.

8.3.3 Impacts on avifauna

The SABAP2 data indicated that a total of 192 bird species could potentially occur within the development area and immediate surroundings. Of these, 67 species were classified as priority species and 2 of these are South African Red Data species. Of the priority species, 11 are likely to occur regularly at the development area, and another 17 could occur sporadically. On-site surveys were conducted from 20 - 22 July 2020 by means of transect counts. The abundance of avifauna recorded during the transect and incidental counts are displayed below (**Figure 8.2** and **Figure 8.3**).



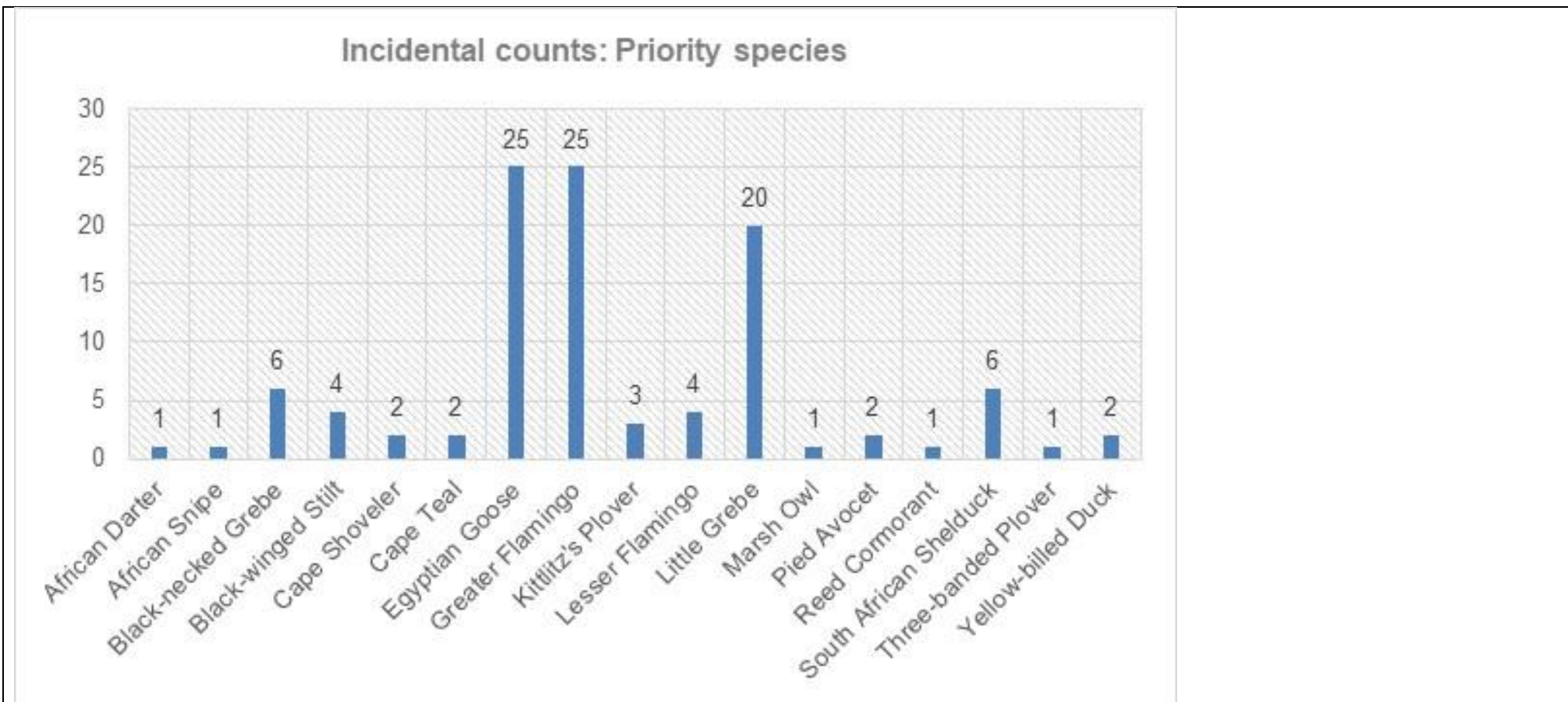


Figure 8.3. Incidental counts of priority species within a 10km radius around the development area.

Bird habitats in the study area were grouped into three broad categories:

- » Grassland: The development area consists mainly of medium-tall, dense, grassland with scattered clumps of *Vachellia* sp. trees and shrubs. The southern section of the development area consists of old lands with severely degraded grassland cover.

- » Woodland: The development area contains scattered areas of thorny shrubs and trees. One small ephemeral drainage line bisects the north-eastern corner of the development area, with a length of approximately 150m situated within the development area. Drainage lines are important corridors for woodland species because the woodland along the banks is a refuge for woodland species. The largest concentration of shrubs and a few small trees in the development area is found along the banks of the drainage line.
- » Pans: The development area contains three small pans. When the pans hold water (which is only likely after sustained rainfall events), it may temporarily attract a variety of waterbirds, as well as other birds which use them to drink and bath. Sources of surface water are major attractants to birds.
- » Fences: The development area contains a number of fences. Farm fences provide important perching substrate for a wide range of birds, as a staging post for territorial displays by small birds and also for perch hunting by some raptors.

Sensitivity Analysis of the Site

The following avifaunal sensitivities were identified (**Figure 8.4**):

- » Very High sensitivity (No solar panels – other infrastructure allowed): Surface water
Included are areas within 200m of the pans on the development area. It is important to leave open space for birds to access and leave the surface water area unhindered. Surface water is also important area for raptors to hunt birds which congregate around water troughs, and they should have enough space for fast aerial pursuit.
- » Very High sensitivity (No solar panels – other infrastructure allowed): Drainage line woodland
Drainage lines are corridors of woodland which provide nesting and foraging opportunities for woodland species which are dependent on this habitat for their survival. The highest density of woodland and trees at the development area is concentrated around the drainage line. A 100m buffer zone should be implemented on both side of the drainage channel.

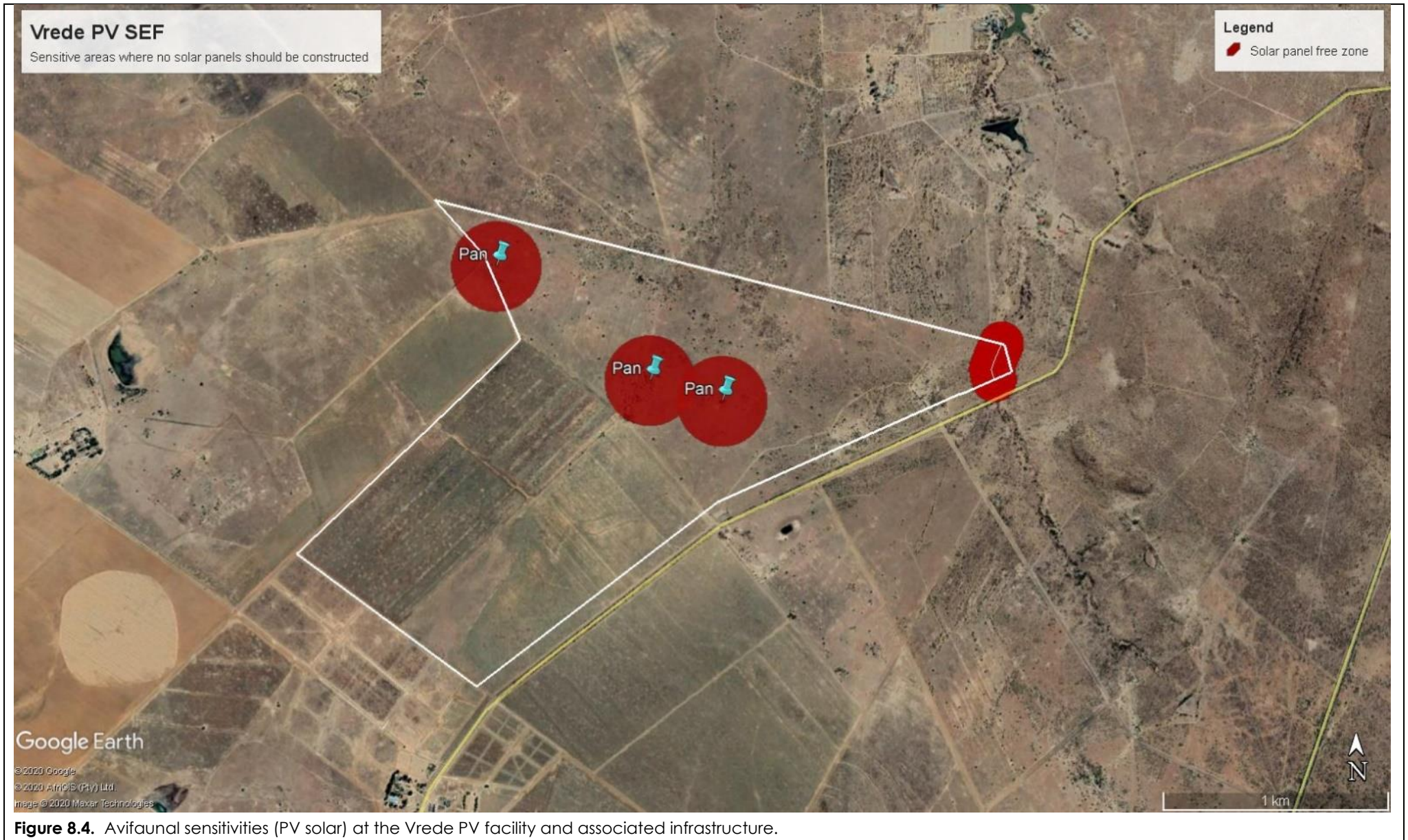


Figure 8.4. Avifaunal sensitivities (PV solar) at the Vrede PV facility and associated infrastructure.

The main impacts of PV plants on avifauna were determined as follows:

- » Displacement due to disturbance associated with the construction of the solar PV plant and associated infrastructure
- » Displacement due to habitat transformation associated with the construction of the solar PV plant and associated infrastructure
- » Collisions with the solar panels
- » Entrapment in perimeter fences

Issue	Nature of Impact	Extent of Impact	No-Go Areas
During construction: Displacement of priority species due to disturbance associated with construction of the PV plant and associated infrastructure.	As far as disturbance is concerned, it is likely that all the avifauna, including all the priority species, will be temporarily displaced in the development footprint, either completely or more likely partially (reduced densities) during the construction phase, due to the disturbance associated with the construction activities e.g. increased vehicle traffic, and short-term construction-related noise (from equipment) and visual disturbance. The priority species which would be most severely affected would be ground nesting birds or those that utilise low shrubs for nesting.	Local	No avifaunal no-go areas were determined necessary for the mitigation of this anticipated impact.
During construction: Displacement of priority species due to habitat transformation associated with construction of the PV plant and associated infrastructure.	Solar energy facilities require substantial site preparation (including the removal of vegetation) that alters topography and, thus, drainage patterns to divert the surface flow associated with rainfall away from facility infrastructure. These activities could have an impact on birds breeding, foraging and roosting in or in close proximity through transformation of habitat, which could result in temporary or permanent displacement.	Local	<ul style="list-style-type: none"> » A 200m solar panel free buffer zone must be implemented around the pans (-27.736377° 27.134694°, -27.740910° 27.141575°, -27.741723° 27.144815°) to provide avifauna with unhindered access to the water. » A 100m solar panel free buffer zone must be implemented on both sides of the drainage line on the development area, to maintain a corridor of woodland.
During operation: Mortality of priority species due to collisions with solar panels	Collision-related fatality i.e. fatality resulting from the direct contact of the bird with a project structure(s). This type of fatality has been occasionally documented at solar projects of all technology types (McCrary et al. 1986; Hernandez et al.	Local	No avifaunal no-go areas were determined necessary for the mitigation of this anticipated impact.

	2014; Kagan et al. 2014). In some instances, the bird is not killed outright by the collision impact, but succumbs to predation later, as it cannot avoid predators due to its injured state.		
During operation: Entrapment of large-bodied birds in the double perimeter fence	Visser et al. (2019) recorded a fence-line fatality (Orange River Francolin <i>Scleroptila gutturalis</i>) resulting from the bird being trapped between the inner and outer perimeter fence of the development area. This was further supported by observations of large-bodied birds unable to escape from between the two fences (e.g. Red-crested Korhaan <i>Lophotis ruficrista</i>) (Visser et al. 2019). It is not foreseen that entrapment of priority species in perimeter fences will be a significant impact. The priority species which could potentially be affected by this impact are most likely medium to large terrestrial species.	Local	No avifaunal no-go areas were determined necessary for the mitigation of this anticipated impact.
During operation: Mortality of priority species due to electrocution on the 33kV internal reticulation network	While the intention is to place the 33kV reticulation network underground next to the access roads where possible, there are areas where the lines might have to run above ground. In these instances, the poles could potentially pose an electrocution risk to raptors. Electrocution refers to the scenario where a bird is perched or attempts to perch on the electrical structure and causes an electrical short circuit by physically bridging the air gap between live components and/or live and earthed components (van Rooyen 2000). The electrocution risk is largely determined by the design of the electrical hardware.	Local	No avifaunal no-go areas were determined necessary for the mitigation of this anticipated impact.
During construction and operation: Cumulative impact of displacement due to construction and habitat transformation, collisions with solar panels and entrapment in fences	Mortality and displacement of priority avifauna due to the construction of the PV facility and associated infrastructure and similar construction of other facilities in the broader Kroonstad region.	Local	<ul style="list-style-type: none"> » A 200m solar panel free buffer zone must be implemented around the pans (-27.736377° 27.134694°, -27.740910° 27.141575°, -27.741723° 27.144815°) to provide avifauna with unhindered access to the water. » A 100m solar panel free buffer zone must be implemented on both sides of

			the drainage line on the development area, to maintain a corridor of woodland.
<p>Description of expected significance of impact</p> <p>Anticipated avifaunal impacts are expected to range from Medium to Low following mitigation, with displacement of priority species due to disturbance, and displacement of priority species due to habitat transformation expected to rate medium following mitigation, whereas all other impacts are expected to be mitigable to a low significance level. Cumulative impact of displacement due to construction and habitat transformation is expected to be low following mitigation considering there are no other known renewable energy projects within a 30km radius of the project site. The site was classified as a Low Sensitivity site as defined in the Solar Guidelines, requiring a Regime 1 protocol to be followed for data collection i.e. a minimum of one site visit of 1 to 5 days in duration.</p>			
<p>Gaps in knowledge & recommendations for further study</p> <ul style="list-style-type: none"> » The impact of solar installations on avifauna is a new field of study, with only one published scientific study on the impact of PV facilities on avifauna in South Africa (Visser et al. 2019). Strong reliance was therefore placed on expert opinion and data from existing monitoring programmes at solar facilities in the USA where monitoring has been ongoing since 2013. The pre-cautionary principle was applied throughout as the full extent of impacts on avifauna at solar facilities is not presently known. » The assessment of impacts is based on the baseline environment as it currently exists in the development area. » Cumulative impacts include all solar PV projects within a 30km radius that currently have open applications or have been approved by the Competent Authority as per the 2020 Q2 database from the DEFF. » Conclusions were based on experience of these and similar species in different parts of South Africa. Bird behaviour can never be entirely reduced to formulas that will be valid under all circumstances. » The density and distribution of protected species of conservation concern across the project site will need to be characterised and quantified within the proposed development footprint to better inform the EIA Phase and the final sensitivity map. » The presence of larger raptors and other similar species of conservation concern at the project site to be confirmed. This information should be used to inform the sensitivity mapping at the site as well as the final layout of the development footprint of the facility. » The design and position of the development footprint and facility should consider potential impacts on avifauna. 			

8.3.4 Impacts on Soils, Geology, Agricultural Potential and Land-Use

The Vrede Solar PV Facility development area includes five different land capability classes according to the land capability data. The entire development area largely consists of land with Moderate (Class 8) to Moderate High (Class 9) land capability. Smaller patches in the centre and south-west consist of land with Low- Moderate (Classes 06 and 07) land capability. Classes 08 and 09 have potential for the production of specific crops under rainfed conditions, while classes 06 and 07 are likely to be very marginal arable land that is more suitable for livestock grazing. Based on the DAFF data layer, the Vrede Solar Energy facility development area includes areas with field crops, of which all the field crop areas consist of rainfed annual crops or planted pastures. Several pivot irrigation fields are located outside the development area, mostly south-west and south of it. Large fields with rainfed crops and/or planted pastures are located to the west and south of the development area with old fields to the north. The grazing capacity of the

largest section of the development area, is 6 ha/LSU. A small area in the north-eastern corner of the development area has a lower grazing capacity of 5 ha/LSU. Since the proposed infrastructure within the development area will be fenced off, it will no longer be available for livestock grazing.

Soil in the area include oxidic yellow-brown and red apedal forms, soils with higher clay content and structure such as that of the Bonheim, Valsrivier and Swartland forms, shallower soil forms underlain by hard plinthite (Westleigh form) as well as gley soils of the Kroonstad form. The desktop analysis indicates that the development area may include areas of high, medium and low agricultural sensitivity.

The following have been identified as potential impacts on agricultural resources and productivity, the significance of which will be determined during the EIA Phase. All these impacts are local in extent, confined to the site.

- » Soil compaction;
- » Soil erosion;
- » Loss of soil fertility through disturbance of in situ horizon organisation;
- » Soil chemical pollution;
- » Reduction or loss of agricultural productivity;
- » Change in numbers of employment opportunities (in the agricultural sector);
- » Change in the land capability of the site

Issue	Nature of Impact	Extent of Impact	No-Go Areas
During construction: Soil compaction	Soil compaction reduces the water infiltration rate of soil that increase the risk of run-off	Local	None
During construction: Soil erosion	Bare soil surfaces are prone to loss of soil particles as a result of wind and water movement	Local	None
During construction: Loss of soil fertility through disturbance of in situ horizon organisation	Earthworks as part of construction of the Solar Energy Facility will result in disturbance of in situ soil profiles	Local	None
During construction: Soil chemical pollution	Oil and fuel spillages as well as waste generation during the project cycle will result in soil chemical pollution.	Local	None
During construction: Reduction or loss of agricultural productivity	The proposed project will change reduce the areas where crops and livestock are produced.	Local	None / Will be determined during the detail assessment
During construction: Change in numbers of employment opportunities	The proposed project will result in the possible loss of agricultural employment opportunities.	Local	None / Will be determined during the detail assessment
During construction: Change in the land capability of the site	Where in situ soil profiles are disturbed by construction activities, the land capability may be altered	Local	None
Description of expected significance of impact			

The soil and agricultural sensitivity of the site therefore varies between low and moderate-high, depending on the soil properties, topography and other landscape features of the development area. No no-go areas have been identified for the proposed project from the perspective of soil and agricultural resource conservation. Soil compaction and soil erosion impacts due to the project activities are anticipated to be moderate, whereas a low to moderate impact of loss of soil fertility through disturbance of in situ horizon organisation is anticipated. Furthermore, moderate to high soil chemical pollution impact is expected, with a low to high impact on agricultural production of the development area anticipated. The site has low-moderate to moderate-high land capability and the proposed project will reduce the land capability of the surface infrastructure footprint. The detailed assessment and subsequent reporting will provide in-depth detail on all anticipated soil and agricultural potential impacts detailed above.

Gaps in knowledge & recommendations for further study

- » Soil samples that will be taken during the site visit will be analysed to determine whether the soil physical properties of the site are particularly sensitive to soil compaction.
- » Soil samples that will be taken during the site visit will be analysed to determine the erodibility risk of the soil in the development area.
- » The results of the soil survey that will be conducted will be used to determine the sensitivity of the in situ profiles to this impact.
- » In terms of soil chemical pollution, further detail of activities and materials that may result in soil pollution during the different project phases is required in order to further assess this impact.
- » The economic viability of rainfed annual crop production and livestock farming within the development area, will be calculated during the detail study phase.
- » It is not currently known how many agricultural jobs are made possible by the agricultural activities within the proposed development area. This will be investigated through informal discussions with the current landowner (or person/entity leasing the land for agricultural production).
- » The final land capability will be determined during the detail study phase.
- » The appropriate placement of the PV facility and other infrastructure to be assessed considering the slopes and erodibility of the soils present on the site. The following will be assessed in the EIA phase:
 - Soil conditions
 - Erosion potential and mitigation
 - Activities and materials that may result in soil pollution
 - Current land use viability

8.3.5 Impacts on Heritage (Archaeology and Palaeontology)

The cultural landscape qualities of the region essentially consist of a rural setup. Based on desktop datasets of other heritage studies conducted in the broader region, no heritage resource was determined to be located within approximately 7km of the project site. Furthermore, the development area is located more than 5km away from the site of the Boer War concentration camps and associated burial grounds. However, based on the find in the broader area of Kroonstad, potential exists for Early, Middle or Later Stone Age artefacts to be located within the proposed development area. Furthermore, it is possible that evidence of Iron Age settlement may also be located within the proposed development area.

The project site is also overlaid by Adelaide Subgroup (Pa) as well as Jurassic Dolerite (Jd) and Quaternary Sands (Qs), of which the most palaeontologically sensitive formation is the Adelaide Subgroup of the Beaufort Group, which are known to include fossils of fish, amphibians, reptiles, therapsids and vertebrate burrows, amongst others. The potential therefore exists that palaeontological resources be found within the development area.

The following anticipated impacts were determined by the heritage specialist, detailed below:

- » Cumulative impact to the Cultural Landscape
- » Destruction of significant archaeological heritage resources
- » Destruction of significant palaeontological heritage resources

Issue	Nature of Impact	Extent of Impact	No-Go Areas
During construction: Cumulative impact to the Cultural Landscape	Erosion of the sense of place associated with a rural area characterised by open spaces and an abundant variety of vegetation	Local	None
During construction: Destruction of significant archaeological heritage resources	Permanent loss of evidence of past occupation of the landscape	Local	To be determined through the field assessment
During construction: Destruction of significant palaeontological heritage resources	Permanent loss of scientific knowledge regarding the evolution of life	Local	To be determined through the field assessment

Description of expected significance of impact

Overall, the Vrede Solar PV facility has a high sensitivity regarding impacts to heritage resources. While no archaeological resources are known to exist within the development area, based on other heritage finds in the broader Kroonstad area, potential exists for archaeological resources within the development area. Any damage or loss of archaeological resources will be irreversible and permanent, representing a loss of evidence of past occupation of the landscape. Should an archaeological feature be damaged, the significance of the impact is therefore expected to be high.

In addition, a very high palaeontological sensitivity was determined for the development area. Any damage or loss of palaeontological heritage resources will be irreversible and permanent loss of scientific knowledge regarding the evolution of life. Should a palaeontological resource be damaged, the significance of the impact is therefore expected to be high.

Gaps in knowledge & recommendations for further study

- » The area proposed for the development of the Vrede Solar PV has not previously been surveyed for significant archaeological or palaeontological heritage resources based on the Desktop Information available.
- » In addition, the Cultural Landscape of rural areas located on the outskirts of Kroonstad have not been assessed for their heritage significance.

- » In line with the National Heritage Resources Act (Act 25 of 1999) a Phase 1 Archaeological Impact Assessment report will be prepared considering existing survey reports submitted to SAHRA. A full survey must be undertaken to support this Impact Assessment report.
- » The subsurface archaeological and palaeontological record can never be fully understood without excavation, and the EIA Phase report will make recommendations on how to proceed should fossils or heritage finds be discovered during construction activities.
- » In line with the National Heritage Resources Act (Act 25 of 1999) a Heritage Impact Assessment will be prepared considering existing survey reports submitted to SAHRA which will assess likely impacts to archaeological and palaeontological heritage resources through the completion of additional specialist studies. A full survey to identify archaeological and palaeontological resources must be undertaken to support this Impact Assessment report. This assessment should:
 - o Comply with specific requirements and guidelines of SAHRA and NHRA.
 - o Include the identification and mapping of all heritage resources in the area affected, as defined in Section 2 of NHRA.
 - o Include an assessment of the significance of such resources in terms of the heritage assessment criteria as set out in the regulations.
 - o Include an assessment of the impact of development on such heritage resources.
 - o Identify heritage resources to be monitored.
 - o Suggest suitable mitigation measures to address the identified impacts.
 - o Provide recommendations regarding the alternatives provided from a heritage perspective.
 - o Provide a description of the heritage sensitivity of the development based on the finding of the study.

8.3.6 Visual Impacts

Existing Settlements and Infrastructure

The natural land cover within the project site is predominantly grassland interspersed with open woodland, with wetlands in the lower lying reaches of the drainage lines. The development area itself is a combination of natural grassland and woodland (eastern section), and old farm lands to the west. Large tracts of the project site have been transformed by dryland agriculture (primarily maize farming) as well as irrigated crop farming (crop circles).

The broader region has a rural and predominantly natural character and the main land use activity, outside of the Kroonstad city limits, is maize farming. The region is similarly sparsely populated outside of the Kroonstad urban centre, with a population density of less than ten people per km². Farm residences, or homesteads, dot the landscape at an irregular interval. These homesteads are generally located at great distances from each other (i.e. more than 2.5km apart). The project site is easily accessible from the N1 national road via the R34 arterial road, the Hennenman road and the S172 secondary (gravel) road.

The only protected area in the broader area borders the proposed development area to the north. This is the Boslaagte Private Nature Reserve (farm Oshoek 47) that includes the Lechwe Lodge. This is the only tourist facility or destination identified within the study area (excluding Kroonstad itself). This lodge functions as a venue that can accommodate up to 300 people and provides overnight lodging. In spite of the rural and natural character of the study area, there is a large number of overhead power lines associated with the Kroonstad Municipal Substation. Two power lines traverse east of the proposed development area at a distance of approximately 1.5km (at the closest). Other than these power lines there is also a railway line crossing ~2.5km towards the south of the development area, in the direction of the industrial area west of the Kroonstad CBD.

Visibility of the Facility

The core area of potential visual exposure is primarily contained within a 1km radius of the proposed development site. The facility is expected to be very visible from the S172 secondary road within this zone and may potentially be visible from parts of the Boslaagte Private Nature Reserve. Within a 1 – 3km radius the facility may be visible from the Lechwe Lodge, and the Mooiwater, Gesukkel and Highlands homesteads. It may also be visible from a short section of the R34 arterial road. Within a 3 – 6km radius the visual exposure is largely restricted to higher lying areas south-west and north of the site. The facility may be visible from the Francina, Wilgerboom and Toggekry homesteads and may also be visible from the R713 main road. Other than these receptors, most of the visual exposure will be relatively scattered within vacant open space. At distances exceeding 6km the intensity of visual exposure is expected to be very low and highly unlikely due to the distance between the object (development) and the observer. Further to this, most of these areas are not inhabited and generally devoid of observers.

In general terms it is envisaged that the structures, where visible from shorter distances (e.g. less than 3km), and where sensitive visual receptors may find themselves within this zone, may constitute a high visual prominence, potentially resulting in a visual impact. The incidence rate of sensitive visual receptors is however expected to be quite low, due to the generally remote location of the proposed development and the low number of potential observers. This statement needs to be confirmed during the EIA phase of the project and the potential visual impacts must be investigated in terms of their nature, extent, duration, magnitude, probability and significance. The following impact is anticipated.

Issue	Nature of Impact	Extent of Impact	No-Go Areas
During construction & operation: Visual impact of the facility on observers in close proximity to the proposed infrastructure and activities.	The potential negative experience of viewing the Solar PV Facility infrastructure and activities within a predominantly natural/rural setting. Potential sensitive visual receptors include: <ul style="list-style-type: none"> » Visitors to the Boslaagte Private Nature Reserve and Lechwe Lodge » Residents of homesteads and farm dwellings (if present in close proximity to the facility) » Observers travelling along the S172 secondary and the R34 arterial roads 	Local - Primarily observers situated within a 3km radius of the facility	None identified

Description of expected significance of impact

In general terms it is envisaged that the structures, where visible from shorter distances (e.g. less than 3km), and where sensitive visual receptors may find themselves within this zone, may constitute a high visual prominence, potentially resulting in a visual impact. The incidence rate of sensitive visual receptors is however expected to be quite low, due to the generally remote location of the proposed development and the low number of potential observers. This statement needs to be confirmed during the EIA phase of the project and the potential visual impacts must be investigated in terms of their nature, extent, duration, magnitude, probability and significance.

Within a 3 – 6km radius the visual exposure is largely restricted to higher lying areas south-west and north of the site. The facility may be visible from the Francina, Wilgerboom and Toggekry homesteads and may also be visible from the R713 main road. Other than these receptors, most of the visual exposure will be relatively scattered within vacant open space.

At distances exceeding 6km the intensity of visual exposure is expected to be very low and highly unlikely due to the distance between the object (development) and the observer. Further to this, most of these areas are not inhabited and generally devoid of observers.

An overall Moderate to High significance is expected for the visual impact related to potentially sensitive visual receptors, to be confirmed during the EIA phase.

Gaps in knowledge & recommendations for further study

- » A layout of the Vrede Solar PV Facility and ancillary infrastructure are required for further analysis. This includes the provision of the dimensions of the proposed structures and ancillary equipment.
- » Additional spatial analyses are required in order to create a visual impact index that will include the following criteria:
 - Visual exposure
 - Visual distance/observer proximity to the structures/activities
 - Viewer incidence/viewer perception (sensitive visual receptors)
 - Visual absorption capacity of the environment surrounding the infrastructure and activities
- » Confirmation of sensitivity of the landscape and receptors from a site visit and consultation during the EIA process.
- » A development layout and details of structure height is needed to assess the impacts as well as the identification of possible mitigation measures in any detail.
- » Additional spatial analyses to be undertaken in order to create a visual impact index that will further aid in determining potential visual impact.
- » Specific spatial criteria need to be applied to the visual exposure of the proposed facility in order to successfully determine visual impact and ultimately the significance of the visual impact.

8.3.7 Social Impacts

Potential impacts associated with the detailed design and construction phase of a project are usually of a short duration (i.e. 12 to 18 months; equivalent to the length of the construction phase) and temporary in nature, but could have long-term effects on the social environment if not planned or managed appropriately. It is necessary, for example, that the detailed design phase be conducted in such a manner so as not to result in permanent impacts associated with the ill-placement of project components or associated infrastructure.

The proposed development supports the social and economic development through enabling skills development and training in order to empower individuals and promote employment creation within the area. The Project could create much needed employment opportunities in the area and will contribute to the overall objective of national government of diversifying energy sources in the country and improving energy security. The positive socio-economic impacts that are associated with the Project include the creation of direct and indirect employment opportunities, economic multiplier effects and the development of non-polluting, renewable energy infrastructure. Negative

impacts include in-migration of people (non-local workforce and jobseekers), safety and security impacts, impacts on daily living and movement patterns, nuisance impact (noise and dust), visual and sense of place impacts and impacts associated with the loss of agricultural land.

Based on the findings of the SIA Scoping Report, no red flags or fatal flaws have been identified from a social perspective from a desktop level.

Issue	Nature of Impact	Extent of Impact	No-Go Areas
During Construction: Construction of the project will result in the creation of a number of direct and indirect employment opportunities, which will assist in addressing unemployment levels within the area and aid in skills development of communities in the area.	Positive – The creation of employment opportunities will assist to an extent in alleviating unemployment levels within the area.	The impact will occur at a local and regional.	None identified.
During Construction: Economic multiplier effects from the use of local goods and services during the construction phase.	Positive – There are likely to be opportunities for local businesses to provide goods and services during the construction phase of development.	The impact will occur at a local, and regional level.	None identified.
During Construction: Increased pressure on infrastructure and basic services, and social conflicts during construction as a result of in-migration of people.	Negative – The in-migration of job seekers to the area could result in increased pressure being placed on infrastructure and basic services, and a rise in social conflicts.	The impact will occur at a local level.	None identified.
During Construction: Temporary increase in safety and security concerns associated with the influx of people during the construction phase.	Negative – The in-migration of job seekers to the area could be perceived to result in increased criminal activity.	The impact will occur at a local level.	None identified. No workers should be allowed to reside on-site during construction.
During Construction: Temporary increase in traffic disruptions and movement patterns during construction.	Negative – An increase in traffic due to construction vehicles and heavy vehicles could create short-term disruptions and safety hazards for current road users.	The impact will occur at a local level.	None identified.
During Construction: Nuisance impacts in terms of temporary	Negative – The impact will negatively impact sensitive receptors and could cause disruptions for neighbouring properties.	The impact will occur at a local level.	None identified.

increase in noise and dust, and wear and tear on access roads to the site.			
During Construction: Intrusion impacts from construction activities will have an impact on the area's "sense of place".	Negative – The project could alter the area's sense of place which could negatively impact on sensitive receptors.	The impact will occur at a local level.	None identified.
During Operation: Creation of direct and indirect employment and skills development opportunities and skills development as a result of the operation of the project.	Positive – The creation of employment opportunities and skills development will assist to an extent in alleviating unemployment levels within the area.	The impact will occur at local and regional.	None identified.
During Operation: Development of non-polluting, renewable energy infrastructure.	Positive – Increasing the contribution of the RE sector to the local economy would contribute to the diversification of the local economy and provide greater economic stability.	The impact will occur at local, regional, and national levels.	None identified.
During Operation: Benefits to the local area from Socio-Economic Development (SED) / Enterprise Development (ED) programmes	Positive – The creation of employment opportunities, skills development, and the contributions to local economic development will assist to an extent in both alleviating unemployment levels within the area, and improving the quality of life.	The impact will occur at local, regional, and national levels.	None identified.
During Operation: Sense of place impacts from a social perspective associated with the operation phase of the solar energy facility and associated infrastructure.	Negative – The project could alter the areas sense of place which could negatively impact on sensitive receptors.	The impact will occur at a local level.	None identified.
During Operation: The development footprint on which the solar energy facility will be developed will be removed from agricultural production.	Negative – Impacts associated with loss of agricultural land due to occupation of land by the solar energy facility.	The impact will occur at a local level.	None identified.
Description of expected significance of impact			
At its peak, the construction is likely to result in the creation of approximately 500 employment opportunities. The employment will comprise of low skilled semi-skilled and skilled workers. Skills developed through experience in the construction of the facility will be retained by the community members involved. The impact is likely to be positive, local to national in extent, short-term, and of medium significance.			

Economic multiplier effects from the use of local goods and services opportunities include, but are not limited to, the provision of construction materials and equipment, and workforce essentials such as services, safety equipment, ablution, accommodation, transportation and other goods. The increase in demand for goods and services may stimulate local business and local economic development (however locally sourced materials and services may be limited due to availability). There is likely to be a direct increase in industry and indirect increase in secondary businesses. The impact is likely to be positive, local to regional in extent, short-term, and of medium significance.

The in-migration of people to the area as either non-local workforce and / or jobseekers could result in increased pressure being placed on infrastructure and basic services on the local population (rise in social conflicts). An influx of people into the area, could lead to a temporary increase in crime levels, cause social disruption, and put pressure on basic services. An influx of people looking for economic opportunities could result in pressure on the local population such as rise in social conflicts and change in social dynamics, increase in social ills. Adverse impacts could occur if a large in-migrant workforce, which is culturally different from the local population, is brought in during construction. The impact is likely to be negative, local in extent, short-term²⁷, and of medium significance due to the number of jobs expected to be created.

The perception exists that an influx of jobseekers, and / or construction workers to an area is a contributor to increased criminal activities in an area; such as increased safety and security risk for neighbouring properties and damage to property, increased risk of veld fire, stock theft, and crime etc. The impact is likely to be negative, local in extent, short-term, and of medium significance due to the number of jobs expected to accrue to the non-local workforce.

Increased traffic due to construction vehicles and heavy vehicles could cause disruptions to road users and increase safety hazards. The use of local roads and transport systems may cause road deterioration and congestion. The impact is likely to be negative, local in extent, short-term, and of low significance.

Impacts associated with construction related activities include noise, dust and disruption or damage to adjacent properties. Site clearing activities increase the risk of dust and noise being generated, which can in turn negatively impact on adjacent properties. The impact is likely to be negative, local in extent, short-term, and of low significance.

Intrusion impacts such as aesthetic pollution (i.e. building materials, construction vehicles, etc.), noise and light pollution, and impacts could impact the "sense of place" for the local community. The impact is likely to be negative, local in extent, short-term, and of medium significance.

During operation 90 direct full time employment opportunities will be created which will include low-skilled, semi-skilled skilled opportunities. Employment opportunities include safety and security staff, operation and monitoring; and maintenance crew. Maintenance activities will be carried out throughout the lifespan of the project, and will include

²⁷ While the extent of the impact may be short-term (i.e. people are only likely to move into the area in search of employment prior to and possibly during construction), the implications thereof may be long-term, as people are likely to have settled in the area, and are unlikely to leave immediately after the completion of construction.

washing of solar panels, vegetation control, and general maintenance around the solar energy facility. The impact is likely to be positive, local to national in extent, long-term, and of medium significance.

The generation of renewable energy will contribute to South Africa's electricity market and may contribute to the diversification of the local economy. The growth in the RE sector as a whole could introduce new skills and development into the area. The impact is likely to be positive, local to national in extent, long-term, and of medium significance.

Under the REIPPP Programme renewable energy projects are required to contribute to local economic development in the area. Awarded projects are required to spend a certain amount of their generated revenue (as defined in the agreement with DoE) on Socio-Economic Development (SED) and Enterprise Development (ED) and share ownership in the project company with local communities. The impact is likely to be positive, local to national in extent, long-term, and of high significance.

The presence of the solar energy facility could impact the "sense of place" for the local community. The impact is likely to be negative, local in extent, long-term, and of low significance based on the current use of the project site.

The development of the proposed project on an agricultural property would result in the area of land required to support the development footprint being removed from potential agricultural production, however the projects site has been left derelict for more than 10 years with no future prospects of re-undertaking agricultural activities. . The impact is likely to be negative, local in extent, long-term, and of very low significance.

Gaps in knowledge & recommendations for further study

Further information is required on the following during the EIA phase assessment:

- » Information on the exact direct and indirect employment opportunities and skills development opportunities likely to be created during construction.
- » Information on capital expenditure to be spent on local goods and services.
- » Information on the exact number of employment opportunities likely to accrue to the local labour force, versus the number of employment opportunities likely to accrue to the non-local workforce and jobseekers.
- » Mechanisms for employment of local labour and minimisation of in-migration
- » Number of vehicle trips anticipated during construction.
- » Impact of noise and dust on surrounding landowners.
- » Potential sensitive visual receptors need to be identified.
- » Visual Impact Assessment to inform the impact on the sense of place.
- » Information on exact direct and indirect employment opportunities and skills development programmes likely to be created during operation.
- » Information on the proposed project's contribution towards diversifying the local economy.
- » Information on the project's proposed contributions to SED and ED.
- » The current land use and agricultural potential of the area likely to be removed from agricultural production needs to be determined.
- » Soils and Agricultural Potential Impact Assessment to inform impact associated with the loss of agricultural land.

8.4 Evaluation of Potential Cumulative Impacts Associated with the project

Impacts of a cumulative nature place the direct and indirect impacts of the proposed project into a regional and national context, particularly in view of similar or resultant developments and activities in the region. Potential cumulative impacts associated with the Vrede Solar PV Facility are described below, and will be assessed in detail as part of the subsequent EIA phase to be conducted for the project.

Impact

Cumulative impacts, in relation to an activity, refer to the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area. For cumulative effects analysis to help the decision-maker and inform interested parties, it must be limited to effects that can be evaluated meaningfully (DEAT, 2004). It is important to explore the potential for cumulative impacts as this will lead to a better understanding of these impacts and the potential for mitigation that may be required. The scale at which the cumulative impacts are assessed is important. For example, the significance of the cumulative impact on the regional or national economy will be influenced by solar PV facility developments throughout South Africa, while the significance of the cumulative impact on the visual amenity may only be influenced by solar PV facility developments that are in closer proximity to each other. For practical purposes a sub-regional scale of 30km is considered for the evaluation of cumulative impact of PV facilities.

The cumulative impacts associated with the Vrede Solar PV Facility have been viewed from two perspectives within this Scoping Report:

- » Cumulative impacts associated with the scale of the project (one 100MW PV Facility on the project site); and
- » Cumulative impacts associated with other relevant planned, approved or existing solar developments within a 30km radius of the project site (multiple PV facilities in the proximity of the site).

Based on the Department of Environment, Forestry and Fisheries' (DEFF) latest release of the South African Renewable Energy EIA Application Database (REEA_OR_2020_Q2, 31 August 2020)²⁸, no other renewable energy facilities have been authorised within 30km of the Vrede Solar PV Facility project site. A map showing other relevant solar projects in the greater area is shown in **Figure 8.5**.

²⁸ Source: The DEFF's Environment Geographic Information Systems (EGIS) website (<https://egis.environment.gov.za/>).

One additional 75MW PV solar energy facility is, however, proposed within the immediate area, namely:

Project Name	Affected property	Contracted Capacity	Status
Rondavel Solar PV Facility	Remaining Extent of the farm Rondavel Noord No. 1475 (main site); and Remaining Extent of the farm Rondavel No. 627 (main and grid site).	75MW	In process – S&EIR

The cumulative assessment will consider this facility only within the 30km radius from the Vrede Solar PV Facility.

The cumulative impacts that have the potential to be compounded through the development of the solar PV facility and its associated infrastructure in proximity to other similar developments. The role of the cumulative assessment is to test if such impacts are relevant to the Vrede Solar PV Facility within the development area being considered for the development:

- » Unacceptable loss of threatened or protected vegetation types, habitat or species through clearing, resulting in an impact on the conservation status of such flora, fauna or ecological functioning;
- » Unacceptable risk to freshwater features through disturbance associated with construction activities and increased runoff and erosion during the operation phase;
- » Unacceptable risk to avifauna through habitat loss, displacement and collision with PV panels;
- » Unacceptable loss of high agricultural potential areas presenting a risk to food security and increased soil erosion;
- » Unacceptable loss of heritage resources (including palaeontological and archaeological resources);
- » Complete or whole-scale change in the sense of place and character of an area and unacceptable visual intrusion; and
- » Unacceptable impact to socio-economic factors and components.

Summary of the nature, significance, consequence, extent, duration and probability of the impacts

- » The above mentioned impacts are considered to be probable, although it is anticipated that the extent, duration, and magnitude of these impacts can be minimised to levels where this impact can be regarded as having low significance through the implementation of appropriate mitigation measures.
- » The operational lifespan of the project and the one other PV facility within the surrounding area is expected to be long-term (i.e. a minimum of 20 years) and subsequently the impact is also expected to be long-term.
- » The impact associated with the proposed development is expected to be local, affecting mainly the immediate environment and surrounding areas, as well as other renewable energy facilities within the vicinity (currently only one planned).

Gaps in knowledge & recommendations for further study:

- » Each specialist study will consider and assess the cumulative impacts of proposed, approved and authorised renewable projects in the area.
- » Cumulative impacts will be fully assessed and considered in the EIA phase.

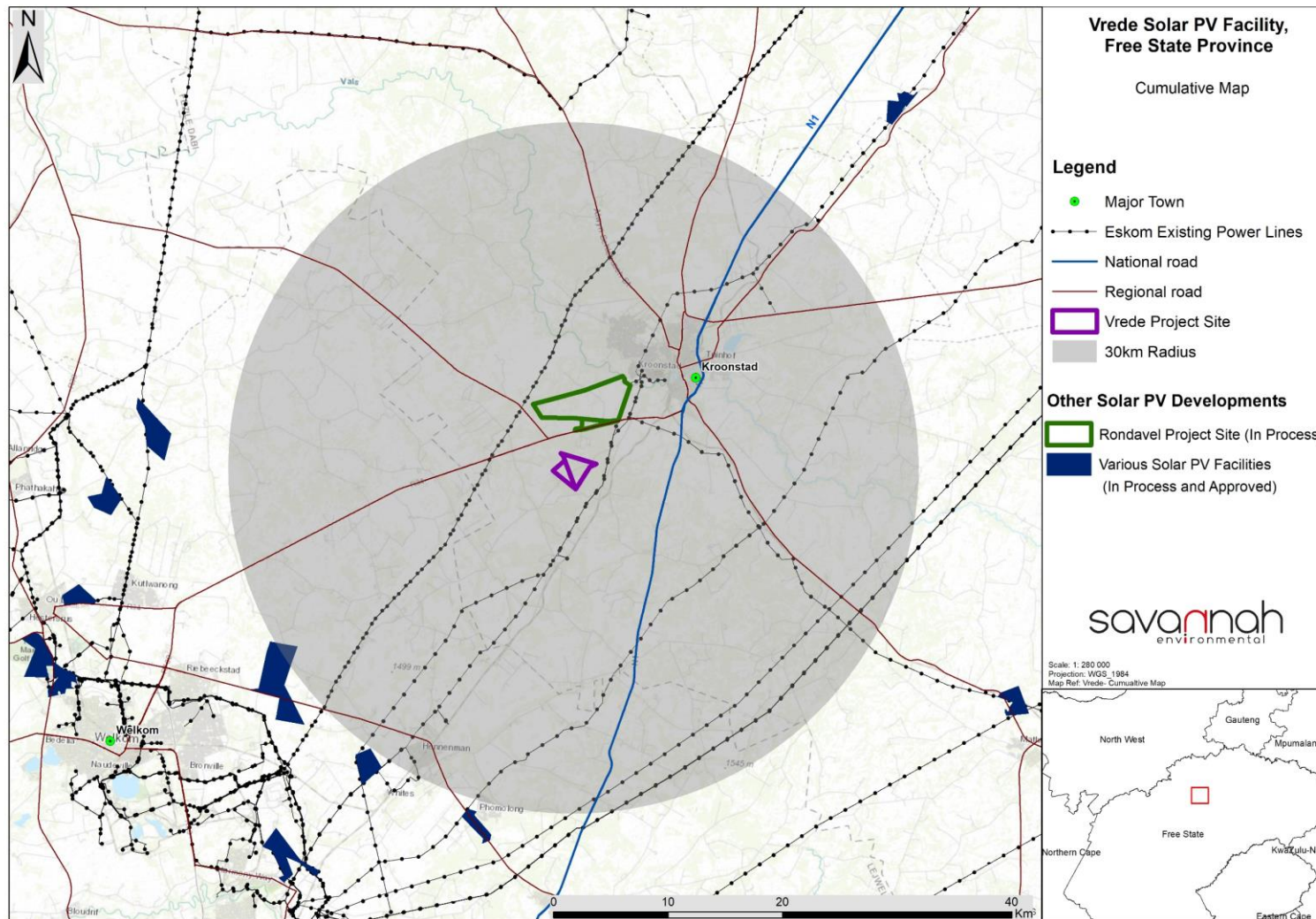


Figure 8.5: Cumulative map illustrating other approved and/or constructed PV facilities located within the vicinity of the project site (Refer **Appendix J** for A3 maps).

CHAPTER 9 CONCLUSIONS

This Scoping Report is aimed at detailing the nature and extent of the proposed development, identifying and describing potential issues associated with developing the project on the identified project site, identifying potential environmental fatal flaws and/or areas of sensitivity, and defining the extent of studies required to be undertaken as part of the detailed EIA phase. This has been achieved through considering available desktop information, input from the project team with experience on similar projects and specialist scoping assessments. This Scoping Report has been compiled in terms of the 2014 EIA Regulations (GNR 982, as amended) published in terms of Section 24(5) of NEMA.

A summary of the conclusions of the evaluation of the potential impacts identified to be associated with the project is provided in **Section 9.2**. Recommendations regarding investigations required to be undertaken within the detailed EIA phase are provided within the Plan of Study for EIA (**Chapter 10**).

9.1 Legal Requirements as per the EIA Regulations, 2014 (as amended) for the undertaking of an Impact Assessment Report

This chapter of the scoping report includes the following information required in terms of Appendix 2: Content of the Scoping Report:

Requirement	Relevant Section
(g)(xi) a concluding statement indicating the preferred alternatives, including the preferred location of the activity.	An overall conclusion and fatal flaw analysis regarding the Vrede Solar PV Facility is included within Section 9.4 .

9.2 Conclusions drawn from the Evaluation of the PV Facility Development

The Vrede Solar PV Facility is proposed on the Remaining extent of the farm Vrede No. 1152 and Portion 1 of the farm Uitval No. 1104 which is located approximately 13km south-west of the town of Kroonstad. PV technology is proposed to be utilised for the generation of electricity, and the Vrede Solar PV Facility will have a contracted capacity of up to 100MW. Infrastructure associated with the solar PV facility will include the following:

- » Solar PV array comprising PV modules and mounting structures.
- » Inverters and transformers.
- » Cabling between the project components.
- » On-site facility substation to facilitate the connection between the solar PV facility and the Eskom electricity grid.
- » Battery Energy Storage System (BESS).
- » Site offices and maintenance buildings, including workshop areas for maintenance and storage.
- » Laydown areas.
- » Access roads, internal distribution roads and fencing around the development area.

The Scoping study included the identification of potential impacts associated with the project through a desktop study and scoping specialist assessments, as well as consultation with affected parties and key stakeholders. A preliminary evaluation of the extent and significance of potential impacts associated with the development of the Vrede Solar PV Facility have been detailed in Chapter 8. These will be assessed in detail through the EIA Phase assessment, which will include independent specialist assessments.

This scoping study has identified areas of higher sensitivity within the development area to assist in focussing the location of the development footprint for the Vrede Solar PV Facility to minimise the potential for environmental impact. The proposed delineated development area is larger than the area required to house the PV facility and associated infrastructure. A development area²⁹ of ~279ha was demarcated and considered in this Scoping report, which is sufficient for the installation of a solar PV facility with a contracted capacity of up to 100MW_{AC}, while allowing for the avoidance of environmental site sensitivities. A development envelope has been demarcated as a preferred area within the development area for the placement of the development footprint. The identified development envelope has an extent of ~245ha, which is equivalent to 87% of the extent of the development area. The facility can therefore be appropriately placed within the larger project site and avoid identified sensitivities. The site extent is sufficient for the proposed development and other alternative locations for the development have not been considered in this report. The size of the development footprint within the development envelope will be confirmed in the EIA phase once the facility layout is available for assessment.

The majority of potential impacts identified to be associated with the construction of the Vrede Solar PV Facility are anticipated to be localised and restricted to the development footprint itself, while operation phase impacts/benefits range from local to regional. No environmental fatal flaws were identified to be associated with the development area. Features within the larger area have, however, been identified as 'no-go' areas based on the avifaunal sensitivity and impact anticipated, which should be avoided by the development footprint. The development envelope has been identified to avoid these areas of sensitivity present within the development area and therefore avoidance of sensitive features is considered a necessity for the placement of infrastructure early in the EIA process.

The potentially significant issues related to the **construction** of the Vrede Solar PV Facility include:

- » Disturbance to and loss of indigenous natural vegetation.
- » Disturbance or loss of threatened/protected plants.
- » Loss of habitat for fauna species of conservation concern.
- » Disturbance to migration routes and associated impacts to species populations.
- » Impact on Critical Biodiversity Areas.
- » Establishment and spread of declared weeds and alien invader plants.

²⁹ The development area is that identified area (located within the project site) where the Vrede Solar PV Facility is planned to be located. This area has been selected as a practicable option for the facility, considering technical preference and constraints. The development area is ~279ha in extent.

- » Disturbance to and loss of wetland vegetation
- » Impact on wetland systems through the possible increase in surface water runoff
- » Increase sedimentation and erosion
- » Impact on localised surface water quality
- » Loss of habitat for fauna dependent on such habitats.
- » Displacement of priority species due to disturbance associated with construction of the PV plant and associated infrastructure.
- » Displacement of priority species due to habitat transformation associated with construction of the PV plant and associated infrastructure.
- » Cumulative impact of displacement due to construction and habitat transformation, collisions with solar panels and entrapment in fences
- » Soil compaction
- » Soil erosion
- » Loss of soil fertility through disturbance of in situ horizon organisation
- » Soil chemical pollution
- » Reduction or loss of agricultural productivity
- » Change in numbers of employment opportunities
- » Change in the land capability of the site
- » Cumulative impact to the Cultural Landscape
- » Destruction of significant archaeological heritage resources
- » Destruction of significant palaeontological heritage resources
- » Visual impact of the facility on observers in close proximity to the proposed infrastructure and activities.
- » During Construction: Construction of the project will result in the creation of a number of direct and indirect employment opportunities, which will assist in addressing unemployment levels within the area and aid in skills development of communities in the area.
- » Economic multiplier effects from the use of local goods and services during the construction phase.
- » Increased pressure on infrastructure and basic services, and social conflicts during construction as a result of in-migration of people.
- » Temporary increase in safety and security concerns associated with the influx of people during the construction phase.
- » Temporary increase in traffic disruptions and movement patterns during construction.
- » Nuisance impacts in terms of temporary increase in noise and dust, and wear and tear on access roads to the site.
- » Intrusion impacts from construction activities will have an impact on the area's "sense of place".

The potentially significant issues related to the **operation** of the Vrede Solar PV Facility include:

- » Disturbance or loss of indigenous natural vegetation.
- » Establishment and spread of declared weeds and alien invader plants.
- » Impact on wetland systems through the possible increase in surface water runoff
- » Impact on localised surface water quality
- » Mortality of priority species due to collisions with solar panels
- » Entrapment of large-bodied birds in the double perimeter fence
- » Mortality of priority species due to electrocution on the 33kV internal reticulation network

- » Cumulative impact of displacement due to construction and habitat transformation, collisions with solar panels and entrapment in fences
- » Visual impact of the facility on observers in close proximity to the proposed infrastructure and activities.
- » Creation of direct and indirect employment and skills development opportunities and skills development as a result of the operation of the project.
- » Development of non-polluting, renewable energy infrastructure.
- » Benefits to the local area from Socio-Economic Development (SED) / Enterprise Development (ED) programmes
- » Sense of place impacts from a social perspective associated with the operation phase of the solar energy facility and associated infrastructure.
- » The development footprint on which the solar energy facility will be developed will be removed from agricultural production.

9.3 Sensitivity Analysis for the Development Area

The potentially sensitive areas which have been identified through the environmental scoping study are listed below and illustrated in **Figure 9.1**. The scoping phase sensitivity map provides an informed estimate of the sensitivity on the larger site, and specifically the development area. The detail is based on the desktop review of available baseline information for the development area, as well as the sensitivity data provided by the specialist assessments. The sensitivity map informed the location/layout of the development envelope for the facility, and must be used as a tool by the developer to avoid those areas flagged to be of potential high sensitivity. The development envelope is the area which will be assessed further in detail in the EIA Phase (**Figure 9.2**).

The vast majority of the development area is comprised of fallow lands, and disturbed or transformed areas which have a low ecological sensitivity. These areas are considered suitable for development. Very high sensitivity features determined by the ecological specialist included natural grasslands, which either occurred within CBA1 areas or were representative of undisturbed Vaal-Vet Sandy Grassland, which is an Endangered vegetation type. A further very high sensitivity feature identified by the ecologist is the rocky outcrop, which provides a niche habitat within the broader landscape and has a CBA1 classification. While important for ecological function and regarded as highly sensitive, these areas were not deemed as no-go zones from an ecological perspective but warrant further investigation during the EIA phase. Medium sensitivity features included isolated grassland and open shrub grassland (where these were not part of CBA1 areas) which by virtue of being isolated were considered to not contribute as strongly to the conservation of the endangered vegetation type (Vaal-Vet Sandy Grassland).

Freshwater sensitivity ranged from medium to very high, depending primarily on the anticipated natural and undisturbed state of a given wetland feature. Artificial wetland features that are located outside of any sensitive natural wetland areas are of medium sensitivity, due to the habitat provided by these features to fauna and livestock on site. Dams and artificial wetlands forming part of natural wetlands features were afforded a high sensitivity whereas natural wetland features which form part of important downstream watercourses were classified as very high sensitivity features, due to the CBA1 classification of these areas, and the unique habitats and ecological services (flood attenuation, erosion control, water quality enhancement amongst others) that these features provide. A preliminary no-go buffer of 35m around these features is required (to be confirmed during the EIA phase assessment). In addition, these buffer

zones coincide with avifaunal no-go areas, which are far greater in extent and therefore are wholly contained within the avifaunal sensitivities determined for the site. These avifaunal sensitive areas were surface water features (very high sensitivity), and a drainage line (very high sensitivity) located within the woodland portion of the development area (the north-eastern corner of the development area). Surface water features were afforded a 200m no-go zone within which no solar panels may be placed, to allow for unhindered access to and from these features for bird species. Drainage lines were also classified as very high sensitivity features due to being important nesting and foraging habitat for woodland species. A 100m buffer zone within which no solar panels may be placed (other infrastructure allowed however) was determined for this drainage lines from an avifaunal sensitivity perspective.

The above specialist determined no-go zones have been excluded from the development area, to determine the proposed development envelope, as demarcated in **Figure 9.1** and **Figure 9.2**. Furthermore, soil and agricultural sensitivity varied from low to moderate-high within the development footprint, based on the land capability of as per the DAFF land capability data layers. No no-go areas were however determined in terms of soil and agriculture potential, as further investigation is required during the EIA phase to confirm the scoping phase sensitivity.

Potentially sensitive receptors from a visual perspective were anticipated to be the Lechwe Lodge, and the Mooiwater, Gesukkel and Highlands homesteads which are located within 1-3km from the development area, potentially resulting in a visual impact. The incidence rate of sensitive visual receptors is however expected to be quite low, due to the generally remote location of the proposed development and the low number of potential observers.

While no archaeological resources are known to exist within the development area, based on other heritage finds in the broader Kroonstad area, potential exists for archaeological resources within the development area and the development area is thus regarded as sensitive from an archaeological perspective. Furthermore, a very high palaeontological sensitivity was determined for the development area based on the underlying formations, which are known to include important palaeontological resources.

An area of focus which is environmentally preferred for the development of a PV project within the development area is shaded in yellow in **Figure 9.1** and in **Figure 9.2**. The area represents the development envelope, that is, the portion of the farm and development area with the greatest potential for development of a PV facility after taking into consideration the sensitivity identified within the development area.

This 'funnel-down approach' in the consideration of the larger project site and development area focuses the detailed specialist studies to be undertaken in the EIA Phase on the portion of the site with reduced environmental sensitivities. In order to reduce the potential for on-site environmental impacts the identified sensitive areas should be avoided as far as reasonably possible. While observing these constraints to the available area for development, the demarcated focus area for the development is illustrated in **Figure 9.1** as the "Development Envelope". The extent of this demarcated area exceeds the required development footprint for the 100MW PV facility and, therefore, it is possible to accommodate the PV development at the site with a low impact on sensitive features.

9.4 Overall Conclusion and Fatal Flaw Analysis

The findings of the desktop Scoping Study indicate that no environmental fatal flaws are associated with the Vrede Solar PV Facility project site. While some impacts of potential significance do exist, it is anticipated that the implementation of appropriate mitigation measures would assist in reducing the significance of such impacts to acceptable levels. It is however recommended, that the development area for the development of the facility be considered outside of the identified no-go areas or areas of very high sensitivity as far as possible in order to ensure that the development does not have a detrimental impact on the environment. This forms part of the 'funnel-down approach' for the identification of an appropriate development footprint within the project site. Even with the appropriate avoidance of sensitive areas, there is a large area on the site which can accommodate the proposed facility with relatively low impacts on the environment. This area is referred to as the Development Envelope.

With an understanding of which areas within the project site are considered sensitive to the development of the proposed facility, the Applicant can prepare the detailed infrastructure layout for consideration within the EIA Phase. During the EIA phase, more detailed environmental studies will be conducted in line with the Plan of Study for EIA contained in **Chapter 10** of this Scoping Report. These studies will consider the detailed layouts produced by the Applicant, and make recommendations for the implementation of avoidance strategies (if required), and mitigation and management measures to ensure that the final assessed layout retains an environmental impact within acceptable limits. The sensitivity map will be further refined in the EIA phase on the basis of these specialist studies, in order to provide an assessment of environmental acceptability of the final design of the facility.

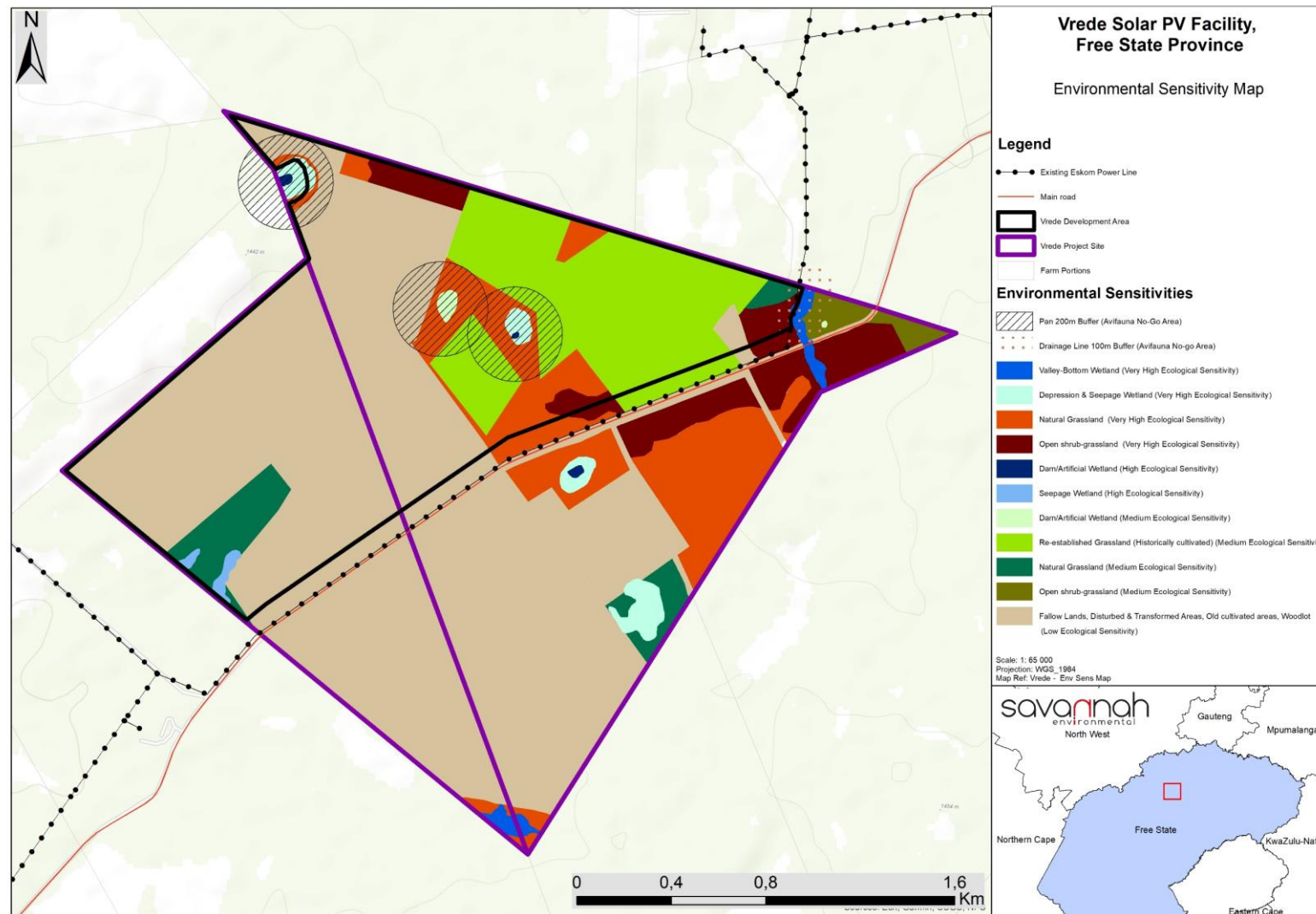


Figure 9.1: Environmental Sensitivity Map from the results of the scoping evaluation for the Vrede Solar PV Facility, indicating the recommended development envelope.

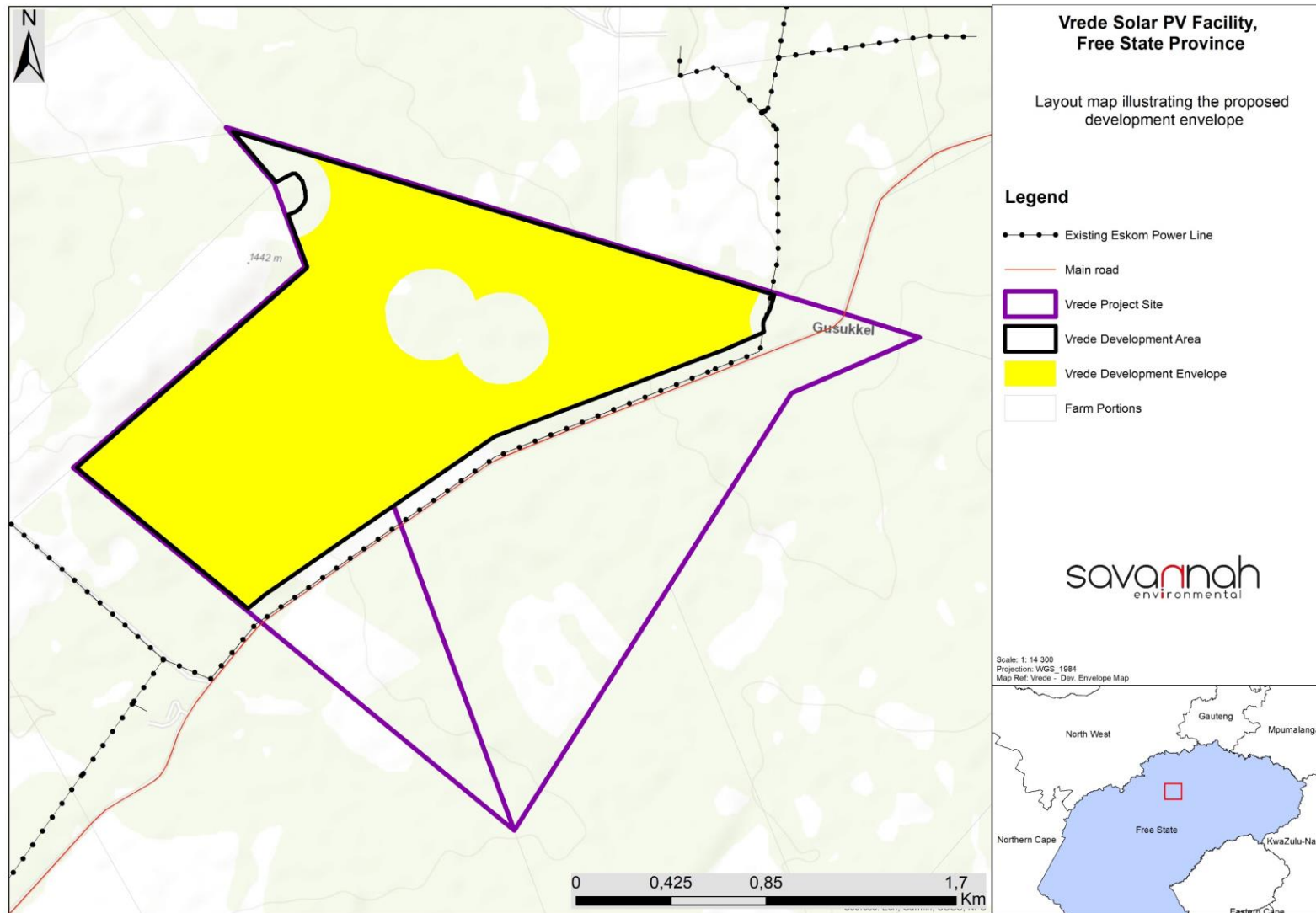


Figure 9.2: Development envelope to be assessed in detail as part of the EIA Phase and within which the project development footprint/layout will be designed

CHAPTER 10 PLAN OF STUDY FOR THE EIA

One of the key objectives of the Scoping phase is to determine the level of assessment to be undertaken within the EIA Phase of the process. This will include the methodology to be applied, the expertise required as well as the extent of further consultation to be undertaken. This is to determine the impacts and risks a particular activity will impose on a preferred site through the life of the activity (including the nature, significance, consequence, extent, duration and probability of the impacts) to inform the location of the development footprint within the preferred site.

This Chapter contains the Plan of Study for the EIA for the Vrede Solar PV Facility. The findings of the Scoping Phase include inputs from the project proponent and the EIA specialist team. The findings are used to inform the Plan of Study for EIA together with the requirements of the 2014 EIA Regulations (GNR 982, as amended) and applicable guidelines. The Plan of Study for EIA describes how the EIA Phase will proceed, and includes details of the independent specialist studies required to be undertaken to assess the significance of those impacts identified within the Scoping Study to be of potential significance.

10.1 Legal Requirements as per the EIA Regulations, 2014 (as amended) for the undertaking of an Impact Assessment Report

This chapter of the scoping report includes the following information required in terms of Appendix 2: Content of the Scoping Report:

Requirement	Relevant Section
<p>(h) a plan of study for undertaking the environmental impact assessment process to be undertaken, including -</p> <ul style="list-style-type: none"> (i) a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity; (ii) a description of the aspects to be assessed as part of the environmental impact assessment process; (iii) aspects to be assessed by specialists; (iv) a description of the proposed method of assessing the environmental aspects, including aspects to be assessed by specialists; (v) a description of the proposed method of assessing duration and significance; (vi) an indication of the stages at which the competent authority will be consulted; (vii) particulars of the public participation process that will be conducted during the environmental impact assessment process; and (viii) a description of the tasks that will be undertaken as part of the environmental impact assessment process; (ix) identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored. 	<p>A plan of study for the undertaking of the EIA Phase for the Vrede Solar PV Facility is included within this chapter.</p>

10.2 Objectives of the EIA Phase

The EIA will assess the potential direct, indirect and cumulative environmental impacts and benefits associated with each phase of the development including design, construction, operation, and decommissioning. The EIA will aim to provide the CA with sufficient information to make an informed decision regarding the proposed development. The site layout being proposed, will be assessed by a range of independent specialist studies. Furthermore, as required in terms of the 2014 EIA Regulations (GNR 982, as amended), the assessment will also include an assessment of the "do nothing" (i.e. no-go) alternative.

The EIA Phase will aim to achieve the following:

- » Provide an overall assessment of the social and biophysical environment affected by the Vrede Solar PV Facility.
- » Assess potentially significant impacts (direct, indirect and cumulative, where required) associated with the Vrede Solar PV Facility.
- » Identify and recommend appropriate mitigation measures for potentially significant environmental impacts.
- » Undertake a fully inclusive public involvement process to ensure that I&APs are afforded the opportunity to participate, and that their issues and concerns are recorded.

10.3 Authority Consultation

Consultation with the regulating authorities (i.e. DEFF and Free State DEDTEA) have been and will continue to be undertaken and will continue throughout the EIA process. On-going consultation will include the following:

- » Approval of a Public Participation Plan by DEFF prior to the lodging of the Application for Environmental Authorisation.
- » Submission of a Scoping Report for review and comment.
- » Submission of a Final Scoping Report following the 30-day public review period (and consideration of comments received).
- » Submission of an EIA Report for review and comment.
- » Submission of a Final EIA Report following a 30-day public review period (and consideration of comments received).
- » Consultation and a site visit with DEFF and Free State DEDTEA (if required) in order to discuss the findings and conclusions of the EIA Report.

10.4 Consideration of Alternatives

The following project alternatives will be investigated in the EIA Phase:

- » **Design and Layout Alternatives:** The Vrede Solar PV facility development footprint is to be located within the best possible position within a development area of ~279ha. A development envelope has been demarcated as an area of ~245ha, which is equivalent to 87% of the extent of the development area. The facility can therefore be appropriately placed within the larger site and avoid identified sensitivities. The site extent is sufficient for the proposed development and other alternative locations for the development have not been considered in this report. The size of the development footprint within the

development envelope will be confirmed in the EIA phase once the facility layout is available for assessment. The environmental sensitivity identification process will inform the layout design for the solar facility, avoiding sensitive areas as far as possible, thereby ensuring that the layout plan taken forward for consideration during the EIA Phase is the most optimal from an environmental perspective. An optimal location within the broader project site has been identified based on constraints identified through desk-top data and specialist scoping assessments. An area for the development of the solar facility (a development envelope) has, therefore, been recommended based on this information. These constraints also include any areas considered to be no-go areas.

- » **The 'Do-Nothing' Alternative:** The 'do-nothing' alternative is the option of not constructing the Vrede Solar PV Facility. Should this alternative be selected, there would be no environmental impacts as a result of construction and operation activities associated with a solar PV facility. This alternative will be assessed within the EIA Phase of the process.

10.5 Assessment of Potential Impacts and Recommendations regarding Mitigation Measures

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

The requirement for the submission of a Screening Report (included as **Appendix L** of the Scoping Report) for the Vrede Solar PV Facility is applicable as it triggers Regulation 21 of the EIA Regulations, 2014 (as amended). **Table 10.1** provides a summary of the specialist assessments identified in terms of the screening tool and responses to each assessment from the project team considering the development area under consideration.

Table 10.1: Sensitivity ratings from the DEFF's web-based online Screening Tool associated with the development of the Vrede Solar PV Facility

Specialist Assessment	Sensitivity Rating as per the Screening Tool (relating to the need for the study)	Project Team Response
Agricultural Impact Assessment	High	An Agricultural Impact Assessment will be undertaken as part of the EIA Phase.
Visual Impact Assessment		A Visual Impact Assessment will be undertaken as part of the EIA Phase.
Archaeological and cultural heritage impact assessment	High	A Heritage Assessment Report will be undertaken as part of the EIA Phase to comply with the requirements of the Heritage Resources Act. This report will also consider archaeology and cultural heritage.
Palaeontological impact assessment	High	A Heritage Assessment Report will be undertaken as part of the EIA Phase to comply with the requirements of the Heritage Resources Act. This report will also consider palaeontology.
Terrestrial biodiversity impact assessment	Very high	An Ecological Impact Assessment (including flora and fauna) will be undertaken as part of the EIA Phase.

Aquatic biodiversity impact assessment	Very high	A Freshwater Resource Study & Assessment will be undertaken as part of the EIA Phase.
Avian impact assessment	High	An avifaunal impact assessment will be undertaken as part of the EIA Phase.
Civil Aviation Assessment	Low	As per GNR 320 (of 20 March 2020), no requirement for a Civil Aviation Assessment is required where a low sensitivity is determined.
Defence Assessment	Low	As per GNR 320 (of 20 March 2020), no requirement for a Defence Assessment is required where a low sensitivity is determined.
RFI Assessment	Low	The Vrede Solar PV Facility is not located within any sensitive regions in terms of RFI and therefore no study is deemed necessary. Comments from the South African Radio Astronomy Observatory (SARAO) and Sentech will however be requested during the course of the assessment process to determine the requirement for further study.
Geotechnical Assessment	The Screening Report did not include a rating for this theme;	An in-depth geotechnical investigation will be conducted by the proponent to inform the final site layout. The geotechnical status of the site, however, informs only the design efforts and do not contribute to any environmental impact, and as such does not form part of the EIA suite of studies for this project.
Socio-economic Assessment	The Screening Report did not include a rating for this theme; however, the specialist assessment was identified based on the technology proposed.	A Social Impact Assessment will be undertaken as part of the EIA Phase.
Plant species assessment	Low	Government Notice 1150 of 30 October 2020, specific to animal and plant species protocols, indicated that:
Animal species assessment	Medium	<p>"The requirement of these protocols will apply from the date of publication, except where the applicant provides proof to the competent authority that the specialist assessment affected by these protocols had been commissioned by the date of publication of these protocols in the Government Gazette, in which case Appendix 6 of the Environmental Impact Assessment Regulations, 2014, as amended, will apply to such applications."</p> <p>Please refer to Appendix N for proof that the specialist studies for this application were commissioned prior to the date of publication in the Government Gazette (30 October 2020), and that therefore Appendix 6 requirements apply. This assessment is addressed by the biodiversity specialist study conducted for the project.</p>

A summary of those issues identified during Scoping which require further investigation during the EIA Phase, as well as the proposed activities to be undertaken in order to assess the significance of these potential impacts, is provided in **Table 10.2**. As part of the EIA Phase, these specialist studies will consider the development footprint proposed for Vrede Solar PV Facility and associated infrastructure (excluding the grid connection, which is being authorised under a separate process), as well as feasible and reasonable alternatives identified for the project.

It must be noted that the independent specialist studies will consider and comply (where relevant and applicable) with the requirements of the minimum criteria for reporting on identified environmental themes, as gazetted on 20 March 2020 (GNR 320).

Table 10.2: Impacts requiring further investigation during the EIA Phase, and activities to be undertaken in order to assess the significance of these potential impacts relevant to Vrede Solar PV Facility.

Issue	Activities to be undertaken in order to assess significance of impacts
<p>Ecology (Flora and Fauna)</p>	<p>Sensitivity Analysis and EIA assessment</p> <p>The Terrestrial Biodiversity (Fauna and Flora and Terrestrial Habitat) Assessment as well as Aquatic Biodiversity Assessment will be conducted in accordance with the protocols and procedures (3(a-d)) as set out in Section 24(5)(a) and (h) of the National Environmental Act, 1998, which has been gazetted on 10 January 2020.</p> <p>The main aspects that need to be incorporated in a sensitivity analysis include the following:</p> <ul style="list-style-type: none"> » Detailed baseline field survey to assess baseline terrestrial vegetation status, species composition, condition and importance, with a focus on mapping and assessing untransformed grassland vegetation and habitat. A key distinction will be made between primary and secondary vegetation communities, and the representatives of any remaining intact grassland vegetation communities by comparison with known reference state/composition. » Baseline vegetation surveys to include an assessment of faunal SCC which will need to be documented and GPS co-ordinates taken for species encountered in the field. » The focus of faunal surveys should be on assessing habitat condition and requirements for key mammal and herpetofaunal species and documenting the presence and location of any SCC in the field. » Identification and assessment of the estimated significance of key ecological impacts to vegetation, plant species and fauna. » Confirm any fatal flaws from a terrestrial ecological perspective to inform planning and layout of development proposed. » Assess the need and desirability for terrestrial biodiversity offsets (where necessary) and provide preliminary recommendations. <p>Recommendations in terms of impact mitigation and management aimed at reducing impacts significant in line with the principles of the 'mitigation hierarchy', including possible biodiversity buffer zones, development realignments, onsite controls (Best Management Practices: BMPs) and initial post-development rehabilitation requirements (i.e. conceptual terrestrial habitat rehabilitation strategy).</p> <p>Assessment of Impacts for the EIA</p> <p>The methodology described above assists in the evaluation of the overall impact of a proposed activity on the environment. It includes an assessment of the significant direct, indirect, and cumulative impacts associated with an activity. The significance of environmental impacts is to be assessed by means of the criteria of extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive).</p> <p>The nature of the impact will be defined and described. It will refer to the causes of the effect, what will be affected, and how it will be affected. For each anticipated impact, recommendations will be made for desirable mitigation measures.</p>

Issue	Activities to be undertaken in order to assess significance of impacts
	<p>Environmental Management Programme For each overarching anticipated impact, management recommendations for the design, construction, and operational phase (where appropriate) will be drafted for inclusion in the project EMPr.</p>
<p>Freshwater resources</p>	<p>Sensitivity Analysis and EIA assessment The Aquatic Biodiversity Assessment will be conducted in accordance with the protocols and procedures (3(a-d)) as set out in Section 24(5)(a) and (h) of the National Environmental Act, 1998, which has been gazetted on 10 January 2020.</p> <p>Specific outcomes in terms of the EIA Phase are presented below:</p> <ul style="list-style-type: none"> » Detailed baseline field survey to confirm / ground-truth wetland boundaries, assess wetland condition, functioning and importance/sensitivity. » Identification and assessment of the estimated significance of key ecological impacts to wetlands. » Confirm any fatal flaws from an aquatic ecological perspective to inform planning and layout of development proposed. » Assess the need and desirability for wetland offsets (where necessary) and provide preliminary recommendations. <p>Recommendations in terms of impact mitigation and management aimed at reducing impacts significant in line with the principles of the 'mitigation hierarchy', including relevant wetland buffer zones, development realignments, onsite controls (Best Management Practices: BMPs) and initial post-development rehabilitation requirements (i.e. conceptual wetland rehabilitation strategy).</p> <p>Assessment of Impacts for the EIA This methodology described above assists in the evaluation of the overall impact of a proposed activity on the environment. It includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of environmental impacts is to be assessed by means of the criteria of extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive).</p> <p>The nature of the impact will be defined and described. It will refer to the causes of the effect, what will be affected, and how it will be affected. For each anticipated impact, recommendations will be made for desirable mitigation measures.</p> <p>Environmental Management Programme For each overarching anticipated impact, management recommendations for the design, construction, and operational phase (where appropriate) will be drafted for inclusion in the project EMPr.</p>
<p>Avifauna</p>	<p>Sensitivity Analysis and EIA assessment The following activities are proposed during the EIA Phase:</p>

Issue	Activities to be undertaken in order to assess significance of impacts
	<ul style="list-style-type: none"> » Consider the findings of a summer-season avifaunal survey utilising transects and incidental counts, in accordance with the sensitivity regime determine for the site and the latest BirdLife SA monitoring survey guideline³⁰, against the planned infrastructure within the development footprint. » Provide an assessment of cumulative impacts associated with the development of the project site. Including an assessment of the extent of habitat lost to solar energy development in the area to date, and the likely future potential loss from the current as well as other proposed developments in the area. » Evaluate, based on the site attributes and final layout of the proposed development, what the most applicable mitigation measures to reduce the impact of the proposed development on the project site would be, and if there are any areas where specific pre-cautions or mitigation measures should be implemented. Particular attention will be paid to potential impacts on important landscape features in the vicinity of the site or where sensitive avifaunal species may nest or roost. » Identifying the species or habitat features that are 'key ecosystem providers' and complete sensitivity mapping. » Sensitivity ratings assigned and reasoning will be clearly defined. <p>Assessment of Impacts for the EIA</p> <p>This methodology described above assists in the evaluation of the overall effect of a proposed activity on the environment. It includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of environmental impacts is to be assessed by means of criteria including extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive).</p> <p>The nature of the impact will be defined and described. It will refer to the causes of the effect, what will be affected, and how it will be affected. For each anticipated impact, recommendations will be made for desirable mitigation measures.</p> <p>Environmental Management Programme</p> <p>For each overarching anticipated impact, management recommendations for the design, construction, and operational phase (where appropriate) will be drafted for inclusion in the project EMPr.</p>

³⁰ The BirdLife South Africa (BLSA) Guidelines for assessing and monitoring the impact of solar power generating facilities on birds in southern Africa. BirdLife South Africa by Jenkins, A.R., Ralston-Patton, Smit- Robinson, A.H. 2017

Issue	Activities to be undertaken in order to assess significance of impacts
<p>Soils, Land Use, Land Capability and Agricultural Potential</p>	<p><i>Sensitivity Analysis and EIA assessment</i></p> <p>A site visit will be conducted to determine the soil properties and associated agricultural potential of the proposed Vrede Solar PV Facility. The area to be surveyed is the development area. This area includes for the proposed surface footprint as well as a 50m buffered area around it.</p> <p>The area will be surveyed according to planned survey points spread spaced evenly across the development area. The soil will be classified according to the most recent Soil Classification System for South Africa (Soil Classification Working Group, 2018). The following data will be recorded during the site visit:</p> <ul style="list-style-type: none"> » Soil forms present within the development area » Soil depth » Topsoil and subsoil clay percentages » Terrain units and slope of the development area <p>The data points of the spatial data that will be generated during the site visit, will be interpreted for the soil and land capability mapping of the final Soil and Agricultural EIA-level report to be submitted for the proposed Vrede Solar PV Facility. The productivity and employment data will be gathered through discussion sessions with the land-owners of the farm portions or otherwise the main users.</p> <p>Following the results of the survey and data analysis, the final proposed project infrastructure layout will be used to calculate whether the proposed Vrede Solar PV Facility will be within the allowable development limits for renewable energy developments or where it exceeds it.</p> <p>The report will be prepared in alignment with all the relevant NEMA regulations as well as General Notice 320 of 2020 that specifically address Agricultural Compliance reporting for the renewable energy sector.</p> <p><i>Assessment of Impacts for the EIA</i></p> <p>The methodology described above assists in the evaluation of the overall impact of a proposed activity on the environment. It includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of environmental impacts is to be assessed by means of the criteria of extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive).</p> <p>The nature of the impact will be defined and described. It will refer to the causes of the effect, what will be affected, and how it will be affected. For each anticipated impact, recommendations will be made for desirable mitigation measures.</p> <p><i>Environmental Management Programme</i></p>

Issue	Activities to be undertaken in order to assess significance of impacts
	<p>For each overarching anticipated impact, management recommendations for the design, construction, and operational phase (where appropriate) will be drafted for inclusion in the project EMP.</p>
<p>Visual impact</p>	<p>Sensitivity Analysis and EIA assessment</p> <p>The VIA is determined according to the nature, extent, duration, intensity or magnitude, probability and significance of the potential visual impacts, and will propose management actions and/or monitoring programs, and may include recommendations related to the solar energy facility layout.</p> <p>The visual impact is determined for the highest impact-operating scenario (worst-case scenario) and varying climatic conditions (i.e. different seasons, weather conditions, etc.) are not considered. The VIA considers potential cumulative visual impacts, or alternatively the potential to concentrate visual exposure/impact within the region. The following VIA-specific tasks must be undertaken:</p> <ul style="list-style-type: none"> » Determine potential visual exposure: The visibility or visual exposure of any structure or activity is the point of departure for the visual impact assessment. It stands to reason that if (or where) the proposed facility and associated infrastructure were not visible, no impact would occur. The viewshed analyses of the proposed facility and the related infrastructure are based on a 30m SRTM digital terrain model of the study area. The first step in determining the visual impact of the proposed facility is to identify the areas from which the structures would be visible. The type of structures, the dimensions, the extent of operations and their support infrastructure are taken into account. » Determine visual distance/observer proximity to the facility: In order to refine the visual exposure of the facility on surrounding areas/receptors, the principle of reduced impact over distance is applied in order to determine the core area of visual influence for this type of structure. Proximity radii for the proposed infrastructure are created in order to indicate the scale and viewing distance of the facility and to determine the prominence of the structures in relation to their environment. The visual distance theory and the observer's proximity to the facility are closely related, and especially relevant, when considered from areas with a high viewer incidence and a predominantly (anticipated) negative visual perception of the proposed facility. » Determine viewer incidence/viewer perception (sensitive visual receptors): The next layer of information is the identification of areas of high viewer incidence (i.e. main roads, residential areas, settlements, etc.) that may be exposed to the project infrastructure. This is done in order to focus attention on areas where the perceived visual impact of the facility will be the highest and where the perception of affected observers will be negative. Related to this data set, is a land use character map, that further aids in identifying sensitive areas and possible critical features (i.e. tourist facilities, protected areas, etc.), that should be addressed. » Determine the visual absorption capacity of the landscape: This is the capacity of the receiving environment to absorb the potential visual impact of the proposed facility. The VAC is primarily a function of the vegetation, and will be high if the vegetation is tall, dense and continuous. Conversely, low growing, sparse and patchy vegetation will have a low VAC. The VAC would also be high where the environment can readily absorb the structure in terms of texture, colour, form and light / shade characteristics of the structure. On the other hand, the VAC for a structure contrasting markedly with one or more of the characteristics of the environment would be low. The VAC also generally increases with distance, where discernible detail in visual characteristics of both environment and structure decreases.

Issue	Activities to be undertaken in order to assess significance of impacts
	<ul style="list-style-type: none"> » Calculate the visual impact index: The results of the above analyses are merged in order to determine the areas of likely visual impact and where the viewer perception would be negative. An area with short distance visual exposure to the proposed infrastructure, a high viewer incidence and a predominantly negative perception would therefore have a higher value (greater impact) on the index. This focusses the attention to the critical areas of potential impact and determines the potential magnitude of the visual impact. Geographical Information Systems (GIS) software is used to perform all the analyses and to overlay relevant geographical data sets in order to generate a visual impact index. » Determine impact significance: The potential visual impacts are quantified in their respective geographical locations in order to determine the significance of the anticipated impact on identified receptors. Significance is determined as a function of extent, duration, magnitude (derived from the visual impact index) and probability. Potential cumulative and residual visual impacts are also addressed. The results of this section are displayed in impact tables and summarised in an impact statement. » Propose mitigation measures: The preferred alternative (or a possible permutation of the alternatives) will be based on its potential to reduce the visual impact. Additional general mitigation measures will be proposed in terms of the planning, construction, operation and decommissioning phases of the project. » Reporting and map display: All the data categories, used to calculate the visual impact index, and the results of the analyses will be displayed as maps in the accompanying report. The methodology of the analyses, the results of the visual impact assessment and the conclusion of the assessment will be addressed in this VIA report. » Site visit: A site visit must be undertaken in order to verify the results of the spatial analyses and to identify any additional site specific issues that may need to be addressed in the VIA report. <p>Assessment of Impacts for the EIA</p> <p>This methodology described above assists in the evaluation of the overall impact of a proposed activity on the environment. It includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of environmental impacts is to be assessed by means of the criteria of extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive).</p> <p>The nature of the impact will be defined and described. It will refer to the causes of the effect, what will be affected, and how it will be affected. For each anticipated impact, recommendations will be made for desirable mitigation measures.</p> <p>Environmental Management Programme</p> <p>For each overarching anticipated impact, management recommendations for the design, construction, and operational phase (where appropriate) will be drafted for inclusion in the project EMPr.</p>

Issue	Activities to be undertaken in order to assess significance of impacts
<p>Heritage (Archaeology and Palaeontology)</p>	<p>Sensitivity Analysis and EIA assessment</p> <p>SAHRA requires that an assessment be provided for the Vrede Solar PV Facility. The report will comply with the requirements of the National Heritage Resources Act section 38(3) and will consider Heritage and Palaeontological Impacts, based on a field assessment of palaeontological, heritage and cultural resources within the development footprint. The following HIA specific tasks must be undertaken:</p> <ul style="list-style-type: none"> » Undertake a Phase 1 HIA in accordance with the National Heritage Resources Act (Act 25 of 1999) (NHRA). » Comply with specific requirements and guidelines of SAHRA and NHRA. » The identification and mapping of all heritage resources in the area affected, as defined in Section 2 of NHRA. » An assessment of the significance of such resources in terms of the heritage assessment criteria as set out in the regulations. » An assessment of the impact of development on such heritage resources. » Identify heritage resources to be monitored. » Suggest suitable mitigation measures to address the identified impacts. » Provide recommendations regarding the alternatives provided from a heritage perspective. » Compile a report that reflects the above and includes appropriate mapping. Ensure that the report complies with Appendix 6 of GN No. R982 (2017). » Provide a description of the heritage sensitivity of the development based on the finding of the study. <p>Assessment of Impacts for the EIA</p> <p>The methodology described above assists in the evaluation of the overall effect of a proposed activity on the environment. It includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of environmental impacts is to be assessed by means of the criteria of extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive).</p> <p>The nature of the impact will be defined and described. It will refer to the causes of the impact, what will be affected, and how it will be affected. For each anticipated impact, recommendations will be made for desirable mitigation measures.</p> <p>Environmental Management Programme</p> <p>For each overarching anticipated impact, management recommendations for the design, construction, and operational phase (where appropriate) will be drafted for inclusion in the project EMPr, as well as a chance finds procedure.</p>
<p>Social</p>	<p>Sensitivity Analysis and EIA assessment</p> <p>The specialist study to be undertaken in the EIA phase will include:</p>

Issue	Activities to be undertaken in order to assess significance of impacts
	<ul style="list-style-type: none"> » Review comments pertaining to social impacts received from members of the public, key stakeholders, and any organ of state during the public review of the Scoping Report. Where applicable, comments received from the Department of Environment, Forestry and Fisheries (DEFF) on the Final Scoping Report (FSR), which may pertain to social impacts or have relevance to the SIA, will also be reviewed. » Collect primary data during a site visit. Interview directly affected and adjacent landowners, and key stakeholders to obtain primary information related to the project site, social environment, and to gain their inputs on the proposed project and its perceived social impact (positive and /or negative). Where interviews can be held telephonically or through a virtual platform (i.e. Zoom or Microsoft Teams) these will be undertaken accordingly. » Update the baseline information with information received during the site visit and/or interviews, as well as any additional information received from the client, or updates to the project description. » Assess impacts identified for the project in terms of their nature, extent, duration, magnitude, probability, status, and significance; as well as the degree to which the impact can be reversed, may cause irreplaceable loss of resources, and can be mitigated. Cumulative impacts will also be assessed. » Identify mitigation measures with which to reduce negative impacts, and enhance positive impacts for inclusion in the Environmental Management Programme (EMPr). As far as possible the mitigation hierarchy of "avoid, minimise, and reduce" will be followed in the mitigation of potential negative impacts. » Identify any conditions for inclusion in the Environmental Authorisation (EA). » Identify any monitoring requirements for inclusion in the EMPr or EA. » Provide a reasoned opinion regarding the acceptability of the project, and whether the proposed project should be authorised. » Prepare a SIA Report for inclusion in the EIA Report to be prepared for the project. » Subject the SIA Report prepared for the project for inclusion in the EIA Report to external peer review. <p>Assessment of Impacts for the EIA</p> <p>This methodology described above assists in the evaluation of the overall impact of a proposed activity on the environment. It includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of environmental impacts is to be assessed by means of the criteria of extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive).</p> <p>The nature of the impact will be defined and described. It will refer to the causes of the effect, what will be affected, and how it will be affected. For each anticipated impact, recommendations will be made for desirable mitigation measures.</p> <p>Environmental Management Programme</p> <p>For each overarching anticipated impact, management recommendations for the design, construction, and operational phase (where appropriate) will be drafted for inclusion in the project EMPr.</p>

10.6 Assessment of Potential Impacts Associated with the Project

Direct, indirect and cumulative impacts of the above issues, as well as all other issues identified will be assessed in terms of the following criteria:

- » The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- » The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional:
 - * Local extending only as far as the development site area – assigned a score of 1.
 - * Limited to the site and its immediate surroundings (up to 10 km) – assigned a score of 2.
 - * Will have an impact on the region – assigned a score of 3.
 - * Will have an impact on a national scale – assigned a score of 4.
 - * Will have an impact across international borders – assigned a score of 5.
- » The **duration**, wherein it will be indicated whether:
 - * The lifetime of the impact will be of a very short duration (0 – 1 years) – assigned a score of 1.
 - * The lifetime of the impact will be of a short duration (2 – 5 years) - assigned a score of 2.
 - * Medium-term (5 – 15 years) – assigned a score of 3.
 - * Long term (> 15 years) - assigned a score of 4.
 - * Permanent - assigned a score of 5.
- » The **magnitude**, quantified on a scale from 0 – 10, where a score is assigned:
 - * 0 is small and will have no effect on the environment.
 - * 2 is minor and will not result in an impact on processes.
 - * 4 is low and will cause a slight impact on processes.
 - * 6 is moderate and will result in processes continuing but in a modified way.
 - * 8 is high (processes are altered to the extent that they temporarily cease).
 - * 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- » The **probability** of occurrence, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale, and a score assigned:
 - * Assigned a score of 1 – 5, where 1 is very improbable (probably will not happen).
 - * Assigned a score of 2 is improbable (some possibility, but low likelihood).
 - * Assigned a score of 3 is probable (distinct possibility).
 - * Assigned a score of 4 is highly probable (most likely).
 - * Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).
- » The **significance**, which shall be determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high.
- » The **status**, which will be described as either positive, negative or neutral.
- » The degree to which the impact can be **reversed**.
- » The degree to which the impact may cause **irreplaceable loss of resources**.
- » The degree to which the impact can be **mitigated**.

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

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

S = Significance weighting

E = Extent
D = Duration
M = Magnitude
P = Probability

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

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

The project applicant has the responsibility to avoid and / or minimise impacts as well as plan for their management (in terms of the 2014 EIA Regulations (GNR 982, as amended)), the mitigation of significant impacts will be discussed. Assessment of mitigated impacts will demonstrate the effectiveness of the proposed mitigation measures.

The results of the impact assessment studies and other available information will be integrated by the Savannah Environmental project team. The EIA Report will be compiled in terms of the requirements of the 2014 EIA Regulations (GNR 982, as amended) and will include:

- » The details and expertise of the **EAP** who prepared the report.
- » The **location** of the activity and a locality map illustrating the location of the proposed activity.
- » A **description** of the scope of the proposed activity including all listed activities triggered and a description of associated structures and infrastructure.
- » The **policy and legislative** context within which the development is located and an explanation of how the development complies and responds to the legislation and policy context.
- » The **need and desirability** of the proposed development of the activity in the context of the preferred location.
- » A motivation for the **preferred development footprint** within the approved site.
- » A description of the **process** followed to reach the proposed development footprint within the approved site, including:
 - * Details of the development footprint considered.
 - * Details of the public participation process undertaken in terms of Regulation 41 of the 2014 EIA Regulations, including copies of supporting documents.
 - * A summary of issues raised by interested and affected parties and the manner in which the issues were incorporated.
 - * The environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects.
 - * The impacts and risks identified including the nature, significance, consequence extent, duration and probability of the impacts, including the degree to which these impacts can be reversed, may cause irreplaceable loss of resources and can be avoided, managed or mitigated.

- * The methodology used for determining and ranking the nature, significance, consequence, extent, duration and probability of potential environmental impacts and risks.
 - * Positive and negative impacts that the activity and alternatives will have on the environment and the community.
 - * Possible mitigation measures to be applied and the level of residual risk.
 - * A motivation for not considering alternative development locations.
 - * A concluding statement indicating the preferred alternative development location.
 - * A full description of the process followed to identify, assess and rank impacts of the activity and associated infrastructure on the preferred location including all environmental issues and risks that have been identified and an assessment of the significance of each issue and risk and the extent to which the issue/risk can be avoided or mitigated.
- » An **assessment** of the identified potentially significant impacts and risks.
 - » A summary of the **findings and recommendations** of any specialist report and an indication as to how these findings and recommendations have been included.
 - » An **environmental impact assessment** containing a summary of key findings, an environmental sensitivity map, and a summary of the positive and negative impacts and risks of the proposed activity.
 - » **Recommendations** from specialist, the recording of proposed impact management **objectives** and the impact management **outcomes** for inclusion in the **EMPr** as well as inclusion as conditions of authorisation.
 - » The final **alternatives** which respond to the impact management measures, avoidance and mitigation measures identified.
 - » Any aspects which were conditional to the findings of the assessment.
 - » A description of the assumptions, uncertainties and gaps in knowledge relating to the assessment and mitigation measures proposed.
 - » An **opinion** as to whether the proposed activity should or should not be authorised and the conditions thereof.
 - » An undertaking or **affirmation** by the EAP in relation to the correctness of the information, the inclusion of comments and inputs from stakeholders and Interested and affected parties, the inclusion of inputs and recommendations from the specialists, and any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties.

The EIA Report will be released to the public and relevant stakeholders, Organs of State and Authorities for a 30-day review period. Comments received from I&APs will be captured within a Comments and Response Report, which will be included within the Final EIA Report, for submission to DEA for decision-making.

10.7 Public Participation Process

A public participation process will be undertaken by Savannah Environmental during the EIA phase. The Public Participation will be undertaken in line with the approved Public Participation Plan as per the correspondence from DEFF (**Appendix B** and **Appendix C9**). Consultation with key stakeholders and I&APs will be on-going throughout the EIA Phase. Through this consultation process, stakeholders and I&APs will be encouraged to verify that their issues were recorded in the Scoping Phase, and to identify additional issues of concern or highlight positive aspects of the proposed project, and to comment on the findings of the EIA Phase. In order to

accommodate the varying needs of stakeholders and I&APs within the study area, as well as capture their inputs, various opportunities will be provided for stakeholders and I&APs to be involved in the EIA Phase of the process, as follows:

- » Focus group meetings (pre-arranged and I&APs invited to attend) via the use of virtual platforms (Zoom or MS Teams).
- » Comments will be able to be submitted directly to the EAP using the Savannah Environmental online stakeholder engagement platform.
- » Provision of project specific information via the Savannah Environmental website during the 30-day review periods of the project.
- » Consultation and communication through the ward councillors or committee members.
- » Written, faxed or e-mail correspondence.
- » Any comments provided telephonically or via instant message will be transcribed and recorded as formal comments.

The EIA Report will be made available for a 30-day review period prior to finalisation and submission to the DEA for decision-making. In order to provide an overview of the findings of the EIA process and facilitate comments, a public meeting will be held during this public review period, depending on the specific needs of the stakeholders in the area. All comments received during the public review period will be included within the final report to be submitted to the DEA for review and decision-making.

10.8 Key Milestones of the Programme for the EIA

The envisaged key milestones of the programme for the EIA Phase are outlined in the following table (and include indicative dates):

Key Milestone Activities	Proposed timeframe ³¹
Make Scoping Report available to the public, stakeholders and authorities (30 days)	20 November 2020 – 11 January 2021 (please note this period specifically excludes the period 15 December – 5 January in compliance with Chapter 3, section 2 of the EIA regulations, as amended).
Finalisation of Scoping Report, and submission of the Final Scoping Report to DEA	January 2021
Authority acceptance of the Final Scoping Report and Plan of Study to undertake the EIA (44 days)	Within 44 days of receipt of the Final Scoping Report (i.e. February 2021/ March 2021)
Make EIA Report and EMPr available to the public, stakeholders and authorities (30 days)	May 2021
Finalisation of EIA Report, and submission of the Final EIA Report to DEA	June 2021

³¹ Indicative dates.

Key Milestone Activities	Proposed timeframe³¹
Authority review period and decision-making (107 days)	Within 107 days of submission of the Final EIA Report to the DEFF

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