Fountain Solar PV Facility

Northern Cape Province

Scoping Report

April 2022

savannah environmental

t +27 (0)11 656 3237
f +27 (0)86 684 0547
e info@savannahsa.com
w www.savannahsa.com

Prepared for:

Fountain Solar PV1 (Pty) Ltd
Top Floor Golf Park 4, Raapenberg Rd., Mowbray, 7700
PO Box 548, Howard Place, 7450
7450

Prepared by:

savannah environmental

t +27 (0)11 656 3237 f +27 (0)86 684 0547 e info@savannahsa.com w www.savannahsa.com
First Floor, Block 2, 5 Woodlands Drive Office Park, Cnr Woodlands Drive & Western Service Road, Woodmead, 2191

PROJECT DETAILS

Title	:	Environmental Impact Assessment Process: Scoping Report for the Fountain Solar PV1 Facility, Northern Cape Province
Authors	:	Savannah Environmental (Pty) Ltd Ansone' Esterhuizen Jo-Anne Thomas
Client	:	Fountain Solar PV1 (Pty) Ltd
Report Revision	:	Revision 0
Date	:	April 2022

When used as a reference this report should be cited as: Savannah Environmental (2022), Scoping Report for the Fountain Solar PV1 Facility, Northern Cape Province.

PURPOSE OF THE SCOPING REPORT AND INVITATION TO COMMENT

Fountain Solar PV1 (Pty) Ltd has appointed Savannah Environmental as the independent environmental consultant to undertake the Scoping and Environmental Impact Assessment Process for the Fountain Solar PV1 Facility. The EIA process is being undertaken in accordance with the requirements of the 2014 EIA Regulations promulgated in terms of the National Environmental Management Act (NEMA; Act No. 107 of 1998). This Scoping report has been compiled in accordance with Appendix 2 of the EIA Regulations, 2014 (as amended) and consists of the following sections:

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 Fountain Solar PV1 Facility project and the environmental impact assessment.
- **Chapter 2** provides a project description of the Fountain Solar PV1 Facility project.
- **Chapter 3** provides the site selection information and identified project alternatives.
- **Chapter 4** outlines strategic regulatory and legal context for energy planning in South Africa and specifically for the proposed facility.
- **Chapter 5** describes the need and desirability of Fountain Solar PV1 Facility.
- **Chapter 6** outlines the process which was followed during the scoping phase of the 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 Fountain Solar PV1 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 11 April to 16 May 2022 at All comments received and recorded during the 30-day review and comment period will be included, considered and addressed where possible within the final Scoping report for the consideration of the National Department of Forestry, Fisheries and the Environment (DFFE).

Please submit your comments by **Monday16 May 2022** to:
Nicolene Venter or Nondumiso Bulunga PO Box 148, Sunninghill, 2157 Tel: 011-656-3237 Fax: 086-684-0547 Email: publicprocess@savannahsa.com

Comments can be made as written submission via fax, post or email.

EXECUTIVE SUMMARY

Fountain Solar PV1 (Pty) Ltd is proposing the development of a Photovoltaic (PV) Solar Energy Facility and associated infrastructure located on a site approximately 10km east of De Aar within the Emthanjeni Local Municipality and the Pixley Ka Seme District Municipality in the Northern Cape Province. A study area consisting of the Remaining Portion 1 of Farm Riet Fountain No 6. is being considered for the solar PV facility. The solar PV facility will comprise several arrays of PV panels and associated infrastructure and will have a contracted capacity of up to 100MW and will be known as the Fountain Solar PV1 Facility.

The infrastructure associated with the solar PV facility, including all associated infrastructure will include:

- Solar PV array comprising bifacial PV modules and mounting structures, using single axis tracking technology
  - Inverters and transformers
  - Cabling between the panels
  - Battery Energy Storage System (BESS)
  - Laydown areas, construction camps, site offices
  - 12m wide Access Road and entrance gate to the project site and switching station
  - 6m wide internal distribution roads
  - Operations and Maintenance Building, Site Offices, Ablutions with conservancy tanks, Storage Warehouse, workshop, Guard House
  - Onsite IPP substation, including all necessary electrical and auxiliary equipment required at the IPP substation that serves that solar facility. This would include transformer, switchyard/bay, control building, fences etc

  - The facility will be connected to the national electricity grid via the following infrastructure (to be assessed in a separate Basic Assessment Report):
  - Onsite Switching Station (SwS), adjacent to the IPP substation (SS).
  - A 132kV Overhead Power Line (OHPL) from the SwS connecting back to a Main Transmission Substation (MTS). There is an MTS proposed on either the farm Vetlaagte (i.e., Vetlaagte MTS) or the farm Wagt en Bietjie (i.e., Wagt en Bietjie MTS). Two separate EA processes are currently underway to authorise the two MTS's and it is uncertain at this stage as to which MTS will be authorised and used to connect these projects.
  - The development of the Fountain Solar PV1 Facility may require the following at the above-mentioned MTSs:
    - an extension of the 132kV Busbar.
    - an extension of the 400kV Busbar
    - an additional 400/132kV Transformer to be added
    - a new 132kV Feeder Bay

Most potential impacts identified to be associated with the construction of Fountain Solar PV1 facility and associated infrastructure are anticipated to be localized and restricted to the development area itself and the grid connection corridor alternative, while operation phase impacts/benefits range from local to regional. No environmental fatal flaws were identified to be associated with the development area. Areas or features of high sensitivity were identified to be avoided by the development footprint.

Sensitivity Analysis for the Fountain Solar PV1 facility

This section considers the sensitive features located within the development area, as identified by the independent specialists within each respective field, and also indicates the locations of the sensitive features within 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 detail is based on the desktop review of available baseline information for the project site, as well as the sensitivity data from specialist studies undertaken during the scoping phase, which included field surveys. During the site and desktop surveys, the affected area was investigated in sufficient detail in order to provide definitive insight into the potential for constraining factors on the site. The sensitivity map must be used as a tool by the developer to avoid any areas flagged to be of higher risk or sensitivity and inform the location/layout of the development footprint for the facility and associated infrastructure. The development footprint is the area which will be assessed further in detail in the EIA Phase, in order to provide an assessment of environmental acceptability and suitability of the facility layout of the Fountain Solar PV1 facility..

Ecological Sensitive Features

The majority of the site is considered low sensitivity on account of the generally low abundance of species of concern. High sensitivity areas which should preferably be avoided by the PV development is indicated in **Figure 9.2.** The non-developable areas were delineated based on the 50 m buffer of the drainage lines which are recommended for maintaining species diversity (Macfarlane *et al*, 2009), as well as the dolerite koppies and sills. The potentially developable areas are still subject to the outcomes of the Biodiversity Impact Assessment. Overall, provided that the PV development footprint can be accommodated within the lower sensitivity parts of the site, the impact of the development would be relatively low and would be considered acceptable.

At a regional level, the Critical Biodiversity Area (CBA) map for Northern Cape indicates the eastern part of the broader project site as being important for conservation as the remaining drainage lines of the broader project site are indicated as being Ecological Support Areas (ESAs).

In terms of species of concern and overall biological diversity, including both plants and animals, the low hills and mountain ranges are the areas with the most species recorded as well as being most likely to contain any species of concern.

Freshwater Sensitive Features

As per the DFFE screening reports the aquatic biodiversity theme sensitivity indicates a dominance of "Very High" sensitivity for the project area, with a small area classified as "Low" sensitivity. No natural wetland areas are expected for the Fountain Solar PV1 facility. Desktop information suggests the presence of drainage features and river networks. The freshwater ecology of the immediate project area and further downstream is sensitive to disturbance from a hydrological and biological perspective, however due to the ephemeral nature of the watercourses, this sensitivity applies more to the watercourses physical characteristics that influence the hydrological and biological aspects in times of flow.

Soils and Agricultural Potential Sensitive Features

According to DAFF (2017), eight land capability classes were identified throughout the project area. These land capability classes are classified as having "Very Low to "Low" (land capability classes 1 to 5) sensitivities with the land capability classes 6 to 8 regarded as having "Moderately Low to "Moderate" sensitivities. These sensitivities are considered to be preliminary and will be confirmed during the impact phase of the project.

Considering the lack of sensitivity, together with holistic mitigation measures, it has been determined that none of the aspects scored during the impact assessment (post-mitigation) are associated with any scores higher than "Low". It is recommended that the site assessment to be conducted for focus areas that potentially are characterised by greater micro-climates (i.e. aspect) and low laying areas characterised by deep soils.

Heritage sensitive features, the cultural landscape (incl. archaeology, palaeontology, and cultural landscape)

Heritage sensitivity relates to archaeological resources, palaeontological resources, heritage resources, and the cultural landscape. According to the CTS Heritage, the area proposed for development's overall archaeological sensitivity with regard to the preservation of Early, Middle and Later Stone Age archaeology as well as Khoe and San heritage, early colonial settlement is regarded as very high.

Despite this, the field assessment conducted for this project has demonstrated that the specific area proposed for development has low sensitivity for impacts to significant archaeological heritage. The observations are typical of the area and are ubiquitously distributed in low densities of less than 5 artefacts per observation. Similar heritage resources are likely to be located within the area proposed for development.

Palaeontology

According to the SAHRIS Palaeosensitivity Map the area proposed for development is underlain by sediments of moderate. high and very high paleontological sensitivity. According to the extract from the Council for GeoSciences Map 3024 for Colesburg, the development area is underlain by Jurassic Dolerite, the Tierberg Formation of the Ecca Group and the Adelaide Subgroup of the Beaufort Group as well as Quaternary sands associated with the drainage lines. The superficial deposits within the study areas (e.g. soils, gravels, alluvium, calcrete hardpans) are of low palaeontological sensitivity as a whole.

There are no areas identified which are required to be excluded from the proposed development footprint.

Visual Sensitive Features

A preliminary viewshed analysis for the proposed Fountain Solar PV1 facility was undertaken in order to determine the general visual exposure of the area under investigation. The viewshed analyses was undertaken from preliminary vantage points within the proposed development area at offsets of 5m above average ground level.

It is envisaged that the structures, where visible from shorter distances, and where sensitive visual receptors may find themselves within this zone, may constitute a high visual prominence, potentially resulting in a

visual impact. This may include residents of the farm dwellings, as well as observers travelling along the roads in closer proximity to the facility .

Overall Conclusion and Fatal Flaw Analysis

The findings of the desktop Scoping Study indicate that no environmental fatal flaws are associated with the Fountain Solar PV1 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 areas of a 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 an extensive 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 .

No environmental fatal flaws were identified to be associated with the development of the Fountain Solar PV1 Facility on the identified project site at this stage in the process. **Figure 1** provides an environmental sensitivity map of the scoping phase no-go areas. This conclusion must be confirmed through a detailed investigation of the development footprint within the EIA Phase of the process.

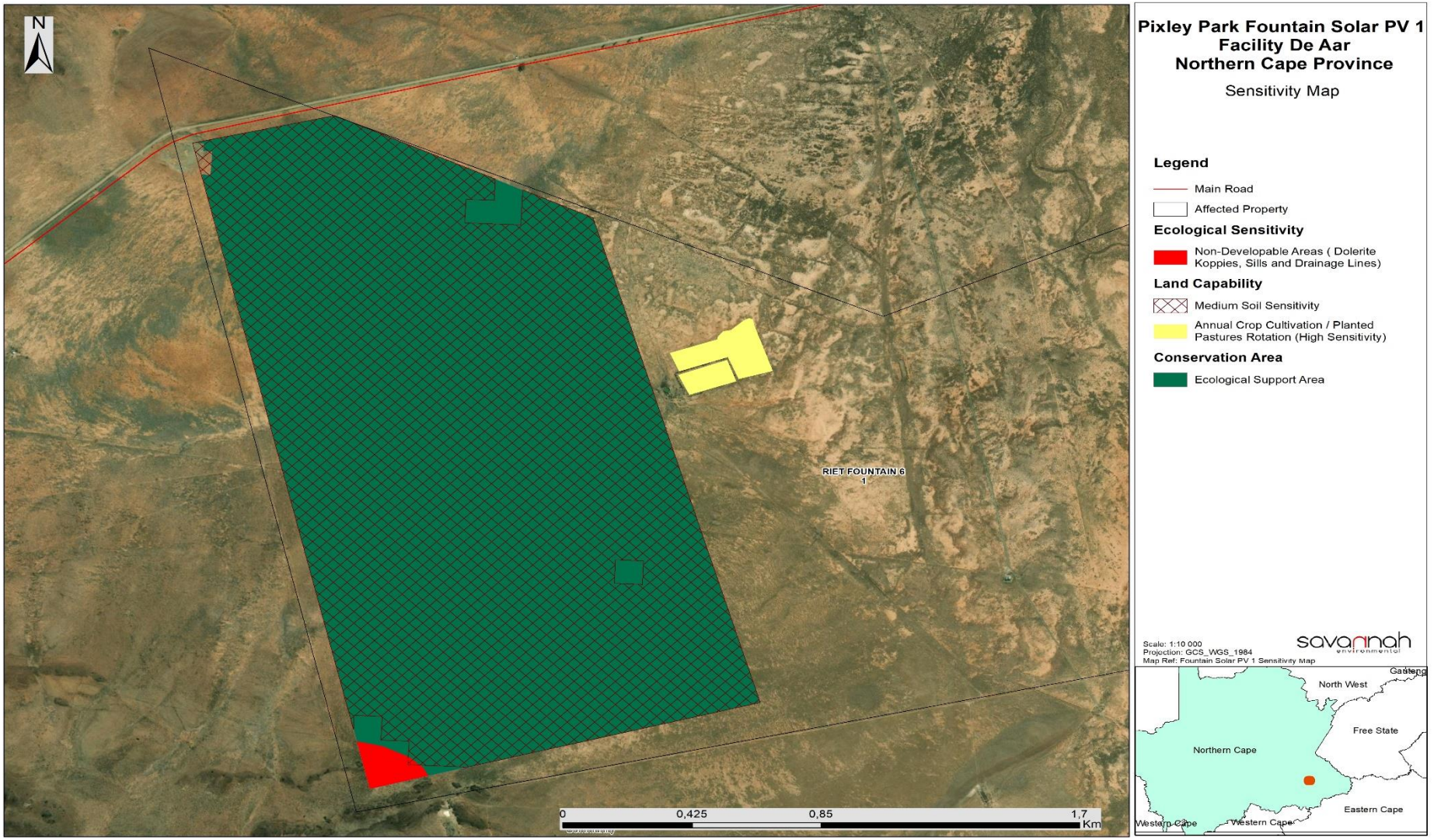


Figure 1: Environmental Sensitivity Map from the results of the scoping evaluation for the Fountain Solar PV1 facility and associated infrastructure. The sensitivity map indicates the sensitivities for the project site, as well as the Fountain Solar PV1 facility development area.

TABLE OF CONTENTS

APPENDICES LIST

Appendix A: EIA Project Consulting Team CVs
Appendix B: Authority Correspondence
Appendix C: Public Participation Process
Appendix C1: I&AP Database
Appendix C2: Site Notices and Newspaper Advertisements
Appendix C3: Background Information Document
Appendix C4: Organs of State Correspondence
Appendix C5: Stakeholder Correspondence
Appendix C6: Comments Received
Appendix C7: Minutes of Meetings
Appendix C8: Comments and Responses Report
Appendix C9: Approved Public Participation Plan
Appendix D Terrestrial Ecology Scoping Study
Appendix E Soils, Agricultural
Appendix F Freshwater Scoping Study
Appendix G Heritage Scoping Study (incl. archaeology and palaeontology)
Appendix H Visual Scoping Study
Appendix I Social Scoping Study
Appendix J Traffic Scoping Study
Appendix K Maps
Appendix L Specialist Declarations
Appendix M DFFE Screening Report
Appendix N EAP Affirmation and Declaration

CHAPTER 1: INTRODUCTION

Fountain Solar PV1 (Pty) Ltd, is proposing the development of a Photovoltaic (PV) Solar Energy Facility and associated infrastructure located on a site approximately 10km east of De Aar within the Emthanjeni Local Municipality and the Pixley Ka Seme District Municipality in the Northern Cape Province. A study area consisting of Portion 1 of Farm Riet Fountain No 6. is being considered for the solar PV facility **(refer to Figure 1.2)**. The solar PV facility will comprise several arrays of PV panels and associated infrastructure and will have a contracted capacity of up to 100MW and will be known as the Fountain Solar PV1 Facility.

The project is planned as part of a larger cluster of proposed renewable energy projects, which include three (3) additional 100MW PV facilities which are located adjacent to the project site (Riet Fountain Solar PV1, Wagt PV1, and Carolus Solar PV1), and associate grid connection infrastructure. These projects are proposed by separate Specialist Purpose Vehicles (SPVs)[1], and are assessed through separate Environmental Impact Assessment (EIA) processes, however potential cumulative impacts of the cluster will be assessed. The projects will all connect to the proposed new Vetlaagte Main Transmission Substation (MTS) or the Wag 'n Bietjie MTS, depending on Eskom requirements. The relative location of the four development areas is indicated in **Figure 1.3**. The grid connection infrastructure for each facility is being assessed through separate Basic Assessment processes.

The PV facility is planned to be located within an area previously authorised for PV project infrastructure[2]. The area has thus previously been thoroughly studied during the previous EIA process (Savannah Environmental, 2012), and substantial information on the area is available. Site-specific studies and assessments to be undertaken within the EIA process will delineate areas of potential sensitivity within the identified project site. Once constraining factors have been confirmed, the layout of the solar PV facility can be planned to minimise social and environmental impacts. A development area of approximately 300 ha has been identified within the study area for the construction and operation of the Fountain Solar PV1 Facility and its associated infrastructure, which is described and evaluated within this Scoping Report.

The Fountain Solar PV1 Facility is proposed in response to the identified objectives of the national and provincial government and local and district municipalities to develop renewable energy facilities for power generation purposes. It is the developer's intention to bid the Fountain Solar PV1 Facility under the Department of Mineral Resources and Energy's (DMRE's) Renewable Energy Independent Power Producer Procurement (REIPPP) programme or similar 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, in line with the objectives of the Integrated Resource Plan (IRP), with the Fountain Solar PV1 Facility is set to inject up to 100MW into the national grid.

From a regional perspective, the Northern Cape, and particularly the area under investigation, is considered favourable for the development of a commercial solar facility by virtue of prevailing climatic conditions, relief, the extent of the affected properties, the availability of a direct grid connection (i.e., a point of connection of the national grid) and the availability of land on which the development can take place.

[1] The development of the various projects under separate SPVs is in accordance with the DMRE's requirements under the REIPPPP.
[2] DFFE reference numbers 12/12/20/2250/1, 12/12/20/2250/2, 12/12/20/2250/3, 12/12/20/2250/4, and 12/12/20/2250/5

1.1. Requirement for an Environmental Impact Assessment Process

Section 24 of South Africa's 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. The 2014 Environmental Impact Assessment (EIA) Regulations, as amended (GNR 326) published under NEMA prescribe the process to be followed when applying for Environmental Authorisation (EA), while the Listing Notices (Listing Notice 1 (GNR 327), Listing Notice 2 (GNR 325), and Listing Notice 3 (GNR 324)) contain those activities which may not commence without Environmental Authorisation from the Competent Authority.

Various aspects of the Fountain Solar PV1 Facility are listed as activities that may have a detrimental impact on the environment. The primary listed activity triggered by Fountain Solar PV1 Facility is Activity 1 of Listing Notice 2 (GN R325) which relates to the development of facilities or infrastructure for the generation of electricity from a renewable resource where the generating capacity is 20MW or more. The Fountain Solar PV1 Facility will have a contracted capacity of 100MW.

The Fountain Solar PV1 Facility requires Environmental Authorisation from the National Department of Forestry, Fisheries, and the Environment (DFFE) 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 326).

In terms of GNR 779 of 01 July 2016, the DFFE 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 DFFE will be supported by the Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform as the commenting authority.

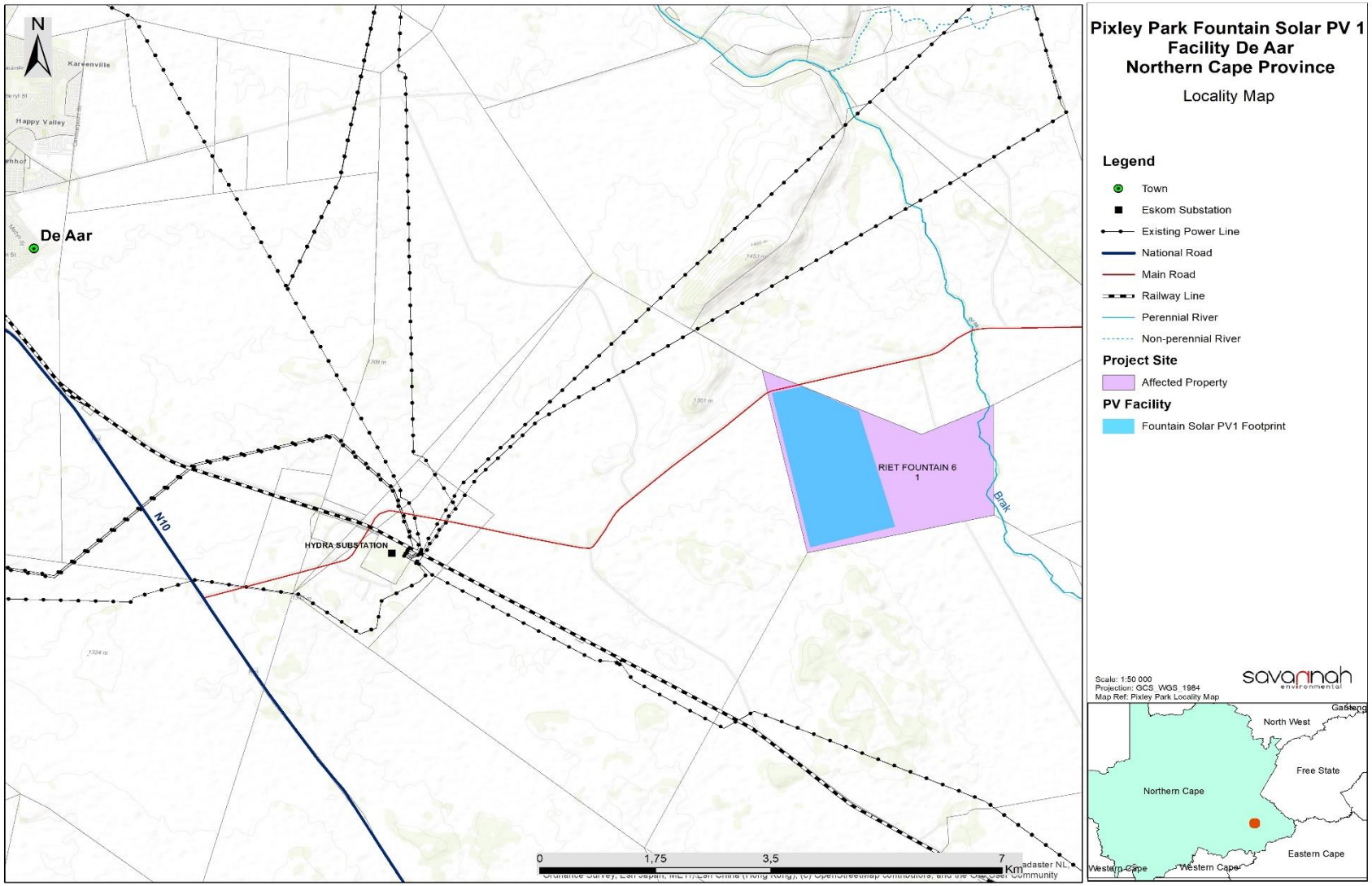


Figure 1.2: Locality map illustrating the location of the Fountain Solar PV1 Facility project site on Portion 1 of the Farm Riet Fountain No.6 ((also refer to **Appendix K**).

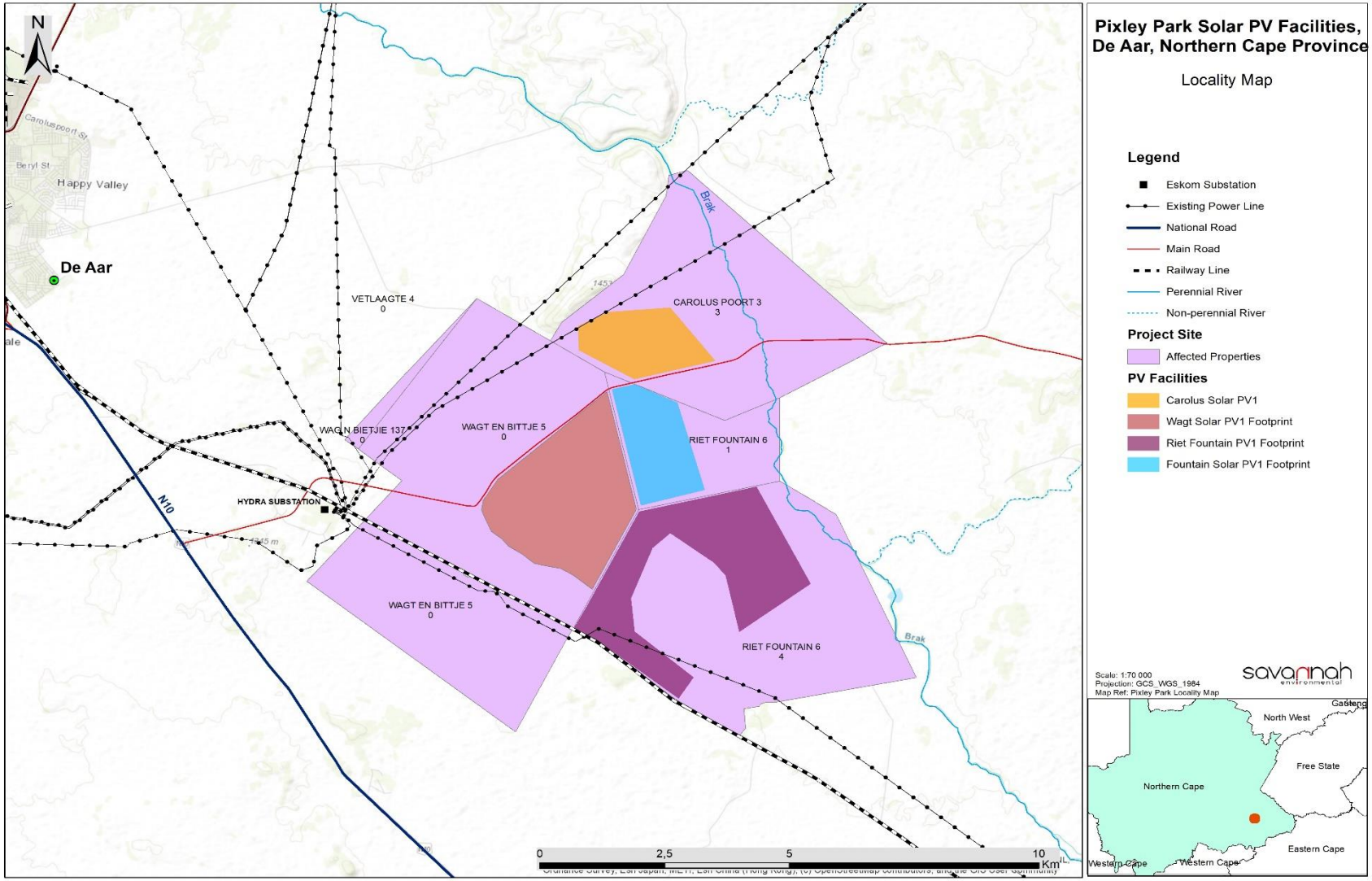


Figure 1.3: Locality map illustrating the cluster of proposed renewable energy facilities (Pixley Park) that the Fountain Solar PV1 Facility forms part of (refer to **Appendix K** for A3 map)

1.2. 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 published on 08 December 2014 (and amended on 07 April 2017) 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 and the expertise of the EAP have been included in **Section 1.5**. The Curriculum vitae of the Savannah Environmental team have 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 Fountain Solar PV Facility has been included as **Figure 1.1**. The details of the affected properties, including the property names and numbers, as well as the SG-codes are included in **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 Fountain Solar PV Facility has been included in **Figure 1.1**. The centre point co-ordinates of the project site are included in **Table 1.1**.

This Scoping Report consists of nine chapters, which include:

- **Chapter 1** provides background to the Fountain Solar PV1 Facility, and the environmental impact assessment process being undertaken.
- **Chapter 2** provides a project description of the Fountain Solar PV1 Facility and associated infrastructure.
- **Chapter 3** provides the site selection information and identified project alternatives.
- **Chapter 4** outlines the strategic regulatory and legal context for energy planning in South Africa and specifically for the proposed facility.
- **Chapter 5** describes the need and desirability of Fountain Solar PV1 Facility.
- **Chapter 6** outlines the process which was followed during the scoping phase of the 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 Fountain Solar PV1 Facility.
- **Chapter 10** describes the Plan of Study (PoS) for the EIA phase.
- **Chapter 11** provides references used to compile the Scoping report.

1.3. 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 300ha has been identified within the project site for the development of Fountain Solar PV1 Facility. 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 footprint or facility layout will be defined based on the findings of the Scoping Study and will be further assessed during the EIA Phase. Therefore, the exact location of the development footprint within the development area for the Fountain Solar PV1 Facility is not defined at this stage. The development footprint/facility layout is estimated to require an area of which is less than the identified project site 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.

Table 1.1: Detailed description of the project.

Province	**Northern Cape Province**
District Municipality	Pixley Ka Seme District Municipality
Local Municipality	Emthanjeni Local Municipality
Ward Number (s)	6
Nearest town(s)	De Aar (~10km east)
Farm name(s) and number(s) of properties affected by the Solar Facility	Portion 1 of the Farm Riet Fountain No.6
Current zoning	Agriculture
PV Development Footprint	300 hectares
PV Development Area	602 ha
Site Coordinates (centre of affected property)	**-30.700643°, 24.170610°**

Infrastructure associated with the solar PV facility will include:

- Solar PV array comprising bifacial PV modules and mounting structures, using single axis tracking technology
- Inverters and transformers
- Cabling between the panels
- Battery Energy Storage System (BESS)
- Laydown areas, construction camps, site offices
- 12m wide Access Road and entrance gate to the project site and switching station
- 6m wide internal distribution roads
- Operations and Maintenance Building, Site Offices, Ablutions with conservancy tanks, Storage Warehouse, workshop, Guard House
- Onsite IPP substation, including all necessary electrical and auxiliary equipment required at the IPP substation that serves that solar facility. This would include transformer, switchyard/bay, control building, fences etc

The facility will be connected to the national electricity grid via the following infrastructure (to be assessed in a separate Basic Assessment Report):

- Onsite Switching Station (SwS), adjacent to the IPP substation (SS).
- A 132kV Overhead Power Line (OHPL) from the SwS connecting back to a Main Transmission Substation (MTS). There is an MTS proposed on either the farm Vetlaagte (i.e., Vetlaagte MTS) or the farm Wagt en Bietjie (i.e., Wagt en Bietjie MTS). Two separate EA processes are currently underway to authorise the two MTS's and it is uncertain at this stage as to which MTS will be authorised and used to connect these projects.
- The development of the Fountain Solar PV1 Facility may require the following at the above-mentioned MTSs:
    - an extension of the 132kV Busbar.
    - an extension of the 400kV Busbar
    - an additional 400/132kV Transformer to be added
    - a new 132kV Feeder Bay

The overarching objective for the Fountain Solar PV1 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. 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 to delineate areas of sensitivity within the identified project site. This will serve to inform and optimise the design of the solar PV facility.

1.4. 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), limited field work, and consultation with interested and affected parties and key stakeholders. This phase considers the broader project site 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 (EMPrs), including recommendations of practical and achievable mitigation and management measures, to the CA for final review and decision-making.

1.5. Details of Environmental Assessment Practitioner and Expertise to conduct the S&EIA Process

In accordance with Regulation 12 of the 2014 EIA Regulations (GNR 326), the applicant has appointed Savannah Environmental (Pty) Ltd as the independent environmental consultant 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 (GNR 326), and all other relevant applicable legislation.

Neither Savannah Environmental nor any of its specialists are subsidiaries 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 specialist environmental consulting company providing a holistic environmental management service, including environmental assessment, and planning to ensure compliance and evaluate the risk of development, and the development and implementation of environmental management tools. Savannah Environmental benefits from the pooled resources, diverse skills and experience in the environmental field held by its team.
The Savannah Environmental team for this project includes:

- ***Ansone' Esterhuizen,*** the principal author of this report and the EAP on this project. She is a registered EAP with the Environmental Assessment Practitioners Association of South Africa (2021/3909), and she holds a Bachelor of Arts in Environmental Management and is currently completing her BSc Honours in Environmental Management. She has over 4 years of experience in conducting Environmental Impacts Assessments, public participation, and Environmental Management Programme for a wide range of projects including renewable energy projects. She is responsible for overall compilation of the report, this includes specialists' engagements, reviewing specialists reports and incorporating specialist studies into the Environmental Impact Assessment report and its associated Environmental Management. She is registered as a Professional Natural Scientist with the South African Council for Natural Scientific Professions (SACNASP), Registration Number (142673)

- **Kristen Shaw**, the junior author of this Scoping Report and EAP on this project, holds a BA in Psychology, Geography and Environmental Management, and a B.Sc. Honours degree with distinction from the North-West University in South Africa. Her key focus is on undertaking environmental impact assessments and environmental permitting, authorisations, GIS and Mapping for the project.

- ***Jo-Anne Thomas,*** the principal EAP on this project, is a registered EAP with the Environmental Assessment Practitioners Association of South Africa (EAPASA - 2019/726). She provides technical input for projects in the environmental management field, specialising in Strategic Environmental Advice, Environmental Impact Assessment studies, environmental auditing and monitoring, environmental permitting, public participation, Environmental Management Plans and Programmes, environmental policy, strategy and guideline formulation, and integrated environmental management. Her key focus is on integration of the specialist environmental studies and findings into larger engineering-based projects, strategic assessment, and providing practical and achievable environmental management solutions and mitigation measures. Responsibilities for environmental studies include project management (including client and authority liaison and management of specialist teams); review and manipulation of data; identification and assessment of potential negative environmental impacts and benefits; review of specialist studies; and the identification of mitigation measures.

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

To adequately identify and assess potential environmental impacts associated with the proposed Fountain Solar PV1 Facility, the following specialist sub-consultants have provided input into this scoping report:

Specialist	Area of Expertise
Andrew Husted of The Biodiversity Company	Ecology, Freshwater, and Soils
Chris van Rooyen and Albert Froneman	Avifauna
Lourens du Plessis of LoGIS	Visual
Tony Barbour of Tony Barbour Environmental Consulting	Social
Jenna Lavin of CTS Heritage	Heritage (including Archaeology Palaeontology and Cultural Landscape)
Adrian Johnston of JG Afrika	Traffic

Appendix A includes the curricula vitae for the environmental assessment practitioners from Savannah Environmental and the specialist consultants.

CHAPTER 2: PROJECT DESCRIPTION

This Chapter provides an overview of the Fountain Solar PV1 Facility and details the project scope which includes the planning/design, construction, operation, and decommissioning activities required for the 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
3(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 project is detailed in Chapter 1, **Table 1.1**, as well as in **section 2.2.1**.
3(d)(ii) a description of the scope of the proposed activity, including a description of the activities to be undertaken including associated structures and infrastructure	A description of the activities to be undertaken with the development of the project is included in **Table 2.1** and **Table 2.2**.

2.2. Nature and Extent of the Fountain Solar PV1 Facility

Coal-fired power plants currently dominate South Africa's electricity generation capacity. Photovoltaic (PV), wind, biogas, other biofuels, hydropower, landfill gas, geothermal, and centralised solar energy are all examples of renewable energy (RE) that are gaining popularity around the world. Ministerial regulations on renewable energy procurement, such as the National Electricity Integrated Resource Plan (IRP) 2010-2030, have boosted renewable energy growth significantly in South Africa which aligns with the need to facilitate the growing electricity demand within South Africa.

Fountain Solar PV1 (Pty) Ltd has identified the need to promote renewable energy and sustainability within the Northern Cape Province, to aid in the country's targets for renewable energy by proposing the development of a commercial solar facility and associated infrastructure on a site near De Aar to add new capacity to the national electricity grid. From a technical perspective the Northern Cape is considered ideal for the development of renewable energy by virtue of the climate and solar conditions, economic viability, availability of infrastructure and land availability for development.

The project is planned as part of a cluster of renewable energy facilities known collectively as Pixley Park, which includes three (3) additional Solar PV Facilities (Wagt Solar PV1, Riet fountain PV1, and Carolus Solar PV1), and associate individual grid connection infrastructures.

Since the proposed Solar PV facilities are located within the same geographical area and constitute the same type of activity, an integrated Public Participation Process (PPP) will be undertaken for the proposed projects. However, separate Applications for Environmental Authorisation (EA) have been lodged with the Competent Authority (i.e., DFFE) for each proposed PV facility and grid connection. Furthermore, separate reports (i.e., BA and Scoping and EIA Reports) will be compiled for each project. This is required because each PV project, and its grid connection, requires separate EAs in the name of the bidding project company, to be eligible to tender a project into a particular DMRE bidding round.

2.2.1. Overview of the Project Site and planned Infrastructure

The project is to be developed on a site located approximately 10km east of De Aar within the Emthanjeni Local Municipality and the Pixley Ka Seme District Municipality in the Northern Cape Province. The full extent of the development area (i.e., ~300ha), has been considered within this Scoping Phase of the EIA process, within which the Fountain Solar PV1 Facility will be appropriately located from a technical and environmental sensitivity perspective.

The development area includes the following affected property:

» Portion 1 of the Farm Riet Fountain No.6

The solar PV facility will be developed in a single phase and will 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 within this Scoping Report.

The Fountain Solar PV1 Facility 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.

A 12m wide access road and entrance gate to the project site and switching station is planned as part of the development. The developer has additionally made provision for 6m wide internal distribution roads. The project site can be accessed via the N10 which lies west of the development area (refer to **Figure 2.1**), and then via the existing public road (Hydra Substation access road) which cuts across the cluster's development footprint and provides access to the project site and development area (refer to **Figure 2.2**).

Grid connection infrastructure for the PV facility will be located outside the PV development area but, within the project site within a 100m corridor. This grid connection infrastructure is to be assessed in a separate Basic Assessment process.

Figure 2.1: Location of the N10 national road in relation to the Fountain Solar PV1 Facility development area (development area in orange).

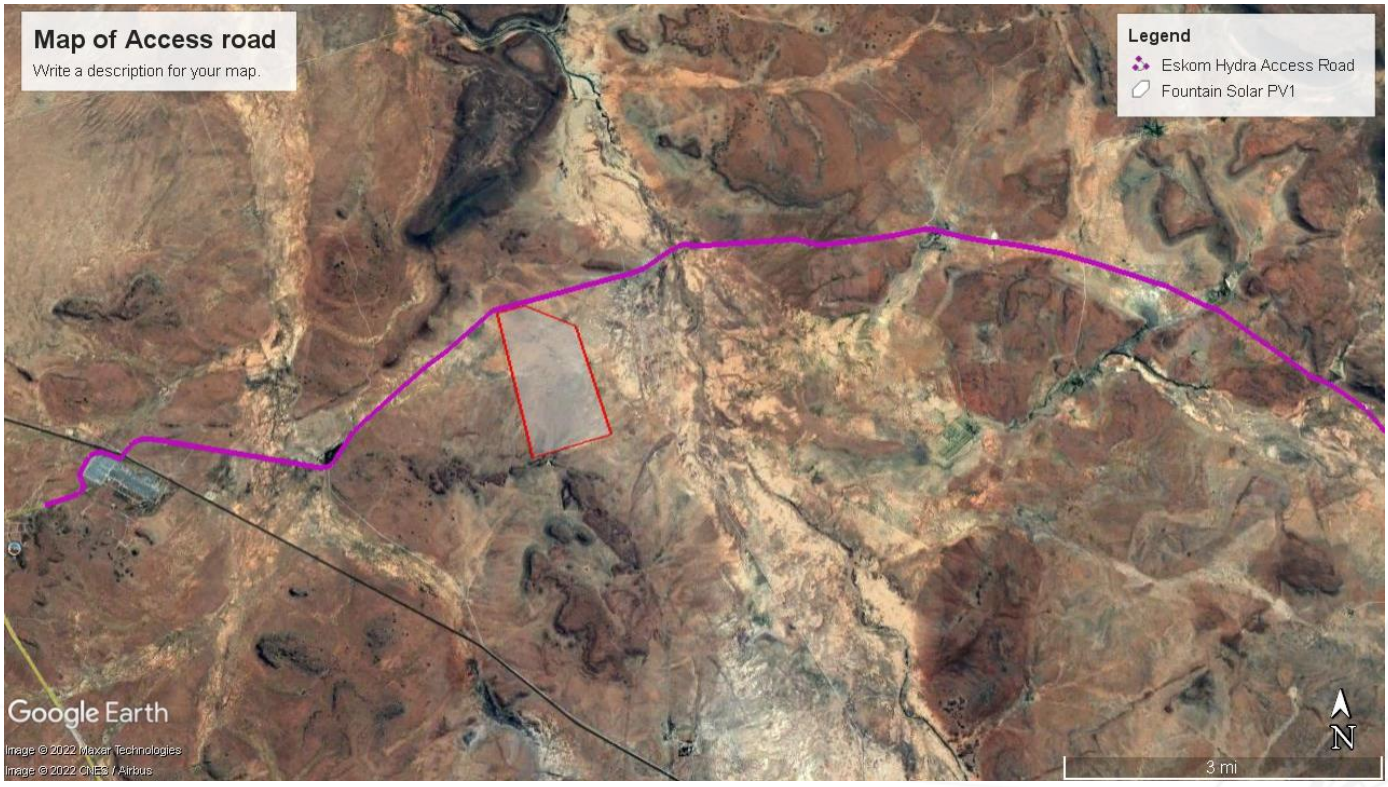


Figure 2.2: Location of the development area (orange) in relation to the access road which provides direct access to the project site and development area.

Once environmentally constraining factors have been identified through the EIA process, the layout of the PV facility and associated infrastructures will be determined. The layout will take into consideration any environmentally sensitive areas identified through the EIA process and the PV panels and associated infrastructures will be appropriately placed. A more accurate understanding of the final development footprint will be determined during the EIA phase with the availability of a facility layout plan.

2.2.2. Components of the Fountain Solar PV1 Facility

The project site is proposed to accommodate both the PV panels and most of the associated infrastructure which is required for such a facility the solar PV facility will include the following:

- Solar PV array comprising bifacial PV modules and mounting structures, using single axis tracking technology
- Inverters and transformers
- Cabling between the panels
- Battery Energy Storage System (BESS)
- Laydown areas, construction camps, site offices
- 12m wide Access Road and entrance gate to the project site and switching station
- 6m wide internal distribution roads
- Operations and Maintenance Building, Site Offices, Ablutions with conservancy tanks, Storage Warehouse, workshop, Guard House
- Onsite IPP substation, including all necessary electrical and auxiliary equipment required at the IPP substation that serves that solar facility. This would include transformer, switchyard/bay, control building, fences etc

The facility will be connected to the national electricity grid via the following infrastructure (to be assessed in a separate Basic Assessment Report):

- Onsite Switching Station (SwS), adjacent to the IPP substation (SS).
- A 132kV Overhead Power Line (OHPL) from the SwS connecting back to a Main Transmission Substation (MTS). There is an MTS proposed on either the farm Vetlaagte (i.e., Vetlaagte MTS) or the farm Wagt en Bietjie (i.e., Wagt en Bietjie MTS). Two separate EA processes are currently underway to authorise the two MTS's and it is uncertain at this stage as to which MTS will be authorised and used to connect these projects.
- The development of the Fountain Solar PV1 Facility may require the following at the above-mentioned MTSs:
    - an extension of the 132kV Busbar.
    - an extension of the 400kV Busbar
    - an additional 400/132kV Transformer to be added
    - a new 132kV Feeder Bay

A summary of the details and dimensions of the planned infrastructure associated with the project is provided in **Table 2.1**

Table 0.1: Details or infrastructures proposed as part of Fountain Solar PV1 Facility. Specific details to be confirmed in the EIA phase.

Infrastructure	Footprint and dimensions
Number of Panels	To be determined in the EIA phase
Panel Height	Up to 5m
Technology	Use of fixed-tilt, single-axis tracking, PV technology. Bifacial panels are being considered.
Contracted Capacity	Up to 100MW
Area occupied by the solar array	~300ha
Area occupied by the on-site facility substation	~ 15ha
Capacity of on-site facility substation	33kV/132kV
Area occupied by laydown area	~10 ha
Access and internal roads	Wherever possible, existing access roads will be utilised to access the project site and development area. A 12m wide access road and entrance gate will be part of the development scope. Internal roads of up to 6m in width will be required to access the PV panels and the on-site substation.
Grid Connection Works (IPP) *To be include in this EA application*	A 132kV on-site IPP substation and associated infrastructure will be constructed with a footprint of approximately 50m x 100m
Grid connection Works (Self-build / Eskom) *Authorised under a separate EA, to be handed over to Eskom in future.*	A132kV on-site switching substation (adjacent to the above IPP substation) will be connected to the proposed 400/132kV MTS via overhead cabling with a capacity of up to 132kV. A new 132kV single-circuit power line will run from the switching station to either the proposed Vetlaagte MTS or the proposed Wag n Bietjie MTS. The MTS will be upgraded to include the extension of the 400/132kV Busbar, instillation of a 132kV feeder bay and a new 400/ 132kV Transformer Bay. The 132kV switching substation and the new 132kV single -circuit overhead Power Line will be assessed as part of a separate Basic Assessment process in support of an application for Environmental Authorisation.
Temporary infrastructure	Temporary infrastructure, including laydown areas, hardstand areas and a concrete batching plant, will be required during the construction phase. All areas affected by temporary infrastructure will be rehabilitated following the completion of the construction phase, where it is not required for the operation phase.

Table 2.2 provides details regarding the requirements and the activities to be undertaken during the Fountain Solar PV1 Facility development phases (i.e., construction phase, operation phase and decommissioning phase). **Section 2.3** provides illustrations of technology considered for the solar energy facility and the generation of electricity.

2.2.3. Project Development Phases Associated with the Fountain Solar PV facility

Table 2.2: Details of the Fountain Solar PV1 Facility project development phases (i.e., construction, operation, and decommissioning)

Construction Phase	
Requirements	» Project receives Environmental Authorisation from the DFFE, preferred bidder allocation granted by DMRE (or other off taker), a generating license issued by NERSA, and a Power Purchase Agreement secured with Eskom (or private entity). » Expected to be 15-18 months for Fountain Solar PV1 Facility. » The construction phase involves installation of the solar PV panels and the structural and electrical infrastructure to make the plant operational. In addition, preparation of the soil and improvement of the access roads would continue for most of the construction phase. » Create direct construction employment opportunities. Approximately 350 employment opportunities will be created. » No on-site labour camps. Employees to be accommodated in the nearby towns such as Richmond and Victoria West and transported to and from site on a daily basis. » Overnight on-site worker presence would be limited to security staff. » Waste removal and sanitation will be undertaken by a suitably qualified sub-contractor. Waste containers, including containers for hazardous waste, will be located at easily accessible locations on site when construction activities are undertaken. » Electricity required for construction activities will be generated by a generator. Where low voltage connections are possible, these will be considered. » Water required for the construction phase will be supplied by the municipality. . In addition In addition, and where the Municipality is unable to provide sufficient wate,, borehole water will be used. Should water availability at the time of construction be limited, water will be transported to site via water tanks. Water will be used for sanitation and potable water on site as well as construction works.
Activities to be undertaken	
Conduct surveys prior to construction	» Including, but not limited to a geotechnical survey, site survey and confirmation of the panel micro-siting footprint, and survey of the on-site IPP substation site to determine and confirm the locations of all associated infrastructure.
Establishment of access roads to the Site	» Internal access roads within the site will be established at the commencement of construction. » Existing access roads will be utilised, where possible, to minimise impact. It is unlikely that access roads will need to be upgraded as part of the proposed development. » Access roads to be established for construction and/or maintenance activities within the development footprint. » Internal service road alignment will be approximately 6m wide. Location is to be determined by the final micro-siting or positioning of the PV panels.

Undertake site preparation	» Including the clearance of vegetation at the footprint of PV panel supports, establishment of the laydown areas, the establishment of internal access roads and excavations for foundations. » Stripping of topsoil to be stockpiled, for use during rehabilitation. » Vegetation clearance to be undertaken in a systematic manner to reduce the risk of exposed ground being subjected erosion. » Include search and rescue of floral species of concern (where required) and the identification and excavation of any sites of cultural/heritage value (where required).
Establishment of laydown areas and batching plant on site	» A laydown area for the storage of PV panels components and civil engineering construction equipment. » The laydown will also accommodate building materials and equipment associated with the construction of buildings. » No borrow pits will be required. Infilling or depositing materials will be sourced from licenced borrow pits within the surrounding areas. » A temporary concrete batching plant of 50m x 50m in extent to facilitate the concrete requirements for foundations, if required.
Construct foundation	» Excavations to be undertaken mechanically. » For PV array installation vertical support posts will be driven into the ground. » Depending on geological conditions, the use of alternative foundations may be considered (e.g., screw pile, helical pile, micropyle or drilled post/piles).
Transport of components and equipment to and within the site	» The components for the solar PV facility and onsite substation will be transported to site by road. Transportation will take place via appropriate National and Provincial roads, and the dedicated access/haul road to the site. » Some of the components (i.e., substation transformer) may be defined as abnormal loads in terms of the Road Traffic Act (Act No. 29 of 1989) by virtue of the dimensional limitations. » Typical civil engineering construction equipment will need to be brought to the site (e.g., excavators, trucks, graders, compaction equipment, cement trucks, etc.) as well as components required for the mounting of the PV support structures, construction of the substation and site preparation.
Erect PV Panels and Construct Substation, Invertors and BESS	» For array installation, typically vertical support posts are driven into the ground. Depending on the results of the geotechnical study a different foundation method, such as screw pile, helical pile, micro-pile or drilled post/pile could be used. The posts will hold the support structures (tables) on which PV arrays would be mounted. Brackets attach the PV modules to the tables. » Trenches are dug for the underground AC and DC cabling and the foundations of the inverter enclosures and transformers are prepared. » While cables are being laid and combiner boxes are being installed, the PV tables are erected. » Wire harnesses connect the PV modules to the electrical collection systems. Underground cables and overhead circuits connect the Power Conversion Stations (PCS) to the on-site AC electrical infrastructure and ultimately the project's on-site substation.

	» This process also involves the installation of the BESS facility.
Connection of PV panels to the substation	» PV arrays to be connected to the on-site substation via underground electrical cables. » Excavation of trenches is required for the installation of the cables. Trenches will be approximately 1.5m deep. » Underground cables are planned to follow the internal access roads, as far as possible. » Onsite substation to be connected to the IPP substation via underground cables.
Establishment of ancillary infrastructure	» Site offices and maintenance buildings, including workshop areas for maintenance and storage will be required. » Establishment will require the clearing of vegetation, levelling, and the excavation of foundations prior to construction.
Connect substation to the power grid	» A new 132kV single circuit power line will run from the onsite IPP substation and the Switching station and tie into the either the proposed Vetlaagte MTS or the proposed Wag n Bietjie MTS.
Undertake site rehabilitation	» Commence with rehabilitation efforts once construction completed in an area, and all construction equipment is removed. » On commissioning, access points to the site not required during the operation phase will be closed and prepared for rehabilitation.
» Operation Phase	
Requirements	» Duration will be 20-25 years. » Requirements for security and maintenance of the project. » Employment opportunities relating mainly to operation activities and maintenance. Approximately 15 - 20 full-time employment opportunities will be available during the operation of the solar facility.
» Activities to be undertaken	
Operation and Maintenance	» Full time security, maintenance, and control room staff. » All PV panels will be operational except under circumstances of mechanical breakdown, inclement weather conditions, or maintenance activities. » Solar PV to be subject to periodic maintenance and inspection. » It is anticipated that the PV panels will be washed twice a year during operation using clean water with no cleaning products, or non-hazardous biodegradable cleaning products. » Disposal of waste products (e.g., oil) in accordance with relevant waste management legislation. » Areas which were disturbed during the construction phase to be utilised, should a laydown area be required during operation.
Decommissioning Phase	
Requirements	» Decommissioning of the Fountain Solar PV1 facility infrastructure at the end of its economic life. » Potential for repowering of the facility, depending on the condition of the facility at the time. » Expected lifespan of approximately 20 - 25 years (with maintenance) before decommissioning is required. » Decommissioning activities to comply with the legislation relevant at the time.

	» It is expected that the areas of the project site affected by the solar facility infrastructure (development footprint) will revert back to its original land-use (i.e., agriculture) once the Fountain PV facility has reached the end of its economic life and all infrastructure has been decommissioned.
» Activities to be undertaken	
Site preparation	» Confirming the integrity of site access to the site to accommodate the required decommissioning equipment. » Preparation of the site (e.g., laydown areas and construction platform). » Mobilisation of construction equipment.
Disassemble and remove PV panels	» Components to be reused, recycled, or disposed of in accordance with regulatory requirements. » 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. » Concrete will be removed to a depth as defined by an agricultural specialist and the area rehabilitated. » Cables will be excavated and removed, as may be required

2.3. Technology considered for the Solar Energy Facility and the Generation of Electricity

Fountain Solar PV1 Facility will have a contracted capacity of up to 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 2.3**).

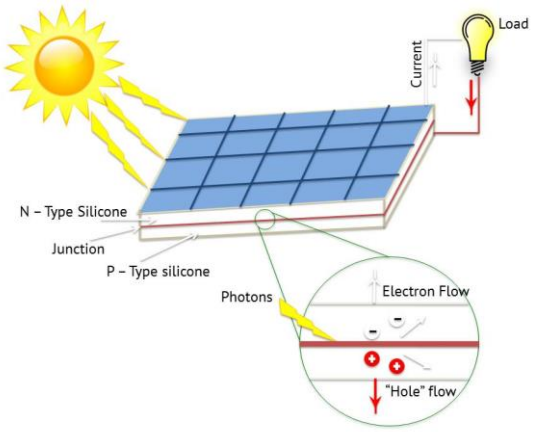


Figure 0.3: Diagram illustrating the Photovoltaic Effect (Source: Centre for Sustainable Energy)

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 2.4**). 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 (DC[3])).

[3] 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).

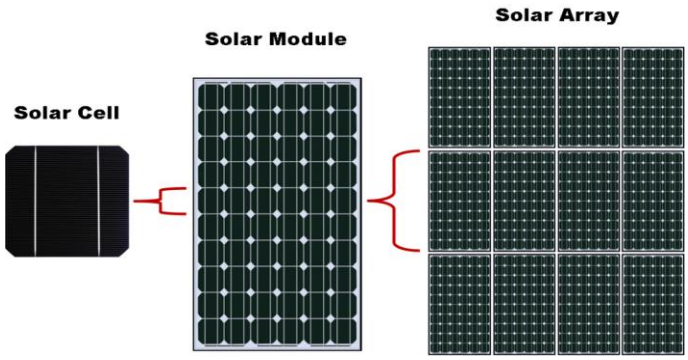
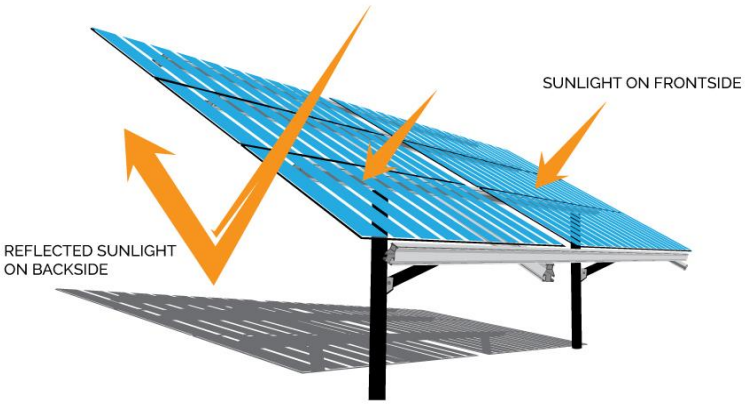


Figure 0.4: Overview of a PV cell, module, and array / panel (Source: pveducation.com)

Bifacial Solar Panel Technology

Fountain PV1 (Pty) Ltd is considering the use of bifacial tracking technology. Bifacial ("two-faced") modules produce solar power from both sides of the panel. Traditional solar panels capture sunlight on one light-absorbing side. The light energy that cannot be captured is simply reflected away. Bifacial solar panels have solar cells on both sides, which enables the panels to absorb light from the back and the front (refer to Figure 2.5). Practically speaking, this means that a bifacial solar panel can absorb light reflected off the ground or another material. In general, more power can be generated from bifacial modules for the same area, without having to increase the development footprint.

The optimum tilt for a bifacial module has to be designed so as to capture a big fraction of the reflected irradiation. Use of trackers is recommended so the modules can track the sun's movement across the sky, enabling them to stay directed to receive the maximum possible sunlight to generate power.



3.

4. **Figure 2.5:**Diagram showing how bifacial Solar PV panels work (Source: https://sinovoltaics.com/learning-center/solar-cells/bifacial-solar-modules/)

Support Structures

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

panels which utilise tracking support structures track the movement of the sun throughout the day so as to receive the maximum amount of solar irradiation.

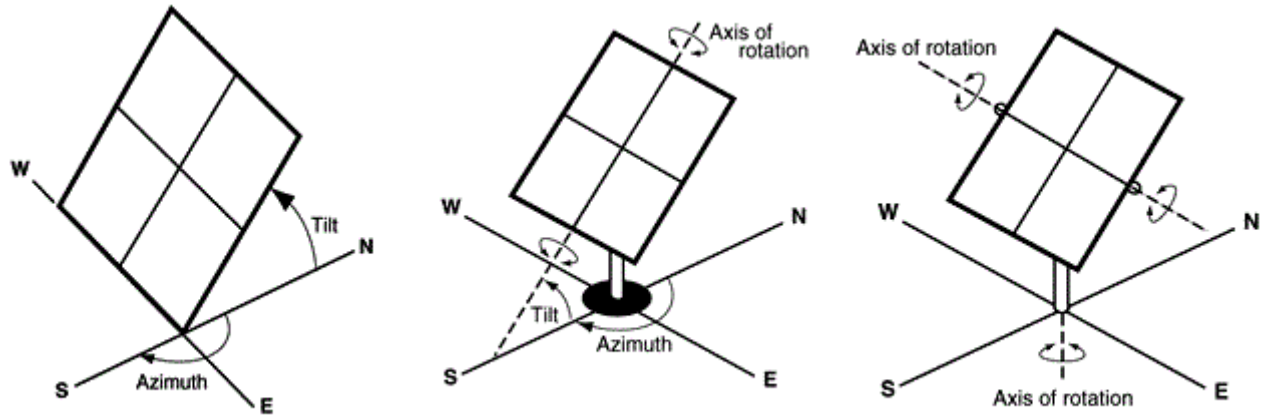


Figure 0.66: Overview of different PV tracking systems (from left to right: fixed-tilt, single-axis tracking, and double-axis tracking (Source: pveducation.com)).

PV panels are designed to operate continuously for more than 25 years, mostly unattended and with low maintenance.

Battery Energy Storage System (BESS)

The need for a BESS stem from the fact that electricity is only produced by the Renewable Energy Facility while the sun is shining, while the peak demand may not necessarily occur during the daytime. Therefore, the storage of electricity and supply thereof during peak-demand will mean that the facility is more efficient, dependable and electricity supply more constant.

The BESS will:

- Store and integrate a greater amount of renewable energy from the Solar PV Facilities into the electricity grid.
- This will assist with the objective to generate electricity by means of renewable energy to feed into the National Grid which will be procured under either the Renewable Energy Independent Power Producer Procurement Program (REIPPPP), other government run procurement programmes or for sale to private entities if required.
- Proposed footprint of battery storage area: Up to ~20ha
- Proposed preferred technology to be used: Three main technologies to be considered, either separately or in combination:
  - Lithium-ion batteries (LFP/NMC or others) (Li-Ion)
  - Lithium capacitors/Electrochemical capacitors (LiC)
  - (LFP/NMC or others) (Li-Ion), Lithium capacitors/Electrochemical
  - capacitors (LiC), Redox-flow batteries (RFB) and/
  - or Sodium Sulphur batteries (NaS)

CHAPTER 3: CONSIDERATION OF ALTERNATIVES

This Chapter provides an overview of the various alternatives considered for Fountain Solar PV1 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
3(g) a motivation for the preferred site, activity, and technology alternative	The identification and motivation for the preferred project site, the development area within the project site, the proposed activity and the proposed technology is included in sections **3.3.1, 3.3.3** and **3.3.4.**
3(h)(i) details of the alternative considered	The details of all alternatives considered as part of the Fountain Solar PV1 Facility are included in sections **3.3.1 – 3.3.5**.
3(h)(ix) the outcome of the site selection matrix	The site selection process followed by the developer to identify the preferred project site and development area is described in section **3.3.1**.
3(h)(x) if no alternatives, including alternative locations for the activity were investigation, the motivation for not considering such	Where no alternatives have been considered, motivation has been included. This is included in section **3.3**.

3.2. Alternatives Considered during the Scoping Process

In accordance with the requirements of Appendix 2 of the 2014 Environmental Impact Assessment (EIA) Regulations (GNR 326), reasonable and feasible alternatives including but not limited to site and technology alternatives, as well as the "do-nothing" alternative should be considered.

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

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

In this instance, 'the project' refers to Fountain Solar PV1 Facility, a solar energy facility with capacity of up to 100MW and associated infrastructure proposed to be developed by an Independent Power Producer (IPP) and intended to form part of the DMRE's REIPPP Programme, or another similar programme.

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)[4], 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. Of relevance to the proposed project is the allocation of 6000MW of new capacity to large scale PV included in the IRP 2019. The site is considered most suitable for the development of a PV solar energy facility because of local irradiation, land availability and topography (as detailed in the sections below). 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.

The sections below describe the incrementally different alternatives being considered for the development of the Fountain Solar PV1 Facility. Where no alternative is being considered, a motivation has been provided as required by the EIA Regulations, 2014.

3.3. Project Alternatives under Consideration for the Fountain Solar PV1 Facility

Table 3.1: Summary of the alternatives considered as part of the Fountain Solar PV1 Facility project.

Nature of Alternatives Considered	Description of the Alternatives relating to the Fountain Solar PV1 Facility.
Site-specific and Layout Alternatives	One preferred project site has been identified for the development of the Fountain Solar PV1 Facility due to site specific characteristics such as the solar resource, land availability, topographical considerations, proximity to a viable grid connection and environmental features. The development site is approximately ~600ha in extent which is sufficient for the development of a Solar PV facility with a contracted capacity of up to 100MW. A development footprint will be defined within this area considering environmental sensitivities identified through the EIA process.
Activity Alternatives	Only the development of a renewable energy facility is considered by Fountain PV1 (Pty) Ltd. Resulting from the location of the project site and the suitability of the solar resource,

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

Nature of Alternatives Considered	Description of the Alternatives relating to the Fountain Solar PV1 Facility.
	only the development of a Solar PV facility is considered feasible considering the natural resources available to the area and the current land-use activities undertaken within the project site. In addition, the development will be in line with the proposed solar cluster proposed.
Technology Alternatives	Only the development of a solar facility is considered due to the characteristics of the site, including the natural resources available. The use of solar PV for the generation of electricity is the most efficient technology for the project site. The use of mono- and bifacial panels is being considered by the developer.
'Do-nothing' Alternative	This is the option to not construct the Fountain Solar PV1 Facility. No impacts (positive or negative) are expected to occur on the social and environmental sensitive features or aspects located within the project site or the surrounds with the implementation of this option. The opportunities associated with the development of the solar facility for the affected area and other surrounding towns in the area will however not be made available.

These alternatives are described in more detail in the sections which follow.

3.3.1. Property or Location Alternatives

The placement of a Solar PV Facility is dependent on several factors, namely, land suitability, climatic conditions (solar irradiation levels), topography, the location and extent of the development area, availability of grid connection infrastructure, and the need and desirability of the project.

The Fountain Solar PV1 Facility is located east of De Aar in the Northern Cape province. The preferred project site for the development of the Solar PV facility was identified through an investigation of prospective sites and properties in the area within the Northern Cape Province. The investigation involved the consideration of specific characteristics within the province and specifically within the areas near De Aar. From a technical perspective the site is highly favourable to establish a Solar PV Facility due to the following site-specific favourable characteristics:

» Solar resource characteristics (including Global Horizontal Irradiation (GHI)).
» Land availability.
» Land use and geographical and topographical considerations.
» Access to the national grid, including distance and capacity to connect the proposed project to the network.
» Site accessibility; and
» Environmental and social aspects.

The characteristics considered were identified by the developer as the main aspects that play a role in the opportunities and limitations for the development of a Solar PV facility. The characteristics considered, and the results thereof, are discussed in the sections below. The developer considered that should these characteristics not be favourable for the development of a Solar PV facility, then some limitations and challenges may be expected and potentially hinder such development from a technical and/or economic perspective.

» **National and Provincial and Local Planning Considerations** - Renewable energy is strongly supported at a national, provincial, and local level. At a national level, the development of and investment in

renewable energy is supported by the National Development Plan (NDP), New Growth Path Framework and National Infrastructure Plan, which all refer to renewable energy. Renewable energy is also supported at a provincial and local municipal level.

» **Solar resource**: The north-western part of South Africa has the highest Global Horizontal Irradiation (GHI), relevant to PV installations and Direct Normal Irradiance (DNI), relevant to CPV and tracking PV installations. Therefore, this section of South Africa is deemed the most suitable for the construction and operation of solar energy facilities as opposed to other areas and provinces within South Africa. For example, coastal regions within KwaZulu-Natal, Eastern Cape and Western Cape mainly have a solar radiation between 1500 kWh/m2 and 1700 kWh/m2 per annum, which is not completely feasible for the proposed projects. On the other hand, the Northern Cape (the area with the predominant pink/red shading in Figure 3.1) has a solar radiation of between 2000 and 2300 kWh/m2 per annum, considered the highest solar irradiation values of the country and therefore enables the development of solar energy projects and the successful operation thereof. Based on the solar resource available the proposed site location was identified as being technically feasible.

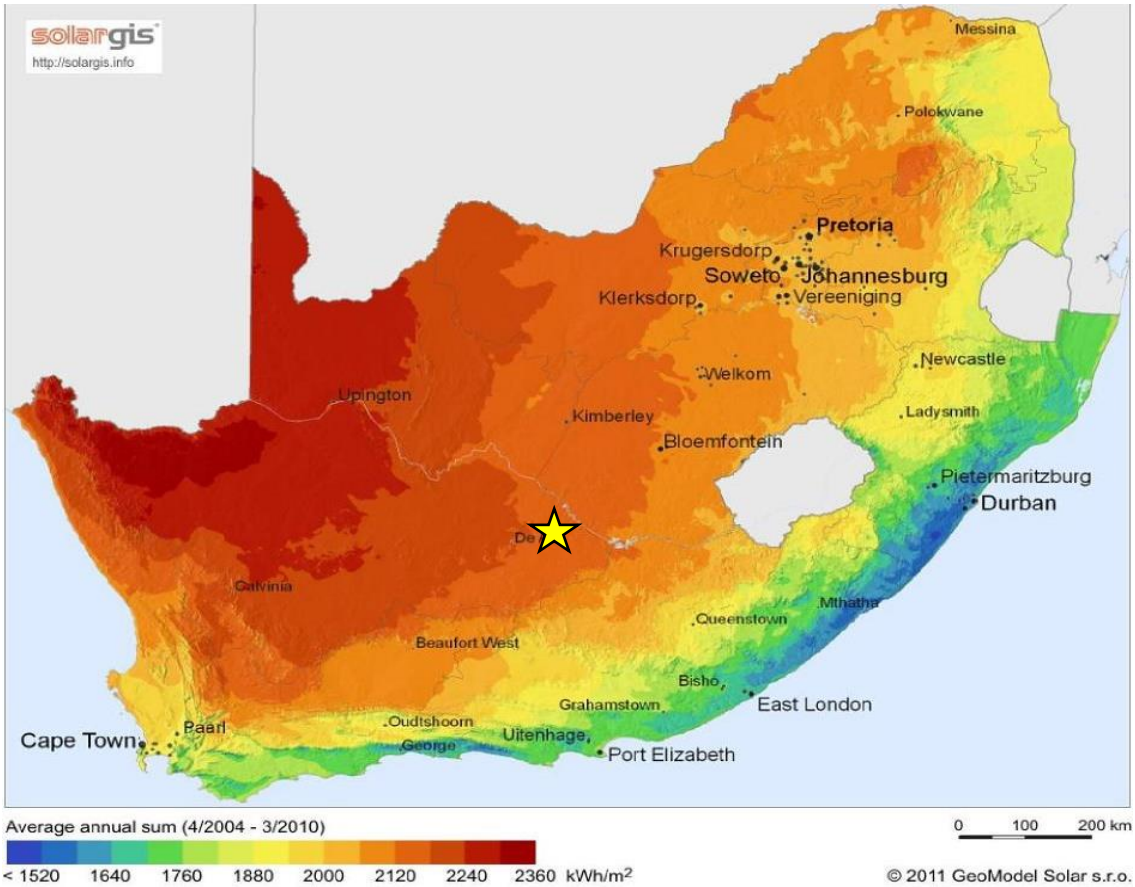


Figure 3.1: Solar irradiation map for South Africa. The proposed Fountain Solar PV1 Facility site is shown by the yellow star on the map. (Source: adapted from GeoModel Solar, 2011).

» **Land availability**: A previous application by a different applicant was undertaken to identify the feasibility for the establishment of a proposed solar PV facility and associated infrastructure within the Northern Cape Province on the same area. This analysis considered various criteria and it was concluded that there was potential to establish a cluster PV development in the De Aar area. **Environmental Authorisation for this proposed development was granted but has since lapsed**, and the option agreements

with relevant landowners have been transferred to a new developer and applicant (i.e., Fountain Solar PV1 Pty Ltd), which is undertaking this new EIA process

» To develop the Fountain Solar PV1 Facility with a contracted capacity of up to 100MW, sufficient space is required. The property included in the project site is privately-owned and is available for a development of this nature through agreement with the landowner, and is deemed technically feasible by the project developer for such development to take place. The affected property has an extent of ~600 ha, which was considered by the developer as sufficient for the development of the Fountain Solar PV1 Facility. A preferred development area of ~300 ha within this larger project site has been identified for the location of the Fountain Solar PV1 Facility. An exact development footprint within the development area for the placement of infrastructure will be identified and assessed as part of the EIA Phase considering environmental constraints and sensitivities.

» In order to ensure the ease of integration of the new solar facility into the existing National Transmission network/grid, and considering the environmental impacts associated with this integration, it was determined that the most feasible site would be close to existing power lines and other electrical infrastructure. The proposed site is located in close proximity to existing transmission lines and the Hydra Substation, which have been confirmed to have capacity to integrate the generated electricity into the national grid.

» **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 affected by the proposed Fountain Solar PV1 Facility (and those affceted by the larger the Pixley Park cluster development) do not view the development as a conflict with their current land use practices. The support from the landowners 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 consent forms.

» **Land use**: The character of the greater area surrounding the project site can be described as a rural, Karoo landscape characterised by livestock farming. There are several farm dwellings located in the vicinity of the site, including three farm dwellings within the boundary of the site. The land use identified within the greater area surrounding the project site (i.e., livestock farming) is generally preferred for developments of this nature as the livestock farming activities can continue the affected properties in tandem with the operation of the solar facility.

» **Geographical and Topographical Considerations:** The topography in the wider area surrounding the project site is characterised by a largely flat to undulating landscape interspersed with areas of high elevation in the form of hills, koppies, ridges and/or mountains. In the wider area, a range of hilly/mountainous topography with high elevations is present to the south-east and north of the site, respectively. As such, there are very few physical constraints present which would influence the construction and operation of a solar PV facility.

» **Access to the National Electricity Grid**: A key factor in the siting of any power generation project is a viable grid connection. The anticipated grid connection solution (subject to a separate environmental assessment and authorisation process) is a 132kV central IPP substation and a 132kV power line to enable connection to the projects will all connect to the new Vetlaagte Main Transmission Substation (MTS) or the new Wag 'n Bietjie MTS. Substation. The developer consulted with the Eskom network planners to understand the current capacity of the existing grid connection infrastructure and to identify feasible connection points

for the facility. . A small transmission substation is planned as part of the Fountain Solar PV1 Facility which will then tie into one of the two proposed new Main Transmission Substations (MTS) which are still under assessment on the adjacent properties

» **Site access**: Access to the project site is limited to the Eskom Hydra Road (a provincial public road) running through the Solar PV development Cluster. The project site is situated adjacent to the N10 national road, which links to the hydra road and provides access to the project site and development area. The site is therefore readily accessible for the delivery of project components and equipment during construction.

Based on the above considerations, the Fountain Solar PV1 Facility project site was identified by the developer as being the most technically feasible and viable project site within the broader area for further investigation in support of an application for authorisation. As a result, no property/location alternatives are proposed as part of this Scoping and EIA process.

3.3.2. Design and Layout Alternatives

The overall aim of the facility layout (i.e., development footprint) is to maximise electricity production through exposure to the solar resource, while minimising infrastructure, operation, and maintenance costs, and social and environmental impacts. The suitability of the site from an environmental perspective for the placement of the Fountain Solar PV1 Facility in the area will be determined through the EIA process being undertaken for the facility. The findings of the specialist scoping assessments will assist the developer in selecting the optimum position for the PV arrays and associated infrastructures including, but not limited to, access roads, and laydown areas.

An overall environmental scoping sensitivity map has been provided to illustrate the sensitive environmental features located within the project site which needs to be considered and, in some instances completely avoided by the development footprint (refer to Chapter 9. Once more detailed information is available from an environmental and planning perspective for the broader site, a detailed micro-siting exercise will be undertaken to effectively 'design' the solar facility layout within the project site, which will be known as the development footprint. Through the process of determining constraining factors and environmentally sensitive areas, the layout of the PV facility footprint and infrastructure will be planned and adjusted if necessary to ensure the avoidance of no-go areas and mitigation of sensitive environmental features. A detailed facility layout will be developed and will be made available for assessment and ground-truthing by the independent specialists in the EIA phase. Where further conflicts are predicted, a mitigation strategy will be developed to meet the objectives of the mitigation hierarchy (avoid, minimise, mitigate).

3.3.3. *Activity Alternatives*

Fountain Solar PV1 (Pty) Ltd is a renewable energy project developer and as such is only considering renewable energy activities in accordance with the need for such development as identified within the IRP. The only activity considered for implementation on the identified site is therefore power generation from renewable energy sources.

3.3.4. Technology Alternatives

Fountain Solar PV1 (Pty) Ltd is a renewable energy project developer and as such is only considering renewable energy technologies for the generation of up to 100MW (contracted capacity) of electricity. The project site is located near the towns of De Aar in the Northern Cape Province which has the Global Horizon Irradiation (GHI) of approximately 2120 kWh/m^2/annum. Based on the solar irradiation resource available, the topography of the site, and the current significant restrictions placed on other natural resources such as water, the development of a solar facility is the preferred option from a technology perspective.

Limited technology options are available for solar energy 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. PV technology is the preferred option for implementation on the site in comparison to CSP as it is associated with limited water demand requirements and a lower visual profile. Furthermore, the IRP 2019 has allocated 6000 MW to be procured from solar PV facilities up to 2030, with no provision for CSP.

Based on available information, it is concluded by the developer that the project site is considered best suited for the development of a solar PV facility from a technical perspective. Therefore, no technology alternatives are considered within this Scoping Report.

When considering PV as a technology choice, several types of panels 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).

The primary difference between PV technologies available relate to the extent of the facility, as well as the height of the facility (visual impacts), while the potential for environmental impacts remains similar in magnitude. Fixed mounted PV systems can 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 acceptable for implementation from an environmental perspective.

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. Once environmental constraining factors have been determined through the Scoping and EIA process, Fountain Solar PV1 (Pty) Ltd will consider various solar panel options. The preferred option will be informed by efficiency as well as environmental impact and constraints (such as sensitive biophysical features). The PV panels proposed, 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.
The Battery Energy Storage System (BESS) capacity is planned to be 2500MWh but will depend on technology to be used and total installed capacity of solar, and it is expected to be in the order of 200-600 MW to 200-800 MWh. A number of technologies are currently available. Technology options to be considered by the developer include Lithium Ion, Sodium Sulphur, Vanadium Flow, Zinc Bromine Flow, Lead Acid.

3.3.5. The 'Do-Nothing' Alternative

The 'do-nothing' alternative is the option of not establishing a new PV facility at the identified site in the Northern Cape Province. Should the option of not implementing the Solar PV facility be considered, the land use of the project site (livestock grazing) will continue, and there would not be environmental impacts as well as socio-economic benefits associated with the implementation of the project. The impact of not implementing the project (i.e., the "No-Go" alternative) will be assessed in 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 Fountain Solar PV1 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 provides an overview of the policy and legislative context which is 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 Fountain Solar PV1 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 Fountain Solar PV1 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.

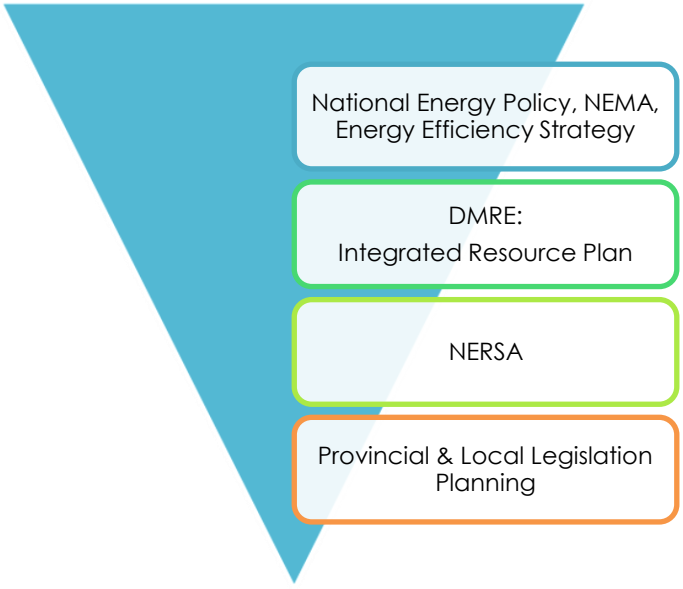


Figure 4.1: Hierarchy of electricity and planning documents

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 Forestry, Fisheries, and the Environment (DFFE):** 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. DEA 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.

» **The South African Heritage Resources Agency (SAHRA):** SAHRA is a statutory organisation established under the National Heritage Resources Act (No. 25 of 1999) (NHRA), as the national administrative body responsible for the protection of South Africa's cultural heritage.

» **South African National Roads Agency Limited (SANRAL):** This Agency is responsible for the regulation and maintenance of all national road routes.

» **Department of Water and Sanitation (DWS):** This Department is responsible for effective and efficient water resources management to ensure sustainable economic and social development. This Department is also responsible for evaluating and issuing licenses pertaining to water use (i.e., Water Use Licenses (WUL) and General Authorisation).

» **The Department of Agriculture, Rural Development and Land Reform (DARDLR):** 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 Northern Cape – Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (DAEARD&LR):** This Department is the commenting authority for the EIA process for the project and is responsible for issuing of biodiversity and conservation-related permits.

» **Northern Cape Department of Transport, Safety and Liaison:** This Department provides effective co-ordination of crime prevention initiatives, provincial police oversight, traffic management and road safety towards a more secure environment.

» **Ngwao-Boswa Ya Kapa Bokone (NBKB):** This Department identifies, conserves, and manages heritage resources throughout the Northern Cape Province.

At the **Local Level,** the local and district municipal authorities are the principal regulatory authorities responsible for planning, land use and the environment. In the Northern Cape Province, both the local and district municipalities play a role. The local municipality includes the **Emthanjeni local Municipality** which forms part of the **Pixley Ka Seme 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. International Policy and Planning Context

A brief review of the most relevant international policies relevant to the establishment of the Fountain Solar PV1 Facility are provided below in **Table 4.1**. The Fountain Solar PV1 Facility is aligned with the aims of these policies, even if contributions to achieving the goals therein are only minor.

Table 4.1: International policies relevant to the Fountain Solar PV1 Facility

Relevant legislation or policy	Relevance to Fountain Solar PV1 Facility
Constitution of the Republic of South Africa, 1996	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. 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

Relevant legislation or policy	Relevance to Fountain Solar PV1 Facility
	are most at risk to environmental impacts. The undertaking of an EIA process for the proposed project in terms of the requirements of the EIA Regulations, 2014 (as amended) aims to minimise any impacts on the natural and social environment.
National Environmental Management Act (No. 107 of 1998) (NEMA)	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. 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. The need for responsible and informed decision-making by government on the acceptability of environmental impacts is therefore enshrined within NEMA.
National Energy Act (No. 34 of 2008)	The purpose of the National Energy Act (No. 34 of 2008) is to ensure that diverse energy resources are available, in sustainable quantities and at affordable prices, to the South African economy in support of economic growth and poverty alleviation, while considering environmental management requirements and interactions amongst economic sectors, as well as matters relating to renewable energy. The National Energy Act also provides for energy planning, increased generation and consumption of renewable energies, contingency energy supply, holding of strategic energy feedstocks and carriers, adequate investment in, appropriate upkeep and access to energy infrastructure. The Act provides measures for the furnishing of certain data and information regarding energy demand, supply, and generation, and for establishing an institution to be responsible for promotion of efficient generation and consumption of energy and energy research. The Act provides the legal framework which supports the development of power generation facilities. The Act also provides for licences and registration as the way generation, transmission, distribution, trading and the import and export of electricity are regulated. The development of the Fountain Solar PV1 Facility will have to ensure compliance with this Act as a license for the generation of electricity will be required.
White Paper on the Energy Policy of the Republic of South Africa (1998)	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. 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.
White Paper on the Renewable Energy Policy of the Republic of South Africa (2003)	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.

Relevant legislation or policy	Relevance to Fountain Solar PV1 Facility
	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 accessible and affordable coal resources. However, significant renewable energy resources that can be sustainable alternatives to fossil fuels, have so far remained largely untapped. The development of additional renewable energy projects will promote the use of the abundant South African renewable energy resources and contribute to long-term energy security and diversification of the energy mix.
The Electricity Regulation Act (No. of 2006)	The Electricity Regulation Act of 2006, replaced the Electricity Act (No. 41 of 1987), as amended, except for 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 way the generation, transmission, distribution, trading, and import and export of electricity are regulated.
Integrated Energy Plan (IEP), 2016	The purpose and objectives of the Integrated Energy Plan (IEP) are derived from the National Energy Act (No. 34 of 2008). The IEP takes into consideration the crucial role that energy plays in the entire economy of the country and is informed by the output of analyses founded on a solid fact base. It is a multi-faceted, long-term energy framework which has multiple aims, some of which include: » To guide the development of energy policies and, where relevant, set the framework for regulations in the energy sector. » To guide the selection of appropriate technologies to meet energy demand (i.e., the types and sizes of new power plants and refineries to be built and the prices that should be charged for fuels). » To guide investment in and the development of energy infrastructure in South Africa. » To propose alternative energy strategies which are informed by testing the potential impacts of various factors such as proposed policies, introduction of new technologies, and effects of exogenous macro-economic factors. A draft version of the IEP was released for comment on 25 November 2016. The purpose of the IEP is to provide a roadmap of the future energy landscape for South Africa which guides future energy infrastructure investments and policy development. The development of the IEP is an ongoing continuous process. It is reviewed periodically to consider changes in the macroeconomic environment, developments in new technologies and changes in national priorities and imperatives, amongst others. The 8 key objectives of the integrated energy planning process are as follows: » Objective 1: Ensure security of supply. » Objective 2: Minimise the cost of energy. » Objective 3: Promote the creation of jobs and localisation. » Objective 4: Minimise negative environmental impacts from the energy sector. » Objective 5: Promote the conservation of water. » Objective 6: Diversify supply sources and primary sources of energy.

Relevant legislation or policy	Relevance to Fountain Solar PV1 Facility
	» Objective 7: Promote energy efficiency in the economy. » Objective 8: Increase access to modern energy.
Integrated Resource Plan for Electricity (IRP) 2010-2030	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. 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: » A total of 6 422MW has been procured thus far under the REIPPP Programme, with 4 724MW being currently operational and made available to the grid[5]. 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. Provision has been made for the following new capacity by 2030: » 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. Based on the IRP 2019, 1 474MW has been installed for solar PV facilities, whereas 6422MW has already been procured. In addition, 1 000MW has been allocated per annum 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 Fountain Solar PV1 Facility is supported by the IRP 2019.
New Growth Path (NGP) Framework, 23 November 2010	The purpose of the New Growth Path (NGP) Framework is to provide effective strategies towards accelerated job-creation through the development of an equitable economy and sustained growth. The target of the NGP is to create 5 million jobs by 2020; with economic growth and employment creation as the key indicators identified in the NGP. The framework seeks to identify key structural changes in the economy that can improve performance in terms of labour absorption and the composition and rate of growth.

[5]http://www.nersa.org.za/wp-content/uploads/2021/05/Monitoring-of-Renewable-Energy-Performance-of-Power-Plants-%E2%80%93-Performance-of-Power-Plants-in-2020

Relevant legislation or policy	Relevance to Fountain Solar PV1 Facility
	To achieve this, government will seek to, amongst other things, identify key areas for large-scale employment creation, because of changes in conditions in South Africa and globally, and to develop a policy package to facilitate employment creation in these areas.
National Development Plan 2030 (2012)	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. 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: » Economic growth and development through adequate investment in energy infrastructure. The sector should provide reliable and efficient energy service at competitive rates, while supporting economic growth through job creation. » Social equity through expanded access to energy at affordable tariffs and through targeted, sustainable subsidies for needy households. » Environmental sustainability through efforts to reduce pollution and mitigate the effects of climate change. In formulating its vision for the energy sector, the NDP took the IRP 2010 as its point of departure. Therefore, although electricity generation from coal is still seen as part of the energy mix within the NDP, the plan sets out steps that aim to ensure that, by 2030, South Africa's energy system will look very different to the current situation: coal will contribute proportionately less to primary-energy needs, while gas and renewable energy resources – especially wind, solar, and imported hydroelectricity – will play a much larger role. The NDP aims to provide a supportive environment for growth and development, while promoting a more labour-absorbing economy. The development of Fountain Solar PV1 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.
Strategic Integrated Projects (SIPs)	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. 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. The development of Fountain Solar PV1 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.
National Climate Change Response Policy, 2011	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

Relevant legislation or policy	Relevance to Fountain Solar PV1 Facility
	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. South Africa signed the Agreement in April 2016 and ratified the agreement on 01 November 2016. The Agreement was assented to by the National Council of Provinces on 27 October 2016, and the National Assembly on 1 November 2016. The Agreement was promulgated on 04 November 2016, thirty days after the date on which at least 55 Parties to the Convention, which account for at least 55% of the total global greenhouse gas emissions have deposited their instruments of ratification, acceptance, approval, or accession with the Depositary. South Africa's National Climate Change Response Policy (NCCRP) establishes South Africa's approach to addressing climate change, including adaptation and mitigation responses. The NCCRP formalises Government's vision for a transition to a low carbon economy, through the adoption of the 'Peak, Plateau and Decline' (PPD) GHG emissions trajectory whereby South Africa's emissions should peak between 2020 and 2025, plateau for approximately a decade, and then decline in absolute terms thereafter, and based on this the country has pledged to reduce emissions by 34% and 42% below Business as Usual (BAU) emissions in 2020 and 2025, respectively. The policy provides support for Fountain Solar PV1 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.
Climate Change Bill, 2018	On 08 June 2018, the Minister of Environmental Affairs published the Climate Change Bill ("the Bill") for public comment. The Bill provides a framework for climate change regulation in South Africa aimed at governing South Africa's sustainable transition to a climate resilient, low carbon economy and society. The Bill provides a procedural outline that will be developed through the creation of frameworks and plans. Fountain Solar PV1 Facility comprises a renewable energy generation facility and would not result in the generation or release of emissions during its operation.

4.4. National Policy and Planning Context

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. As of 31 March 2021, the Department has procured 6 422MW of renewable energy capacity from 112 independent power producers (IPPs), with 4 724MW operational and made available to the grid[6]. National policies must 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.

[6]http://www.nersa.org.za/wp-content/uploads/2021/05/Monitoring-of-Renewable-Energy-Performance-of-Power-Plants-%E2%80%93-Performance-of-Power-Plants-in-2020

A brief review of the most relevant national policies is provided below in **Table 4.2**. The development of Fountain Solar PV1 Facility is considered to align with the aims of these policies, even where contributions to achieving the goals therein are only minor.

Table 4.2: Relevant national legislation and policies for Fountain Solar PV1 Facility

Relevant legislation or policy	Relevance to Fountain Solar PV1 Facility
Constitution of the Republic of South Africa, 1996	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. 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. The undertaking of an EIA process for the proposed project in terms of the requirements of the EIA Regulations, 2014 (as amended) aims to minimise any impacts on the natural and social environment.
National Environmental Management Act (No. 107 of 1998) (NEMA)	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. 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. The need for responsible and informed decision-making by government on the acceptability of environmental impacts is therefore enshrined within NEMA.
National Energy Act (No. 34 of 2008)	The purpose of the National Energy Act (No. 34 of 2008) is to ensure that diverse energy resources are available, in sustainable quantities and at affordable prices, to the South African economy in support of economic growth and poverty alleviation, while considering environmental management requirements and interactions amongst economic sectors, as well as matters relating to renewable energy. The National Energy Act also provides for energy planning, increased generation and consumption of renewable energies, contingency energy supply, holding of strategic energy feedstocks and carriers, adequate investment in, appropriate upkeep and access to energy infrastructure. The Act provides measures for the furnishing of certain data and information regarding energy demand, supply, and generation, and for establishing an institution to be responsible for promotion of efficient generation and consumption of energy and energy research. The Act provides the legal framework which supports the development of power generation facilities. The Act also provides for licences and registration as the way generation, transmission, distribution, trading and the import and export of electricity are regulated. The development of the Fountain Solar PV1 Facility will have to ensure compliance with this Act as a license for the generation of electricity will be required.

Relevant legislation or policy	Relevance to Fountain Solar PV1 Facility
White Paper on the Energy Policy of the Republic of South Africa (1998)	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. 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.
White Paper on the Renewable Energy Policy of the Republic of South Africa (2003)	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. 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 accessible and affordable coal resources. However, significant renewable energy resources that can be sustainable alternatives to fossil fuels, have so far remained largely untapped. The development of additional renewable energy projects will promote the use of the abundant South African renewable energy resources and contribute to long-term energy security and diversification of the energy mix.
The Electricity Regulation Act (No. of 2006)	The Electricity Regulation Act of 2006, replaced the Electricity Act (No. 41 of 1987), as amended, except for 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 way the generation, transmission, distribution, trading, and import and export of electricity are regulated.
Integrated Energy Plan (IEP), 2016	The purpose and objectives of the Integrated Energy Plan (IEP) are derived from the National Energy Act (No. 34 of 2008). The IEP takes into consideration the crucial role that energy plays in the entire economy of the country and is informed by the output of analyses founded on a solid fact base. It is a multi-faceted, long-term energy framework which has multiple aims, some of which include: » To guide the development of energy policies and, where relevant, set the framework for regulations in the energy sector. » To guide the selection of appropriate technologies to meet energy demand (i.e., the types and sizes of new power plants and refineries to be built and the prices that should be charged for fuels). » To guide investment in and the development of energy infrastructure in South Africa. » To propose alternative energy strategies which are informed by testing the potential impacts of various factors such as proposed policies, introduction of new technologies, and effects of exogenous macro-economic factors.

Relevant legislation or policy	Relevance to Fountain Solar PV1 Facility
	A draft version of the IEP was released for comment on 25 November 2016. The purpose of the IEP is to provide a roadmap of the future energy landscape for South Africa which guides future energy infrastructure investments and policy development. The development of the IEP is an ongoing continuous process. It is reviewed periodically to consider changes in the macroeconomic environment, developments in new technologies and changes in national priorities and imperatives, amongst others. The 8 key objectives of the integrated energy planning process are as follows: » Objective 1: Ensure security of supply. » Objective 2: Minimise the cost of energy. » Objective 3: Promote the creation of jobs and localisation. » Objective 4: Minimise negative environmental impacts from the energy sector. » Objective 5: Promote the conservation of water. » Objective 6: Diversify supply sources and primary sources of energy. » Objective 7: Promote energy efficiency in the economy. » Objective 8: Increase access to modern energy.
Integrated Resource Plan for Electricity (IRP) 2010-2030	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. 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: » A total of 6 422MW has been procured thus far under the REIPPP Programme, with 4 724MW being currently operational and made available to the grid[7]. 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. Provision has been made for the following new capacity by 2030: » 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

[7]http://www.nersa.org.za/wp-content/uploads/2021/05/Monitoring-of-Renewable-Energy-Performance-of-Power-Plants-%E2%80%93-Performance-of-Power-Plants-in-2020

Relevant legislation or policy	Relevance to Fountain Solar PV1 Facility
	» 4 000MW from other distributed generation, co-generation, biomass, and landfill technologies. Based on the IRP 2019, 1 474MW has been installed for solar PV facilities, whereas 6422MW has already been procured. In addition, 1 000MW has been allocated per annum 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 Fountain Solar PV1 Facility is supported by the IRP 2019.
New Growth Path (NGP) Framework, 23 November 2010	The purpose of the New Growth Path (NGP) Framework is to provide effective strategies towards accelerated job-creation through the development of an equitable economy and sustained growth. The target of the NGP is to create 5 million jobs by 2020; with economic growth and employment creation as the key indicators identified in the NGP. The framework seeks to identify key structural changes in the economy that can improve performance in terms of labour absorption and the composition and rate of growth. To achieve this, government will seek to, amongst other things, identify key areas for large-scale employment creation, as a result of changes in conditions in South Africa and globally, and to develop a policy package to facilitate employment creation in these areas.
National Development Plan 2030 (2012)	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. 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: » Economic growth and development through adequate investment in energy infrastructure. The sector should provide reliable and efficient energy service at competitive rates, while supporting economic growth through job creation. » Social equity through expanded access to energy at affordable tariffs and through targeted, sustainable subsidies for needy households. » Environmental sustainability through efforts to reduce pollution and mitigate the effects of climate change. In formulating its vision for the energy sector, the NDP took the IRP 2010 as its point of departure. Therefore, although electricity generation from coal is still seen as part of the energy mix within the NDP, the plan sets out steps that aim to ensure that, by 2030, South Africa's energy system will look very different to the current situation: coal will contribute proportionately less to primary-energy needs, while gas and renewable energy resources – especially wind, solar, and imported hydroelectricity – will play a much larger role. The NDP aims to provide a supportive environment for growth and development, while promoting a more labour-absorbing economy. The development of Fountain Solar PV1 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.
Strategic Integrated Projects (SIPs)	The Presidential Infrastructure Coordinating Commission (PICC) is integrating and phasing investment plans across 18 Strategic Integrated Projects (SIPs) which have 5

Relevant legislation or policy	Relevance to Fountain Solar PV1 Facility
	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. 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. The development of Fountain Solar PV1 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.
National Climate Change Response Policy, 2011	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. South Africa signed the Agreement in April 2016 and ratified the agreement on 01 November 2016. The Agreement was assented to by the National Council of Provinces on 27 October 2016, and the National Assembly on 1 November 2016. The Agreement was promulgated on 04 November 2016, thirty days after the date on which at least 55 Parties to the Convention, which account for at least 55% of the total global greenhouse gas emissions have deposited their instruments of ratification, acceptance, approval, or accession with the Depositary. South Africa's National Climate Change Response Policy (NCCRP) establishes South Africa's approach to addressing climate change, including adaptation and mitigation responses. The NCCRP formalises Government's vision for a transition to a low carbon economy, through the adoption of the 'Peak, Plateau and Decline' (PPD) GHG emissions trajectory whereby South Africa's emissions should peak between 2020 and 2025, plateau for approximately a decade, and then decline in absolute terms thereafter, and based on this the country has pledged to reduce emissions by 34% and 42% below Business as Usual (BAU) emissions in 2020 and 2025, respectively. The policy provides support for Fountain Solar PV1 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.
Climate Change Bill, 2018	On 08 June 2018, the Minister of Environmental Affairs published the Climate Change Bill ("the Bill") for public comment. The Bill provides a framework for climate change regulation in South Africa aimed at governing South Africa's sustainable transition to a climate resilient, low carbon economy and society. The Bill provides a procedural outline that will be developed through the creation of frameworks and plans. Fountain Solar PV1 Facility comprises a renewable energy generation facility and would not result in the generation or release of emissions during its operation.

4.5. 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 Fountain Solar PV1 Facility

Relevant policy	Relevance to Fountain Solar PV1 Facility
Northern Cape Provincial Spatial Development Framework (PSDF) 2012	The Northern Cape Provincial Spatial Development Framework (PSDF) 2012 states that the overarching goal for the province is to enable sustainability through sustainable development. The province considers social and economic development as imperative in order to address the most significant challenge facing the Northern Cape, which is poverty. The PSDF identifies key sectoral strategies and plans which are the key components of the PSDF. Sectoral Strategy 19 refers to a provincial renewable energy strategy. Within the PSDF a policy has been included which states that renewable energy sources (including the utilisation of solar energy) are to comprise 25% of the province's energy generation capacity by 2020. The overall energy objective for the province also includes promoting the development of renewable energy supply schemes which are strategically important for increasing the diversity of domestic energy supply and avoiding energy imports, while also minimising the detrimental environmental impacts. The implementation of sustainable renewable energy is also to be promoted within the province through appropriate financial and fiscal instruments. The development of Fountain Solar PV1 Facility supports the overall energy objective of the province to have 25% of its electricity from renewable energy sources.
Northern Cape Provincial Spatial Development Framework (PSDF) 2018 Review - Executive Summary	The review of the Northern Cape PSDF (2018) refers to infrastructure investment and that a balance must be maintained between investments aimed at meeting the social needs of communities and investment aimed at promoting economic development and job creation. The Spatial Development Strategy identified in the PSDF for basic infrastructure includes the achieving the provision of green infrastructure which includes renewable energy. As part of the Vision 2040 of the PSDF key opportunities are identified for the province. The strengthening of the development triangle that is formed by the linking of Kimberley, Vryburg, Upington and De Aar. The development triangle sustains a diverse economy with strong mining, agricultural and renewable energy sectors. It is stated in the PSDF that a sustainable and viable economic network must be driven within the development triangle to improve the return of public investment in the province. The development of Fountain Solar PV1 Facility will contribute to the economic network of the province specifically in terms of the renewable sector, albeit it does not fall within the development triangle.
The Northern Cape Climate Change Response Strategy	The key aspects of the Northern Cape Climate Change Response Strategy (NCCCRS) Report are summarised in the MEC's (NCPG: Environment and Nature Conservation) 2011 budget speech: "*The Provincial Climate Change Response Strategy will be underpinned by specific critical sector climate change adaptation and mitigation strategies that*

Relevant policy	Relevance to Fountain Solar PV1 Facility
	include the Water, Agriculture and Human Health sectors as the 3 key Adaptation Sectors, the Industry and Transport alongside the Energy sector as the 3 key Mitigation Sectors with the Disaster Management, Natural Resources and Human Society, livelihoods and Services sectors as 3 remaining key. Sectors to ensure proactive long-term responses to the frequency and intensity of extreme weather events such as flooding and wildfire, with heightened requirements for effective disaster management". Key points from the MEC address include the NCPG's commitment to develop and implement policy in accordance with the National Green Paper for the National Climate Change Response Strategy (2010), and an acknowledgement of the Northern Cape Province's extreme vulnerability to climate-change driven desertification. The development and promotion of a provincial green economy, including green jobs, and environmental learnership is regarded as an important provincial intervention in addressing climate change. The renewable energy sector, including solar and wind energy (but also biofuels and energy from waste), is explicitly indicated as an important element of the Provincial Climate Change Response Strategy. The development of Fountain Solar PV1 Facility will assist in achieving (although only to a limited extent) the promotion of the provincial green economy of the Northern Cape.
Northern Cape Province Green Document	The NCP Green Document (2017-2018) was prepared by the Northern Cape Department of Economic Development and Tourism and provides an impact assessment of IPPs on the communities in the province located within a 50km radius from existing facilities. The document notes that the NCP is nationally a leader in commercial-scale renewable energy projects. By 2018, a total of 23 IPP projects in the province had been integrated into the national grid. These projects include Solar PV, Concentrated Solar, and Wind Energy Facilities. The document notes that through their economic development obligations, these projects have already made a significant positive contribution to affected communities. Much of the effort has been directed at supporting local education. The document also notes that, as these projects are committed to 20-year minimum lifespans, they collectively hold a tremendous potential for socio-economic upliftment. The development of the Fountain Solar PV1 Facility will contribute towards further socio-economic upliftment in the Northern Cape Province.

4.6. Local Policy and Planning Context

The local tiers of government relevant to the Fountain Solar PV1 Facility project are the Emthanjeni Local Municipality and the Pixley Ka Seme District Municipality (PKSDM). Instruments and/or policies at both the district and local level contain objectives which align with the development of the Fountain Solar PV1 Facility. These include, economic growth, job creation, community upliftment and poverty alleviation.

Table 4.3: Relevant district and local legislation and policies for Fountain Solar PV1 Facility

Relevant policy	Relevance to Fountain Solar PV1 Facility
Pixley District Municipality Integrated Development Plan (2019-2020)	The vision for the PKSDM is "Developed and Sustainable District for Future Generations" The mission statement that underpins the vision is: » Supporting our local municipalities to create a home for all in our towns, settlements, and rural areas to render dedicated services.

Relevant policy	Relevance to Fountain Solar PV1 Facility
	» Providing political and administrative leadership and direction in the development planning process. » Promoting economic growth that is shared across and within communities. » Promoting and enhancing integrated development planning in the operations of our municipalities. » Aligning development initiatives in the district to the National Development Plan. The Strategic Objectives to address the vision that are relevant to the project include the promotion of economic growth in the district and enhancement of service delivery. Chapter 4 of the IDP, Development of Strategies, highlights the key strategies of the PKSDM. The IDP also notes that the growth and development context in the district has also changed radically since 2013 (after it had been stagnant for decades) owing mainly to private and public investments in the area as a hub for renewable energy generation and astronomy. The IDP notes that the economy in the Pixley Ka Seme municipal area is characterised by: » High levels of poverty and low levels of education. » Low levels of development despite the strategic location in terms of the national transport corridors. » High rate of unemployment, poverty, and social grant dependence. » Prone to significant environmental changes owing to long-term structural changes (such as climate change, energy crises and other shifts). Of specific relevance, the IDP highlights the potential for renewable energy to help address some of these challenges. The development of the Fountain Solar PV1 Facility will promote economic development in the Pixley Ka Seme municipal area, thereby assisting in addressing some the challenges faced by the district municipality as detailed in the IDP.
Pixley Ka Seme District Municipality Spatial Development Framework (SDF) (2017)	The SDF notes that the vision for the PKSDM is "Pixley Ka Seme District Municipality, pioneers of development, a home and future for all". The Mission Statement that underpins the vision refers to: » Effective and efficient service delivery. » Optimal human and natural resource development. » Local economic growth and development, job creation and poverty alleviation. » A vibrant tourism industry. » To participate in the fight to reduce the infection rate and lessen the impact of HIV/AIDS and other communicable diseases. » A safe, secure and community friendly environment. The SDF identifies the opportunities and constraints associated with the district. An opportunity of relevance to the Fountain Solar PV1 Facility is renewable energy and the development of a renewable energy hub in the region.
Emthanjeni Local Municipality Integrated Development Plan (IDP) (2021 – 2022)	Emthanjeni has in recent time seen the influx of investment in Renewable energy projects and is a potential industrial growth point with ample industrial sites, reasonable prices and tariffs, affordable labour and the necessary infrastructure. The Emthanjeni Local Municipal Integrated Development Plan indicates that the one of the strategic objectives in terms of provision of access to all basic services rendered to residents within the available resources includes renewable energy projects, with a target of 500.

Relevant policy	Relevance to Fountain Solar PV1 Facility
	The below strategic objectives are aligned with the needs of the communities as these needs reflected mainly on: » Economic Development » Infrastructure Development » Health Services » Youth Development » Housing Delivery » SMME Development » Availability of Agricultural land » Sport and Recreation » Skills development These issues can be addressed by supplier and enterprise development and enterprise development spend linked to the Fountain Solar PV1 Facility.

CHAPTER 5: NEED AND DESIRABILITY

Appendix 2 of the 2014 EIA Regulations (GNR 326) 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 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 of Fountain Solar PV1 Facility is included and discussed as a whole 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 Fountain Solar PV1 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.

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.

Targets	Indicators
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 Fountain Solar PV1 Facility would contribute positively towards Goal 7 of the SDGs through the following:

- By generating up to 100MW (contracted capacity) 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.

The Kyoto Protocol (1997) is also relevant to the need for the development of the Fountain Solar PV1 Facility from an international perspective. The protocol calls for the reduction of South Africa's greenhouse gas emissions through actively cutting down on using fossil fuels, or by utilising more renewable resources. The development of the Fountain Solar PV1 Facility will add capacity to the renewable energy sector of the country and strengthen the commitment and action plan to achieve the requirements, as set out in the protocol, through the generation of energy without the emission of greenhouse gasses.

5.3. Need and Desirability from a National Perspective

Following the energy crisis in 2008, South African Government started to introduce renewable energy developments on a large scale and further enhanced the promotion of energy efficiency in all sectors to meet the demand of energy while reducing CO_2 emissions and creating jobs. As a consequence, significant investment in renewable energy and energy efficient is required. Increasing the diversity of South Africa's electricity mix is important, not only for enhancing the crucially important security of supply of the country, but also to support job creation and mitigate climate change.

The National Development Plan (NDP) envisages that, by 2030, South Africa will have an energy sector that provides reliable and efficient energy service at competitive rates; that is socially equitable through expanded access to energy at affordable tariffs; and that is environmentally sustainable through reduced emissions and pollution. Historically, coal has provided the primary fuel resource for baseload electricity generation in South Africa. Consequently, Eskom, who is the main electricity generating company in the country, generates approximately 85% of the country's electricity from coal resources (Stats SA, 2016), resulting in a large carbon footprint. Taking into consideration the need to ensure adequate supply of electricity and meet international obligations in terms of addressing climate change, Government has identified the need to diversify the energy mix within the country.

South Africa needs to build about 40 000MW of new generation capacity to meet demand requirements. According to the NDP, 17800MW should be provided by renewable energy projects. To achieve this, the government plans to install 8 400 MW of wind energy, 8 400MW of solar photovoltaic energy, and 1 000 MW of concentrated solar power by 2030.

Fountain Solar PV1 Facility is proposed in specific response to the requirement for diversification of the country's energy mix to include renewable energy such as solar PV as detailed in the IRP 2019. As a result, the need and desirability of Fountain Solar PV1 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); and
» 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. The Plan considers the three pillars of sustainable development, and lists the following as the eight key energy planning objectives:

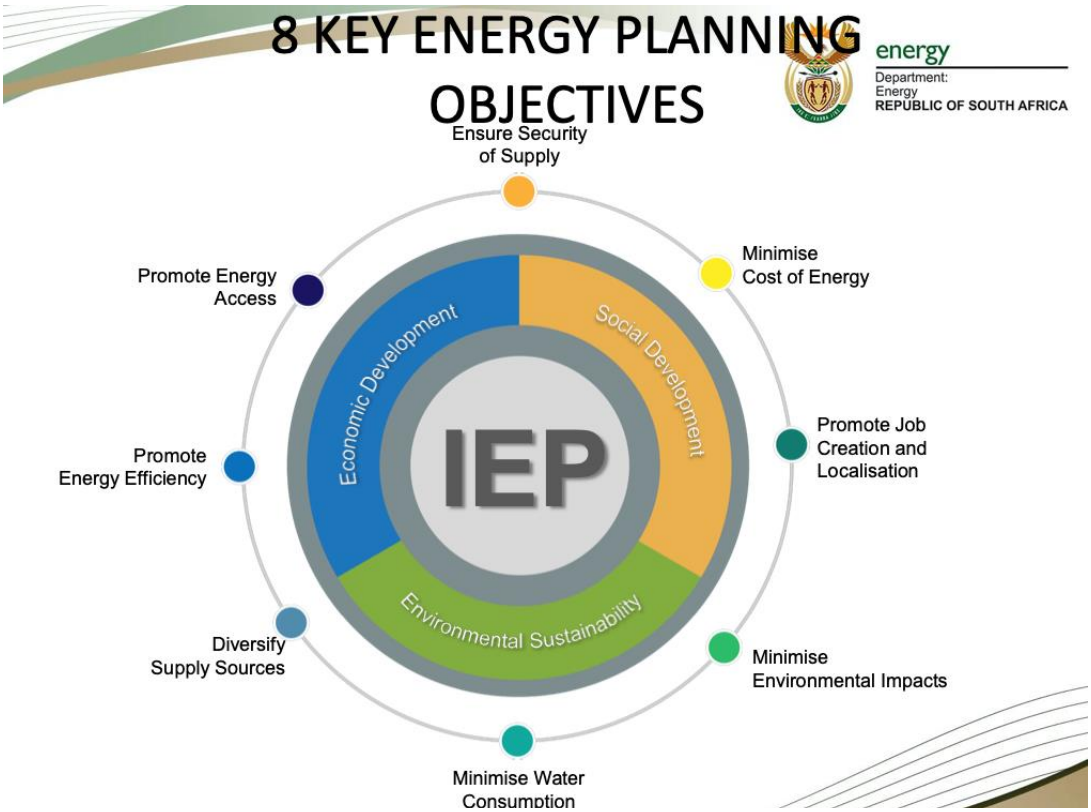


Figure 5.1: Eight key energy objectives as listed in the IEP, 2016 (extract from DOE presentation, December 2016)

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

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

- *Solar should play a much more significant role in the electricity generation mix than it has done historically and constitutes the greatest share of primary energy (in terms of total installed capacity) by 2050. The contribution of solar in the energy mix comprises both CSP and solar PV. Solar PV includes large scale installations for power generation which supply to the grid and individual, off-grid solar home systems and rooftop panels.*

- » *Several interventions which could enhance the future solar energy landscape are recommended as follows: – Large scale CSP projects with proven thermal storage technologies and hybridisation / industrial steam application projects should be incentivised in the short to medium term. In the long term, the existing incentives could be extended to promote locally developed CSP technology storage solutions and large-scale solar fuel projects.*
- » *A thorough solar resource assessment for South Africa should continue to be undertaken in the Northern Cape Province and extended to other provinces deemed to have high solar radiation levels.*
- » *Investments should be made to upgrade the grid in order to accommodate increasing solar and other renewable energy contributions.*

The IRP for Electricity 2010 – 2030 (gazetted in 2019) is a subset of the IEP and constitutes South Africa's current gazetted energy plan. The purpose of the plan is to ensure sustainable electricity development which takes into consideration technical, economic, and social constraints, and identifies investments in the electricity sector which are required to meet the country's forecasted electricity demands at minimum costs. This plan provides for the development of 8288MW of capacity from Solar Photovoltaic energy facilities by 2030, with an annual contribution of 1000MW from 2022.

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	6000MW	
	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. 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.

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.

Between 2011 and 2021, the South African Government, through its IRP 2010 -2020, have successfully launched and completed five bidding windows under the REIPPPP[2] (refer to Table **Figure 5.2**).

REIPPPP Bid Windows	1	2	3	3.5	4	4 (additional)	4.5 (expedited)	5	[...13] (up to 2030)	Total
Bid Date	04-Nov-11	05-Mar-12	19-Aug-13	03-Mar-14	17-Aug-14	17-Aug-14	11-Nov-15	16-Aug-21	TBD	-
Pref. Bidders ("PB") announced	07-Dec-11	21-May-12	31-Dec-13	14-Dec-14	16-Apr-15	07-Jun-15		TBD	TBD	-
Financial Close ("FC") - from	19-Jun-12	13-Dec-12	30-Jul-14	01-May-21	30-Apr-18	30-Apr-18		TBD	TBD	-
Years betwen PB annoucement & FC	0.54	0.57	0.58	6.39	3.05	2.90	CANCELLED	TBD	TBD	-
Projects Bid	53	79	93	3	74	-		102	TBD	**404.0**
Projects awarded	28	19	17	2	13	13		TBD	TBD	**92.0**
Capacity offered (MW)	3,625	1,275	1,473	300	1,105	1,170		2,600	[29,000*]	**11,548.0**
Capacity awarded (MW)	1,426	1,040	1,457	200	1,121	1,084		TBD	TBD	**6,327.9**
Total investment ($bn)	6.2	4.2	4.5	1.8	2.0	1.9		TBD	TBD	**20.5**
Avg. Real IRR (ZAR)	17.0%	15.5%	11.0%	13.75%	9.5%	9.5%		[3%-7%*]	TBD	-

*Estimation; TBD – To be Determined

Source: Finergreen

Figure 5.2: Overview of bid windows 1 to 5

Figure 5.2 shows that between 2011 and 2015, 302 bids were submitted, with around 30% (92) of the projects receiving approval. From those 92 projects, close to 70% (4.41GW) are already in operation, with wind and solar PV projects compromising most of the projects awarded (roughly 86%). In addition, of the 11.5GW of total capacity offered, 6.3GW (roughly 71%) was allocated, with wind and solar PV projects comprising most projects.

Preferred bidders identified under any IPP Procurement Programme, including the REIPPPP, 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 the 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 Fountain Solar PV1 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).

Fountain Solar PV1 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 Fountain Solar PV1 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.

5.3.1 Benefits of Renewable Energy in the South Africa Environment

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

Socio-economic upliftment of local communities: The Fountain Solar PV1 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.

Since inception of the REIPPPP in 2011, approximately 59 071 job years for South African citizens to date have been created. The Fountain Solar PV1 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. According to CSIR's power sector statistics, South Africa experienced loadshedding for 650 hours in the first half of 2021 (15% of the time) wherein 963GWh of estimated energy was shed (mostly stage 2 load shedding). This is 76% of the total loadshedding experienced during 2020[4]. It is important to note that although extensive load shedding continued during the first half of 2021, record relative variable renewable energy contributions were recorded. More recently, power generated from renewable energy sources have assisted Eskom in alleviating the need for rolling blackouts 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.

According to the IPP Procurement Programme overview report dated 31 March 2021, water savings of 71.7 million kilolitres has been realised by the programme from inception to date, of which 4.2 million kilolitres is in this 2021 reporting quarter.

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. According to the IPP Procurement Programme overview report, as of 31 March 2021, the REIPPPP had made the following significant impacts in terms of energy supply:

- 6 422MW of electricity had been procured from 112 Renewable Energy Independent Power Producers (IPPs) in seven bid rounds[5].
- 5 078MW of electricity generation capacity from 79 IPP projects has been connected to the national grid.
- 59 761GWh of energy has been generated by renewable energy sources procured under the REIPPPP since the first project became operational in November 2013. Renewable energy IPPs have proved to be very reliable. Of the 79 projects that have started operations, 67 projects have bene operational for longer than a year.
- The electrical energy generated over the past 12-month period for the 67 projects is 11 679GWh, which is 94% of their annual energy contribution projections of 12 481GWh over a 12-month delivery period.
- Twenty-six (26) of the 67 projects (39%) have individually exceeded their projections.

In addition to the above:

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

Bid Window 6, which aims to sign up a further 2 600MW of power, including 1 600MW of wind and 1 000MW of solar is currently open, with the submission date set for 11 August 2022.

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

The following has been achieved by the IPP programme (March 2021) in terms of investment and economics:

- Investment (equity and debt) to the value of R209.7 billion was attracted in seven bid rounds.
- Socio-economic development contributions of R1.5 billion to date, of which R103.5 million was spent in this 2021 reporting quarter.
- Enterprise development contributions of R463.5 million to date, of which R34.8 million was spent in this 2021 reporting quarter.

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

The overview of the Independent Power Producers Procurement Report (March 2021) indicates that a carbon emission reduction of 60.7 Mton CO_2 has been realised by the IPP programme from inception to date, of which 3.6 Mton is in the 2021 reporting quarter.

Climate friendly development: The uptake of renewable energy offers the opportunity to address energy needs in an environmentally responsible manner and thereby allows South Africa to contribute towards mitigating climate change through the reduction of 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 ranked 12th worldwide in terms of per capita carbon dioxide emissions as of 2021. Since its inception, the REIPPPP has achieved carbon emission reductions carbon emission reduction of 60.7 Mton CO_2. The development of the Fountain Solar PV1 Facility, and the associated electricity generated as a result of the facility, will result in considerable savings on tons of CO_2 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 the Kyoto Protocol and the Paris Agreement, and for cementing its status as a leading player within the international community.

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

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.

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

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 Northern Cape Province has been identified as an area where electricity generation from solar energy facilities is highly feasible and a viable option. The location of the study area and project site within the Northern Cape is therefore considered to support the Province/Region's generation targets. The De Aar area is also considered as a hub for the development of solar energy projects due to the viability of the solar resource for the area and the number of projects proposed in the area.

The overarching objective for the solar energy facility is to maximise electricity production through exposure to the solar resource, while minimising infrastructure, operational and maintenance costs, as well as social and environmental impacts. From a regional site selection perspective, this region is considered to be preferred for solar energy development by virtue of its annual solar irradiation values. The GHI for the area derived from the World Bank Group's Global Solar Atlas is approximately 120 kWh/m2/annum, equivalent to the highest GHI values in the country (refer to **Figure 5.3**).

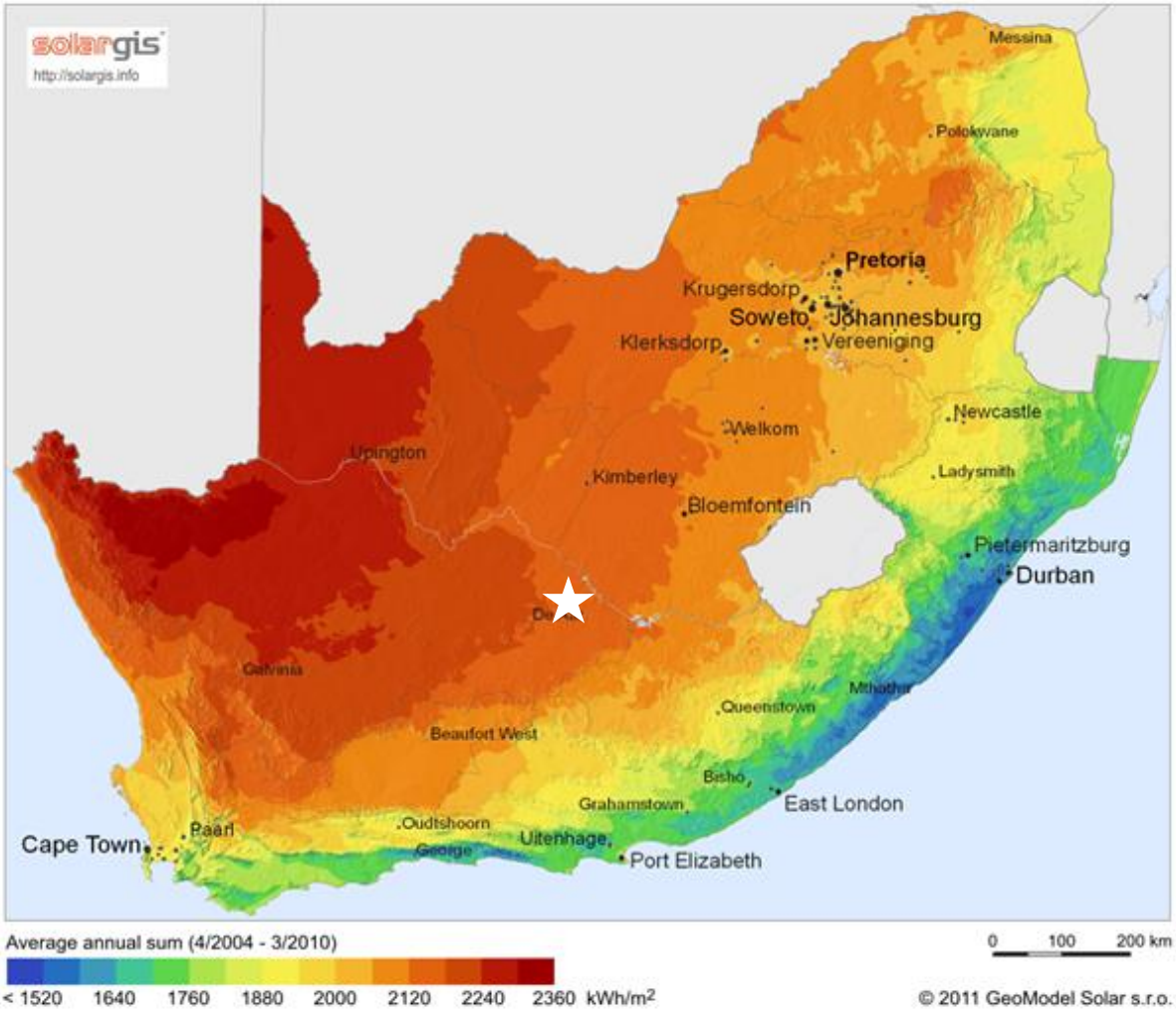


Figure 5.3: Solar irradiation map for South Africa, with the position of Fountain Solar PV1 Facility shown by the white star (Source: GeoModel Solar)

5.5. Need and Desirability of the project from a District and Local Perspective

The Strategic Objectives to address Pixley Ka Seme District Municipality and Emthanjeni Local Municipality vision that are relevant to the project include the promotion of economic growth in the district and enhancement of service delivery. Chapter 4 of the Pixley Ka Seme District Municipality Integrated Development Plan, Development of Strategies, highlights the key strategies of the district. The IDP also notes that the growth and development context in the district has also changed radically since 2013 (after it had been stagnant for decades) owing mainly to private and public investments in the area as a hub for renewable energy generation and astronomy. The potential in the area for Renewable Energy developments including the development of the Fountain Solar PV1 Facility will promote economic development in the Pixley Ka Seme District and the Emthanjeni Local Municipality area, thereby assisting in addressing some of the challenges faced locally such as:

- High levels of poverty and low levels of education.
- Low levels of development despite the strategic location in terms of the national transport corridors.
- High rate of unemployment, poverty, and social grant dependence.
- Prone to significant environmental changes owing to long-term structural changes (such as climate change, energy crises and other shifts).

These issues can be addressed by supplier and enterprise development and enterprise development spend linked to the Fountain Solar PV1 Facility.
The official unemployment rate in the Emthanjeni Local municipality in 2011 was 14.0%, while 37.0% were employed, and 44.0% were regarded as not economically active.

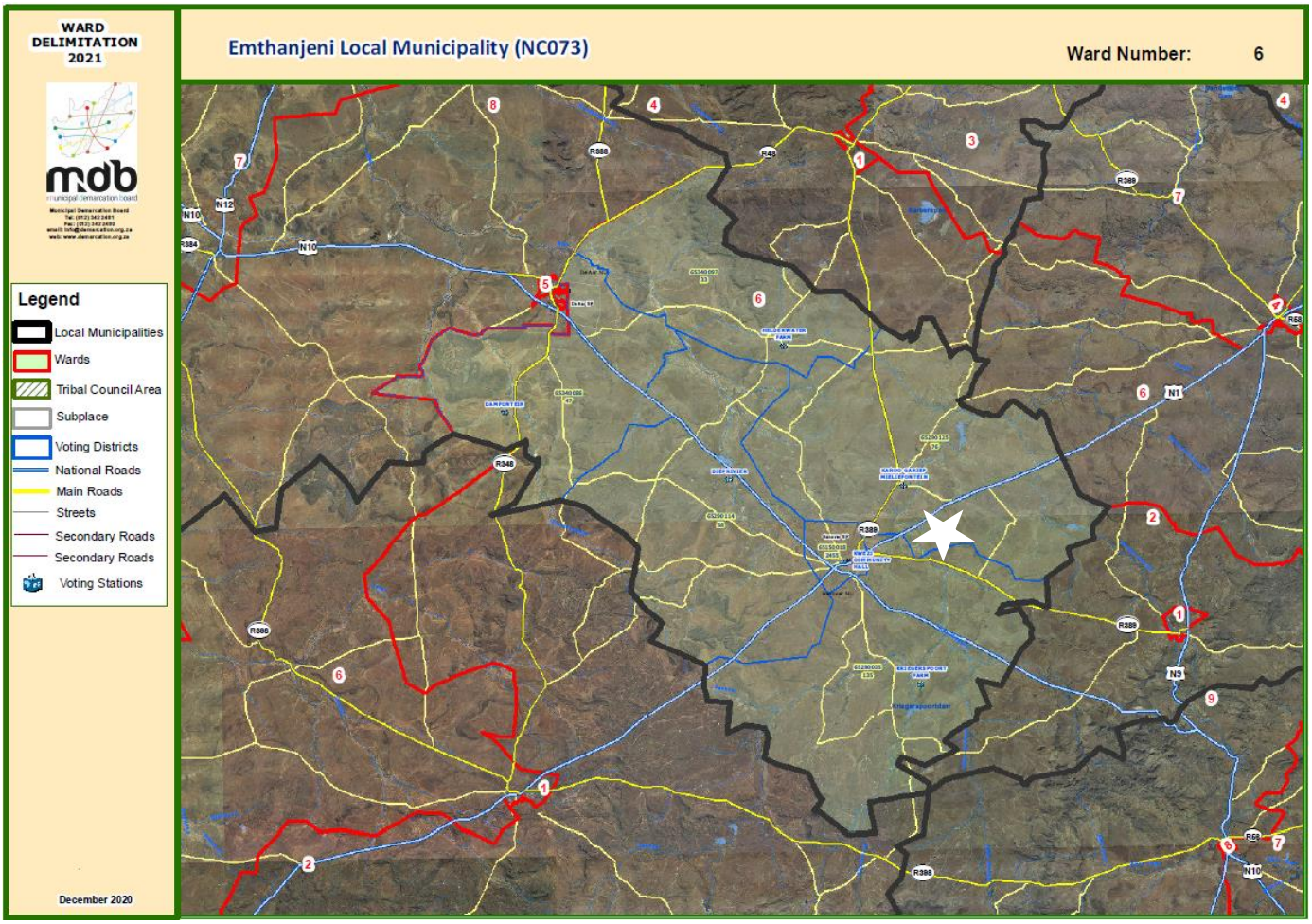


Figure 5.5: A snapshot of the Emthanjeni municipality ward 6 with proposed development site indicated by the white star

The figures for Ward 6 (i.e., the affected ward) in 2011 were 12.0% unemployed, 44.0% employed and 40.0% not economically active. With the development of the Fountain Solar PV1 Facility, secondary social benefits can be expected in terms of additional spend in the nearby towns due to the increased demand for goods and services.

5.6. Receptiveness and Desirability of the project site for the establishment of Fountain Solar PV1 Facility

The feasibility of the project site and development area for the development of the Fountain Solar PV1 Facility also provides an indication of the desirability of the development within the site-specific location. As detailed in Chapter 3 of this report, the site has specifically been identified by the project proponent as being highly desirable for the development of a PV facility due to its suitable topography (i.e. in terms of slope and local topography), site access (i.e. to facilitate the movement of machinery during the construction phase and operations staff in the long-term), land availability (i.e. the land is secured for the intended use), the extent of the site (i.e. the land parcel is able to accommodate the area required for the

facility), and enabling optimal placement of the infrastructure considering potential environmental sensitivities or technical constraints, access to the electricity grid.

Many of the site-specific advantages mentioned above apply to large areas of the Northern Cape. However, Eskom's current grid constraints have eliminated most of the major substations in the Northern Cape as suitable renewable energy development areas, in the short to medium term. However, the De Aar area may have suitable capacity in the short to medium term. The first phase of the new Main Transmission Substation (MTS) that is proposed close to the Fountain Solar PV1 project will unlock 500 MW of grid capacity. Phase two will unlock an additional 500 MW. In the medium to long term future, further MTS upgrades by Eskom has the potential to unluck another 1000 MW of grid capacity.

5.7. Conclusion

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

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 Fountain Solar PV1 facility is a listed activity requiring Environmental Authorisation (EA). The application for EA is required to be supported by a Scoping & Environmental Impact Assessment (EIA) process based on the contracted capacity of the facility being 100MW and Activity 1 of Listing Notice 2 (GNR 325) being triggered.

An EIA process refers to the process undertaken in accordance with the requirements of the relevant EIA Regulations (the 2014 EIA Regulations (GNR 326), 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**, and is illustrated in **Figure 6.1** Public Participation forms an important component of the process and is undertaken throughout both phases.

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

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 Fountain Solar PV1 facility is included in **Section 6.5.2** and copies of the supporting documents and inputs are included in **Appendix C**.

Requirement	Relevant Section
(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 Fountain Solar PV1 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 applicable to the project are detailed within **Section 6.6**.

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 Fountain Solar PV1 facility is a power generation project and relates to the IRP for Electricity 2010 – 2030, the National Department of Forestry, Fisheries, and the Environment (DFFE) has been determined as the Competent Authority (CA) in terms of GNR 779 of 01 July 2016. The Provincial Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (DAEARD & LR) is a Commenting Authority on the project.

The need to comply with the requirements of the EIA Regulations published under 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 Fountain Solar PV1 facility is being 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 details the listed activities in terms of the EIA Regulations, 2014 (as amended) that apply to the Fountain Solar PV1 facility, and for which an application for Environmental Authorisation has been submitted

to the DFFE. The table also includes a description of the specific project activities that relate to the applicable listed activities.

Table 6.1: Listed activities identified in terms of the Listing Notices (GNR 327, 325 and 324).

Notice Number	Activity Number	Description of listed activity
Listing Notice 1 (GNR 327) 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. ***Internal electrical infrastructure required to connect the PV facility to the grid connection infrastructure will consist of a 132kV IPP substation.***
Listing Notice 1 (GNR 327) 08 December 2014 (as amended)	12(ii)(a)(c)	The development of – (ii) Infrastructure or structures with a physical footprint of 100 square metres or more Where such development occurs- a) within a watercourse or c) within 32 meters of a watercourse, measured from the edge of a watercourse ***The proposed development will require the establishment of infrastructures within a physical footprint exceeding 100 square metres within a watercourse or within 32 metres of a watercourse identified within the project area.***
Listing Notice 1 (GNR 327) 08 December 2014 (as amended)	14	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. ***The development of the project will require the construction and operation of facilities and infrastructure for the storage and handling of dangerous goods (combustible and flammable liquids, such as oils, lubricants, solvents) associated with the on-site substation where such storage will occur inside containers with a combined capacity exceeding 80 cubic meters but not exceeding 500 cubic meters.***
Listing Notice 1 (GNR 327) 08 December 2014 (as amended)	19 (ii)	The infilling or depositing of any material of more than 10 cubic meters into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles, or rock of more than 10 cubic meters from a (i)watercourse. ***Some parts of the development area are located within watercourses and will require the removal of approximately 10 cubic metres of soil and rock from the watercourses during the construction phase.***
Listing Notice 1 (GNR 327) 08 December 2014 (as amended)	24 (ii)	The development of a road – (ii) with a reserve wider than 13.5m, or where no reserve exists where the road is wider than 8m. ***The construction of the solar PV facility will require the construction of new access roads up to 12m in width to provide access to the facility.***

Notice Number	Activity Number	Description of listed activity
Listing Notice 1 (GNR 327) 08 December 2014 (as amended)	28 (ii)	Residential, mixed, retail, commercial, industrial, or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare. ***The total area to be developed for the Fountain Solar PV1 Facility is greater than 1ha and occurs outside an urban area in an area currently zoned for agriculture. The total extent of the development area, within which the development footprint will be located is ~300ha.***
Listing Notice 2 (GNR 325) 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 20 megawatts or more, ***The project comprises a renewable energy generation facility, which will utilise solar power technology and will have a generating capacity of up to 100MW.***
Listing Notice 2 (GNR 325) 08 December 2014 (as amended)	15	The clearance of an area of 20ha or more of indigenous vegetation[8]. ***The facility is located on agricultural land where the predominant land use is livestock grazing and is therefore likely to comprise indigenous vegetation. The project would therefore result in the clearance of indigenous vegetation within an area in excess of 20ha for the development infrastructure.***
Listing Notice 3 (GNR 324) 08 December 2014 (as amended	4(g)(ii) (ee)	The development of a road wider than 4 meters with a reserve less than 13,5 meters. **g. Northern Cape** ii. Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. ***The* development of the PV facility requires the construction of main access roads of up to 12m wide and internal distribution roads up to 6m wide outside of an urban area, and within a Critical Biodiversity Area (CBA).**
Listing Notice 3 (GNR 324) 08 December 2014 (as amended	10(g)(ii)(iii)	The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic meters **g. Northern Cape**

[8] "Indigenous vegetation" as defined by the 2014 EIA Regulations (GNR 326) 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
		ii. Areas within a watercourse or wetland; or within 100 meters from the edge of a watercourse or wetland. iii. Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans ***Some parts of the development area are located within CBA1. The development of Fountain Solar PV1 Facility will require the storage and handling of a dangerous good with a capacity of 80 cubic meters within CBA areas.***
Listing Notice 3 (GNR 324) 08 December 2014 (as amended	12(g)(ii)	The clearance of an area of 300 square meters or more of indigenous vegetation **g. Northern cape** ii. Within critical biodiversity areas identified in bioregional plans. ***The development of the Fountain Solar PV1 Facility will require the clearance of more than 300 square meters of indigenous vegetation within areas classified as CBA.***
Listing Notice 3 (GNR 324) 08 December 2014 (as amended	14(ii)(a)(c)(g)(ii) ff)	The development of— (ii) infrastructure or structures with a physical footprint of 10 square meters or more. where such development occurs— (a) within a watercourse. (c) within 32 meters of a watercourse, measured from the edge of a watercourse; **g. Northern Cape** ii. Outside urban areas: (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans ***Some parts of the development area are located within CBA1. The development of Fountain Solar PV1 Facility will require the development of infrastructure within 32m of a watercourse, outside urban areas and within areas classified as CBA.***

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.

In terms of the NFEPA (2011) and the NBAs 2018 National Wetlands Map 5 several wetland areas were identified in the general project area, which included several rivers. The wetland units were largely indirectly associated with the project (outside of the 500 m regulated area) warranting no further ecological assessment of the wetland systems for this project, with emphasis rather afforded to the aquatic assessment of the rivers possibly at risk from the proposed project infrastructure.

Table 6.2 contains 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 (c)	Impeding or diverting the flow of water in a watercourse ***The development area considered for the establishment of the Fountain Solar PV1 Facility has no wetlands located within the extent of the project area, however there are areas classified as rivers throughout the project development area, that might be affected by the activities pertaining to the establishment of the solar facility. This will be confirmed during the EIA phase.***
NWA (No. 36 of 1998)	Section 21 (i)	Altering the bed, banks, course, or characteristics of a watercourse. ***The development area considered for the establishment of the Fountain Solar PV1 Facility has no wetlands located within the extent of the project area, however there are areas classified as rivers throughout the project development area, that might be affected by the activities pertaining to the establishment of the solar facility. This will be confirmed during the EIA phase.***

According to the ecology scoping study undertaken (refer ton Appendix D, the proposed Photovoltaic Solar Facility development will most likely have a Low post-mitigation impact (Low Risk) on freshwater resource features, in the event that the flow of water in the watercourses is affected and the bed, banks or course characteristics are altered then a water use authorisation would be required. This will need to be 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 requirements of Revision of General Authorisation. However, this can only be confirmed through a 21 (c) and (i) Risk Assessment (RA). The process of applying for a WUL or GA registration will only be completed once a positive EA has been received and the project selected as Preferred Bidder.

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 resource 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 Fountain Solar PV1 Facility

In terms of NEMA, the 2014 EIA Regulations (GNR 326), and Listing Notices (Listing Notice 1 (GNR 327) and Listing Notice 2 (GNR 325) the development of Fountain Solar PV1 facility requires EA from DFFE 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 326). 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 325).

The S&EIA process is to be undertaken in two phases as follows (refer to **Figure 6.2**):

» 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 process. The entire development area and development envelope are 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 326) 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 comment on the findings. Following the completion of this review period, a Final Scoping Report which incorporates all comments received during the 30-day public review and comment period, will be prepared, and submitted to DFFE for its consideration. Following its receipt of the Final Scoping Report DFFE 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 326).

» 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 (EMPrs). In accordance with Regulation 23(1)(a) of the 2014 EIA Regulations (GNR 326) the EIA Report and EMPrs 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 EMPrs. Following the conclusion of this review period a Final EIA Report and EMPrs which incorporates all comments received during the 30-day review and comments period, will be prepared and submitted to DFFE for its consideration. Following its receipt of the Final EIA Report and EMPrs, DFFE has 107 days within which to either grant or refuse the EA.

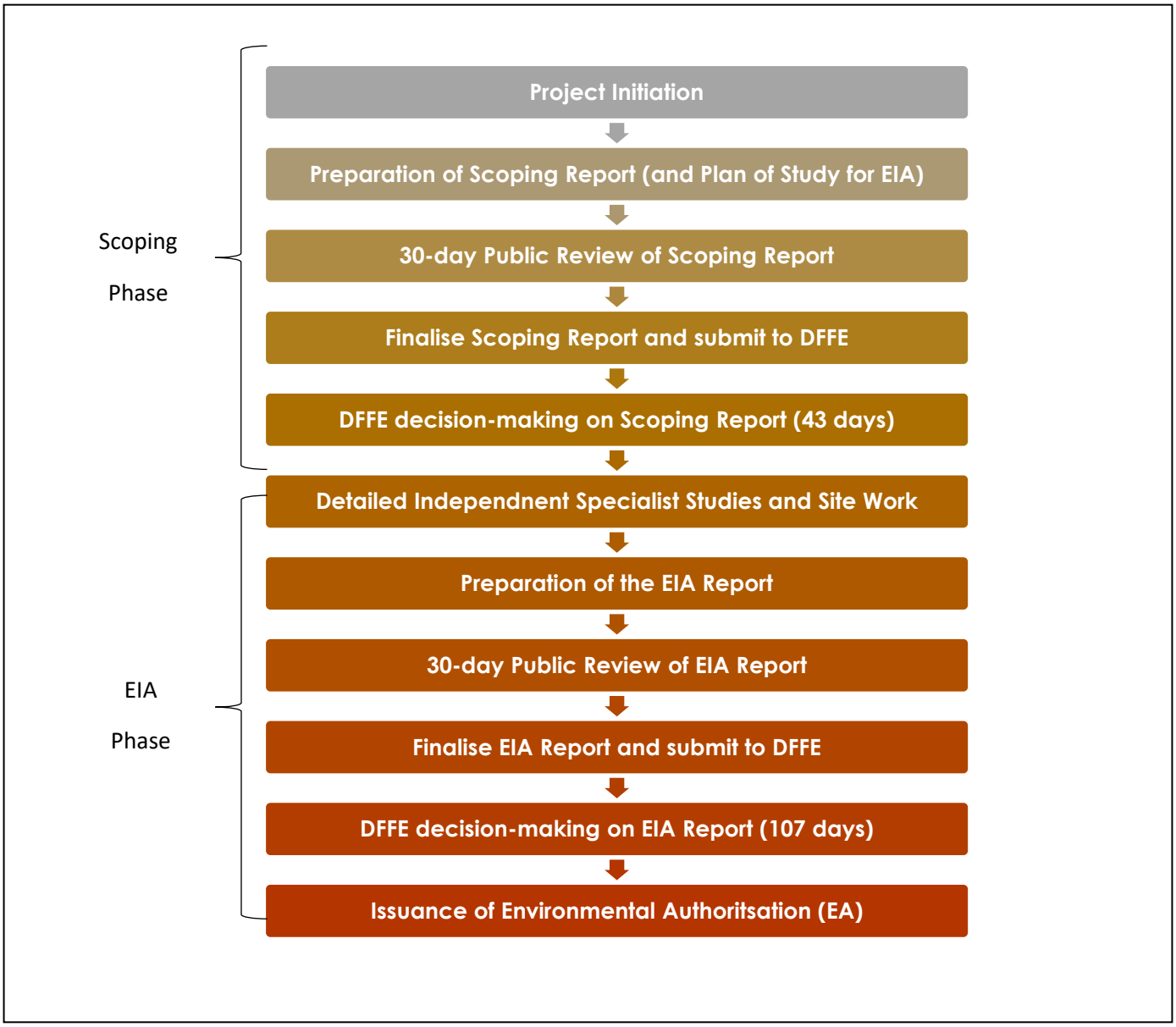


Figure 6.2: Regulated timeframe of an Environmental Impact Assessment (EIA) Process

6.4. Objectives of the Scoping Phase

This Scoping Report documents the evaluation of potential environmental impacts of Fountain Solar PV1 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 326), 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 project area.
- Identify potentially sensitive environmental features and areas within the broader project site and 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 326)) 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 Fountain Solar PV1 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 by the preferred development envelope.
» Preferred areas for the development in the form of a development envelope, which are areas associated with low to medium environmental sensitivity, have been identified within the development area through a desktop level impact assessment process and on-going consultative process. Areas of high sensitivity (i.e., the north, north-western and southern portions of the development area) have been avoided by the development envelope which will be assessed within the EIA Phase, within which the development footprint will be placed.
» 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 (DFFE) in terms of Regulations 5 and 16 of the 2014 EIA Regulations (GNR 326).
» Undertaking a public participation process (in line with the approved public participation plan submitted to DFFE) in accordance with Chapter 6 of GNR326, and the Department of Environmental Affairs (2017), Public Participation guidelines in terms of NEMA EIA Regulations, Department of Environmental Affairs, Pretoria, South Africa (hereinafter referred to as "the Guidelines") in order to identify issues and concerns associated with the proposed project.
» Undertaking of independent specialist studies in accordance with Appendix 6 of the EIA Regulations, 2014 (GNR326), as amended, and the requirements of the Specialist Protocols published in Regulation GNR 320, issued 20 March 2020 and GNR 1150 of 30 October 2020, where relevant, as well as other relevant guidelines.
» 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 326).

- 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 DFFE 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 DFFE 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 Northern Cape Province, the Northern Cape DAEARD & LR 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:

- Submission of a pre-application meeting request form, together with the public participation plan to the DFFE via email for approval on **25 February 2022**. Following submission of the public participation plan, the DFFE provided approval of the submitted PP Plan via email on **03 March 2022**, and no pre-application meeting was considered necessary (refer to **Appendix C9**).
- Submission of the Application for Environmental Authorisation to the DFFE via the use of the DFFE Novell File 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 DFFE (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**.

6.5.2 Public Participation Process

Public participation is an essential and regulatory requirement for an environmental authorisation process and is guided by Regulations 39 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 for Fountain Solar PV1 facility has been run in tandem with the public consultation for the Pixley Park Solar PV cluster consisting of Carolus Solar PV1, Riet Fountain Solar PV1 and Wagt Solar PV1 which are located adjacent to the Fountain Solar PV1 site. The benefit to the stakeholder is that all information relevant to all related applications has been made available for review together, and not only for comments to be raised across the three applications individually, but also provided a complete picture of the potential for impacts and/or benefits related to the suite of projects located in close proximity to one another.

The Public Participation Process undertaken for Fountain Solar PV1 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, Fisheries, and the Environment (DFFE) in terms of consultations with I&APs. To curb the spread of the COVID-19 virus has placed some limitations on the commencement and continuation of the public consultation as part of the EIA process. A Public Participation Plan has been designed by Savannah Environmental and approved by DFFE to cater for the undertaking of the public participation process which includes I&APs, the competent and commenting authorities, directly impacted landowners and their occupiers, adjacent landowners and their occupiers, relevant Organs of State departments, Municipalities, ward councillors and other key stakeholders The DFFE approved the Public Participation Plan via e-mail on **03 April 2022** (**Appendix B**).

The traditional means and opportunities available for the undertaking of public participation will still be covered and implemented as part of the public participation plan considering the current limitations. 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 current 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 which may not be open or have restricted access 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. Where parties do not have access to electronic systems to access the project information, opportunity for them to engage with the project team is facilitated through alternative means, such as consultation with the Ward Councillor, community representatives or one-on-one engagement, where the relevant Regulations to minimise, risks associated with COVID-19 can be adhered to.

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 in the following ways:

- During the **Scoping Phase**:
  - provide an opportunity to submit comments regarding the project.
  - assist in identifying reasonable and feasible alternatives, where required.
  - identify issues of concern to be assessed and addressed in the impact phase.
  - suggestions for enhanced benefits.
  - contribute relevant local information and knowledge to the environmental assessment.
  - allow registered I&APs to verify that their comments have been recorded, considered and addressed, where applicable, in the environmental investigations.
  - foster trust and co-operation in the EIA process.
  - generate a sense of joint responsibility and ownership of the environment.
  - comment on the findings of the Scoping Phase results; and

- attend relevant Focus Group Meeting and Public Participation Process Meeting to be conducted for the project.

» During the **EIA Phase**:
- contribute further relevant local information and knowledge to the environmental assessment.
- verify 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
- attend relevant Focus Group Meeting and Public Participation Process 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, 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 located 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 announcing the initiation of the EIA and public participation process and the availability of the Scoping Report.

- 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 Report (C&RR) which documents the comments received on the EIA process received during the initiation of the EIA and public participation 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 I&APs	•Register as an I&AP by responding to an advert, or sending a 'please call me' to the dedicated public participation mobile number which will be responded to. •State interest in the project. •Receive all project related information via email or other appropriate means as indicated by I&AP's preference.
ii. Advertisments and notifications	•Advertisements, site notices and notifications provide information and details on where to access project information. •Notifications regarding the EIA process and availability of project reports for public review to be sent via email, post or SMS notifications.
iii. Public Involvement and consultation	•Virtual presentations (English) available via the online platform. • Telephonic consultation with relevant authorities, key stakeholders, landowners and occupiers (where possible). • Availability of project information via the online platform or other appropriate means. • An opportunity for I&APs and stakeholders to request virtual meetings with the project team.
iv. Comment on the Scoping and EIA Reports	•Availability of the project reports via the online platform for 30-day comment period. •Submission of comments via e-mail, whatsapp, SMS or post to the PP team. •Comments recorded and responded to, as part of the process.
v. Identification and recording of comments	•Comments and Responses Report, including all comments received throughout the process to be included in the reporting.

i. Stakeholder identification and register of Interested and Affected Parties

Regulation 42 of the EIA Regulations, 2014, as amended, states that a proponent or applicant must ensure the opening and maintenance of a register of I&APs and submit such a register to the competent authority, which register must contain the names, contact details and addresses of –

(a) All persons who, as a consequence of the public participation process conducted in respect of that application, have submitted written comments or attended meetings with the proponent, applicant or EAP.

(b) All persons who have requested the proponent or applicant, in writing, for their names to be placed on the register; and

(c) All organs of state which have jurisdiction in respect of the activity to which the application relates.

The Fountain Solar PV1 facility previously been through a detailed EIA process (Savannah Environmental, 2012), and a comprehensive / collective database has been compiled and has been verified and updated for this application. The project's database has been further updated through a process of networking and referral, obtaining information from Savannah Environmental's existing stakeholder database of previous projects in the study area, liaison with potentially affected parties in the greater surrounding area and a registration process involving the completion of a registration and reply form which accompanied the Background Information Document distributed on Friday, 25 March 2022. 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), e-mail or fax, or registering their interest via the automated registration function on Savannah Environmental's website. An initial list of key stakeholders identified and registered to date is listed in **Table 6.3** below:

Table 6.3: Initial list of Stakeholders identified for the inclusion in the project database during the public participation process for Fountain Solar PV1 Facility

National Government Departments
Department of Forestry, Fisheries, and the Environment (DFFE)
Department of Mineral Resources and Energy (DMRE)
Department of Agriculture, Land Reform, and Rural Development (DALRRD)
Department of Water and Sanitation (DHSWS)
Government Bodies and State-Owned Companies
Air Traffic Navigation Services (ATNS)
Co-Operative Governance & Traditional Affairs
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)
South African Weather Services (SAWS)
Telkom SA SOC Limited
Transnet SA SOC Limited
Provincial Government Departments
Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (DAEARD&LR)
Northern Cape Department of Economic Development and Tourism
Northern Cape Department of Roads and Public Works
Ngwao Boswa Kapa Bokone (NBKB) – provincial Heritage Authority
Local Government Departments
Pixley Ka Seme District Municipality
Emthanjeni Local Municipality – including the Ward Councillor, ward committee members
Commenting Stakeholders
Agri SA and Agri Northern Cape
Birdlife South Africa
Endangered Wildlife Trust (EWT)
National Khoi Council

National SA San Council
Wildlife and Environment Society of South Africa (WESSA)
Landowners
Affected landowners, tenants, and occupiers
Neighbouring landowners, tenants, and occupiers

As per Regulation 42 of the EIA Regulations, 2014 (as amended), all relevant stakeholder and I&AP information has been recorded within a register of I&APs (refer to **Appendix C1** for a listing of the recorded parties). In addition to the above-mentioned EIA Regulations, point 4.1 of the DFFE Public Participation Guidelines has also been followed. The register of I&APs contains the names[9] of:

- all persons who requested to be registered on the database through the use of the online automated registration on the website or in writing, including of the disclosure of 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 is a working document of I&APs and 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

Regulation 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.
Regulation 40. (2)(b) Giving written notice, in any of the manners provided for in section 47Dof 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.
Regulation 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.

[9] 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).

Regulation 40.(2)(d) Placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or district municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official Gazette referred to in paragraph (c)(ii); and
Regulation 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, Key Stakeholders, 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, Key Stakeholders, potentially affected and neighbouring landowners, as well as registered IAPs of Fountain Solar PV1 facility, and providing background information of the project and inviting I&APs to register on the project's database were placed at various public places in De Aar on **Friday, 11 March 2022** and distributed via e-mail on **Friday, 25 March 2022**. Proof of distribution of the BID is contained in **Appendix C2** of the Scoping Report. The BID is also available electronically on the Savannah Environmental website (https://savannahsa.com/public-documents/energy-generation/pixley-park-solar-pv/).
- Placement of site notices announcing the EIA and public participation process at conspicuous places along the boundary of the development area (i.e., the boundaries of the affected property), in accordance with the requirements of the EIA Regulations, 2014, as amended, on **Thursday, 10 March 2022**. Photographs and the GPS co-ordinates of the site notices are contained in **Appendix C3** of the Scoping Report.
- Placement of an advertisement in the Die Echo/Midland Nuus (in English) on **Friday, 25 March 2022** included the following:
  - announced the project and the associated EIA and public participation process.
  - provided details of how I&APs can become involved in the EIA process, including details of the public participation practitioner.
  - provided all relevant details to access the Savannah Environmental online stakeholder engagement platform; and
  - notification of the availability of the Scoping Report for review and comment.
- A copy of the newspaper advert, as sent to Die Echo/Midland Nuus newspaper, and the newspaper advert tear sheet is included in **Appendix C3** of the Scoping Report.
- An updated newspaper advert, as sent to the newspaper announcing the updated Scoping Report review and comment period (i.e., **Monday, 11 April 2022** until **Monday, 16 May 2022**) and a copy of the newspaper advert, as sent to the newspaper, and the newspaper advert tear sheet is included in **Appendix C3** of the Scoping Report.
- The Scoping Report has been made available for review to Organs of State, Key Stakeholders, and I&APs for a 30-day review and comment period from **Monday, 11 April 2022** to **Monday, 16 May 2022**. The Scoping Report and appendices are available on the Savannah Environmental website. The evidence of distribution of the Scoping Report notification sends on **Friday, 08 April 2022** is included in **Appendices C5** and **Appendix C6**of the Scoping Repot.

- Focus group meetings (FGMs)will be held with the commenting authority officials from the Northern Cape Department of Agriculture, environmental Affairs, Rural Development and Land Reform **Monday, 11 April 2022** at **10h00** and with the District and Local Municipal officials on **Monday, 11 April 2022** at **14h00** via MS Teams.
- A FGM is scheduled to be held with affected and adjacent landowners and their occupiers, if required, on **Monday, 11 April 2022** at **16h00 – 17h30** via MS Teams.
- A Key Stakeholder Workshop will be held on **Thursday, 20 April 2022** at **10h00** via MS Teams.
- A public participation process meeting will be held on **Tuesday, 12 April 2022** at **17h00** via MS Teams and the information was included in the Scoping Report notification letter, inviting stakeholders and I&APs to register their attendance. Should it be determined / requested that a face-to-face public meeting is required during the scoping phase, the applicable arrangements will be made, and the information will be included in the final Scoping Report.

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: Public involvement for Fountain Solar PV1 Facility

Activity	Date
Announcement of the EIA process in one local newspaper: De Aar Echo Newspaper (English advertisement)	25 March 2022
Distribution of the BID, process notification letters and stakeholder comment and reply form announcing the EIA and public participation 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.	25 March 2022 18 March 2022
Placement of site notices at the project site, including placement of further notices in the town of De Aar.	10 March 2022
Process notices (A4 copy of the site notice) was placed at various public places within the town of De Aar for notifying the broader public of the proposed project and the EIA and public participation process.	11 March 2022
Announcement of the availability of the Scoping Report for a 30-day review and comment period, including details on how to access the Scoping Report via the online stakeholder engagement platform, in one local newspaper: Die Echo/Midland Nuus (English advertisement) An updated newspaper advert announcing the updated Scoping Report 30-day review and comment period in Die Echo/Midland Nuus.	25 March 2022 08 April 2022
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.	08 April 2021
30-day review and comment period of the Scoping Report.	11 April 2022 - 16 May 2022

Virtual meetings through the use of virtual platforms as determined through discussions with the relevant stakeholder group: » Landowners » Authorities and key stakeholders (including Organs of State, local municipality and official representatives of community-based organisations). » Where and 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: • 11 & 12 April 2022; and • 21 April 2022
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

Regulation 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.
Regulation 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 sub regulation (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 in accordance with the approved public participation plan. Hard copies can however be made available on request where sanitary conditions can be maintained. Copies of the Scoping Report will also be made available on CD and courier, should Savannah Environmental receive such a request.

The Scoping Report has also been made available on the Savannah Environmental website (i.e., online stakeholder engagement platform) (https://savannahsa.com/public-documents/energy-generation/pixley-park-solar-pv/). The notification was distributed prior to commencement of the 30-day review and comment period, on **Monday, 11 April 2022**. 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.

All comments raised as part of the discussions and written comments submitted during the 30-day review and comment period will recorded and included in **Appendix C8** of the final 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 Report (C&RR) which will be included as **Appendix C9** 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&RR will include detailed responses from members of the EIA project team, the environmental specialist and/or the project proponent to the issues and comments raised during the public participation process.

Notes of all the telephonic discussions will be recorded in the C&RR and the e-mail confirmation thereof have been included in **Appendix C6.** The meeting notes of the virtual meetings conducted during the 30-day review and comment period of the Scoping Report will be included in **Appendix C7** of the final Scoping Report.

6.6 Outcomes of the DFFE Web-Based Screening Tool

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 M** of the Scoping Report) for the Fountain Solar PV1 Facility is applicable as it triggers Regulation 19 of the EIA Regulations, 2014, as amended. **Table 6.5** 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 6.5: Sensitivity ratings from the DFFE's web-based online Screening Tool associated with the development of the Fountain Solar PV1 Facility

Specialist Assessment	Sensitivity Rating as per the Screening Tool (relating to the need for the study)	Project Team Response
Agricultural Impact Assessment	Medium	The scoping study is included in this Scoping Report as Appendix E. Based on the outcome of the desktop analysis of available data, it has been concluded that the impacts to soils and agriculture will be further assessed during the EIA phase.
Landscape/Visual Impact Assessment	Very high	A Visual scoping study is included as Appendix H in this Scoping Report. The fact that some components of the proposed PV facility and Associated Infrastructure may

Specialist Assessment	Sensitivity Rating as per the Screening Tool (relating to the need for the study)	Project Team Response
		be visible does not necessarily imply a high visual impact. Sensitive visual receptors within (but not restricted to) a 3km buffer zone from the facility need to be identified and the severity of the visual impact assessed within the EIA phase.
Archaeological and Cultural Heritage Impact Assessment	Low	A Heritage Screening (which covers both archaeological and cultural aspects of the project site) is included in this Scoping Report as Appendix G. Heritage impacts will be further assessed during the EIA phase.
Palaeontology Impact Assessment	Very High	A Heritage Screening (which covers palaeontological aspects of the project site) is included in this Scoping Report as Appendix G. Paleontological impacts will be further assessed during the EIA phase.
Terrestrial Biodiversity Impact Assessment	Very high	An Ecological scoping study (including flora and fauna) has been undertaken for the and is included as Appendix D of the Scoping Report.
Aquatic Biodiversity Impact Assessment	Very high	An Aquatic scoping study has been undertaken for the project and is included as Appendix D of the Scoping Report.
Avian Assessment	Low	There was no need to undertake an avifauna assessment in the area.
Defence Assessment	Low	A defence of military base is not located within close proximity to the development.
RFI Assessment	Very High	The project site under consideration for the development of the Fountain Solar PV1 Facility PV is located within an area that is classified as Less than 18 km form a Weather Radar installation, therefore the South African Radio Astronomy Observatory (SARAO) will be consulted during the 30-day review and comment period of the Scoping Report to provide written comment on the proposed development.
Plant Species Assessment	Low	An Ecological scoping study (including flora and fauna) has been undertaken for the project and is included as Appendix D of the Scoping Report. Based on the outcomes of the desktop study and available data, it has been indicated that the development area falls within the areas identified as Low to Medium-Low Sensitivity. The impacts will be further assessed during the EIA phase.
Animal Species Assessment	High	
Traffic Scoping Assessment	The screening report does not indicate a rating for this theme.	A Traffic Scoping Assessment has been undertaken for the project and is included as Appendix J of the Scoping Report.
Social Assessment	The screening report does not indicate a rating for this theme.	A Social Scoping Assessment has been undertaken and is included in the Scoping Report as Appendix I.

6.6.1. 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 Fountain Solar PV1 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.

6.6.2. 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 DFFE for decision-making. All written comments received will be addressed within the C&R Report (**Appendix C8**).

6.7 Assumptions and Limitations of the EIA Process

The following assumptions and limitations are applicable to the EIA process of Fountain Solar PV1 facility :

- 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 facility identified by the developer represents a technically suitable site for the establishment of Fountain Solar PV1 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 and associated infrastructure (i.e., internal access roads, and the BESS).
- The Scoping Phase evaluation of impacts has been largely based on desktop studies as well as the findings of studies which have been completed previously for this specific site. 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 Fountain Solar PV1 Facility.

6.8 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.
» Department of Environmental Affairs (2017), Integrated Environmental Management Guideline: Guideline on Need and Desirability.
» Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation.
» Guidelines for assessing and monitoring the impact of solar power generating facilities on birds in southern Africa (January 2017); and
» International guidelines – the Equator Principles, the IFC Performance Standards, the Sustainable Development Goals, World Bank Environmental and Social Framework, and the and World Bank Group Environmental, Health, and Safety Guidelines (EHS Guidelines).

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 as identified at this stage in the process is provided in **Table 6.5**.

Table 6.5: Relevant legislative permitting requirements applicable to Fountain Solar PV1 Facility

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Legislation			
Constitution of the Republic of South Africa (No. 108 of 1996)	In terms of Section 24, the State has an obligation to give effect to the environmental right. The environmental right states that: "*Everyone has the right –* » *To an environment that is not harmful to their health or well-being, and* » *To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:* * *Prevent pollution and ecological degradation,* * *Promote conservation, and* * *Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development*."	Applicable to all authorities	There are no permitting requirements associated with this Act. The application of the Environmental Right however implies that environmental impacts associated with proposed developments are considered separately and cumulatively. It is also important to note that the "right to an environment clause" includes the notion that justifiable economic and social development should be promoted, through the use of natural resources and ecologically sustainable development.
National Environmental Management Act (No 107 of 1998) (NEMA)	The 2014 EIA Regulations have been promulgated in terms of Chapter 5 of NEMA. Listed activities which may not commence without EA are identified within the Listing Notices (GNR 327, GNR 325 and GNR 324) which form part of these Regulations (GNR 326). In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these listed activities must be assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation. Considering the capacity of the proposed Fountain Solar PV1 facility project (i.e., contracted capacity of 100MW) and the triggering of Activity 1 of Listing Notice 2 (GNR 325) a full	DFFE – Competent Authority Northern Cape DAEARD&LR – Commenting Authority	The listed activities triggered by the proposed project have been identified and are being assessed as part of the EIA process currently underway for the project. The EIA process will culminate in the submission of a Final EIA Report to DFFE for review and decision-making.

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)	In terms of the "Duty of Care and Remediation of Environmental Damage" provision in Section 28(1) of NEMA every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment. In terms of NEMA, it is the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts.	DFFE Northern Cape DAEARD&LR	While no permitting or licensing requirements arise directly by virtue of the proposed project, this section finds application through the consideration of potential cumulative, direct, and indirect impacts. It will continue to apply throughout the life cycle of the project.
Environment Conservation Act (No. 73 of 1989) (ECA)	The Noise Control Regulations in terms of Section 25 of the ECA contain regulations applicable for the control of noise in the Provinces of Limpopo, Northwest, Mpumalanga, Northern Cape, Eastern Cape, and KwaZulu-Natal Provinces. The Noise Control Regulations cover the powers of a local authority, general prohibitions, prohibitions of disturbing noise, prohibitions of noise nuisance, use of measuring instruments, exemptions, attachments, and penalties. In terms of the Noise Control Regulations, no person shall make, produce, or cause a disturbing noise, or allow it to be made, produced, or caused by any person, machine, device or apparatus or any combination thereof (Regulation 04).	DFFE Northern Cape DAEARD&LR Ubuntu 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 Human Settlement, Water and Sanitation	Areas classified as rivers are extensive throughout the project area for Fountain Solar PV1 Facility as identified in the Aquatic

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	a GA, or if a responsible authority waives the need for a licence. Water use is defined broadly, and includes consumptive and non-consumptive water uses, taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities (activities which impact detrimentally on a water resource), altering a watercourse, removing water found underground for certain purposes, and recreation. Consumptive water uses may include taking water from a water resource (Section 21(a)) and storing water (Section 21(b)). Non-consumptive water uses may include impeding or diverting of flow in a water course (Section 21(c)), and altering of bed, banks, or characteristics of a watercourse (Section 21(i)).		Scoping Assessment (**Appendix G**). As a result, a water use authorisation for the project may be required from the DWS. The process to be undertaken will only be confirmed and completed once a positive EA has been received and the project selected as Preferred Bidder by the DMRE or private off-taker. This is in line with the requirements from the DWS.
Minerals and Petroleum Resources Development Act (No. 28 of 2002) (MPRDA)	In accordance with the provisions of the MPRDA a mining permit is required in accordance with Section 27(6) of the Act where a mineral in question is to be mined, including the mining of materials from a borrow pit.	Department of Mineral Resources and Energy (DMRE)	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.
	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.		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.

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

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	it with details regarding the location, nature, and extent of the proposed development. Section 44 of the NHRA requires the compilation of a Conservation Management Plan as well as a permit from SAHRA for the presentation of archaeological sites as part of tourism attraction.		
National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA)	Section 53 of NEM:BA provides for the MEC / Minister to identify any process or activity in such a listed ecosystem as a threatening process. Three government notices have been published in terms of Section 56(1) of NEM:BA as follows: » Commencement of TOPS Regulations, 2007 (GNR 150). » Lists of critically endangered, vulnerable, and protected species (GNR 151). » TOPS Regulations (GNR 152). It provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), and vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (NEM:BA: National list of ecosystems that are threatened and in need of protection, (Government Gazette 37596, GNR 324), 29 April 2014).	DFFE Northern Cape DAEARD&LR	Under NEM:BA, a permit would be required for any activity that is of a nature that may negatively impact on the survival of a listed protected species. 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.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA)	Chapter 5 of NEM:BA pertains to alien and invasive species, and states that a person may not carry out a restricted activity involving a specimen of an alien species without a permit issued in terms of Chapter 7 of NEM:BA, and that a permit may only be issued after a prescribed assessment of risks and potential impacts on biodiversity is carried out. Applicable, and exempted alien and invasive species are contained within the Alien and Invasive Species List (GNR 864).	DFFE Northern Cape DAEAR&LR	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.
Conservation of Agricultural Resources Act (No. 43 of 1983) (CARA)	Section 05 of CARA provides for the prohibition of the spreading of weeds. Regulation 15 of 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. 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.	Department of Agriculture, Land Reform and Rural Development (DALRD)	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. 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: » 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.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
			» Any other method of treatment recognised by the executive officer that has as its object the control of plants concerned, subject to the provisions of sub-regulation 4. » A combination of one or more of the methods prescribed, save that biological control reserves and areas where biological control agents are effective shall not be disturbed by other control methods to the extent that the agents are destroyed or become ineffective.
National Forests Act (No. 84 of 1998) (NFA)	According to this Act, the Minister may declare a tree, group of trees, woodland, or a species of trees as protected. Notice of the List of Protected Tree Species under the National Forests Act (No. 84 of 1998) was published in GNR 734. The prohibitions provide that "no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister".	Department of Agriculture, Land Reform and Rural Development (DALRD)	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. 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.
National Veld and Forest Fire Act (No. 101 of 1998) (NVFFA)	Chapter 4 of the NVFFA places a duty on owners to prepare and maintain firebreaks, the procedure in this regard, and the role of adjoining owners and the fire protection association. Provision is also made for the making of firebreaks on the international boundary of the Republic of South Africa. The applicant must ensure that firebreaks are wide and long enough to have a reasonable chance of preventing a veldfire from spreading to or from neighbouring land, it does	DFFE	While no permitting or licensing requirements arise from this legislation, this Act will be applicable during the construction and operation of Fountain Solar PV1 Facility, in terms of the preparation and maintenance of firebreaks, and the need to provide appropriate equipment and trained personnel for firefighting purposes.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	not cause soil erosion, and it is reasonably free of inflammable material capable of carrying a veldfire across it. Chapter 5 of the Act places a duty on all owners to acquire equipment and have available personnel to fight fires. Every owner on whose land a veldfire may start or burn or from whose land it may spread must have such equipment, protective clothing and trained personnel for extinguishing fires, and ensure that in his or her absence responsible persons are present on or near his or her land who, in the event of fire, will extinguish the fire or assist in doing so, and take all reasonable steps to alert the owners of adjoining land and the relevant fire protection association, if any.		
Hazardous Substances Act (No. 15 of 1973) (HAS)	This Act regulates the control of substances that may cause injury, or ill health, or death due to their toxic, corrosive, irritant, strongly sensitising or inflammable nature or the generation of pressure thereby in certain instances and for the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger, to provide for the prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products. » Group I and II: Any substance or mixture of a substance that might by reason of its toxic, corrosive etc., nature or because it generates pressure through decomposition, heat, or other means, cause extreme risk of injury etc., can be declared as Group I or Group II substance » Group IV: any electronic product, and » Group V: any radioactive material.	Department of Health (DoH)	It is necessary to identify and list all Group I, II, III, and IV hazardous substances that may be on site and in what operational context they are used, stored, or handled. If applicable, a license would be required to be obtained from the DoH.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.		
National Environmental Management: Waste Act (No. 59 of 2008) (NEM: WA)	The Minister may by notice in the Gazette publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment. The Minister may amend the list by – » Adding other waste management activities to the list. » Removing waste management activities from the list. » Making other changes to the particulars on the list. In terms of the Regulations published in terms of NEM: WA (GNR 912), a BA or EIA is required to be undertaken for identified listed activities. Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that: » The containers in which any waste is stored, are intact and not corroded or in » Any other way rendered unlit for the safe storage of waste. » 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.	DFFE – Hazardous Waste Northern Cape DAEARD&LR – General Waste	No waste listed activities are triggered by Fountain Solar PV1 Facility. Therefore, no Waste Management License is required to be obtained. General and hazardous waste handling, storage and disposal will be required during construction and operation. The National Norms and Standards for the Storage of Waste (GNR 926) published under Section 7(1)(c) of NEM: WA will need to be considered in this regard.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Road Traffic Act (No. 93 of 1996) (NRTA)	The technical recommendations for highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads" outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed. Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts. The general conditions, limitations, and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution, and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the National Road Traffic Act and the relevant Regulations.	South African National Roads Agency (SANRAL) – national roads Northern Cape Department of Transport, Safety and Liaison	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 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.
Provincial Policies / Legislation			
Northern Cape Nature Conservation Act (Act No. 9 of 2009)	This Act provides for the sustainable utilisation of wild animals, aquatic biota, and plants; provides for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora; provides for offences and penalties for contravention of the Act; provides for the appointment of nature conservators to implement the provisions of the Act; and provides for the issuing of permits and other authorisations. Amongst other regulations, the following may apply to the current project:	Northern Cape DAEARD&LR	A collection/destruction permit must be obtained from Northern Cape DAEARD&LR for the removal of any protected plant or animal species found on site. Should these species be confirmed within the development footprint during any phase of the project, permits will be required. An Ecological Impact Assessment will be undertaken as part of the EIA Phase to identify

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	» Boundary fences may not be altered in such a way as to prevent wild animals from freely moving onto or off of a property. » Aquatic habitats may not be destroyed or damaged; » The owner of land upon which an invasive species is found (plant or animal) must take the necessary steps to eradicate or destroy such species; The Act provides lists of protected species for the Province.		the presence of any listed species present on site which will require a permit.

6.8.1. 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 is does not meet any of the above criteria.

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

Bird distribution patterns fluctuate widely in response to environmental conditions (e.g. local rainfall patterns, nomadism, migration patterns, seasonality), meaning that a composition noted at a particular moment in time will differ during another time period at the same locality. For this reason, the PV transects are counted 4 times in Spring and then again 4 times in Autumn. The spring survey has already been conducted and the findings has been used to inform the avifauna scoping report completed for the scoping phase. The result from the Autumn season bird monitoring will be used to inform both the development footprint as well as Avifauna Impact Assessment report to be completed for the EIA phase.

6.8.2. 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 Project Developer's Guide to Utility-Scale Solar Photovoltaic Power Plants

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

6.8.3. 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. consultating 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 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, the development of the Fountain Solar PV1 Facility have been described. This information has been sourced from both existing information available for the area as well as collected field data by specialist consultants and aims to provide the context within which this 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.	The environmental attributes associated with the development of Fountain Solar PV1 Facility is included within this chapter. The environmental attributes that are assessed within this chapter includes the following:
	» The regional setting of the broader study area indicates the geographical aspects associated with Fountain Solar PV1 Facility. This is included in **Section 7.2**.
	» The climatic conditions for the De Aar 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, cultural landscape, 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**
	» The visual quality, land-use and settlement patterns of the affected environment has been included in **Section 7.7**
	» The current traffic conditions for the area surrounding the project have been included in **Section 7.8**

A more detailed description of each aspect of the affected environment is included within the specialist Scoping Reports contained within **Appendices D - J**

7.2. Regional Setting

The Fountain Solar PV1 Facility development area is located approximately 10km east of De Aar, within the Emthanjeni Local Municipality and the Pixley Ka Seme District Municipality in the Northern Cape Province.

The Northern Cape Province is in the north-western extent of South Africa and constitutes South Africa's largest province, occupying an area of 372 889km² in extent, equivalent to nearly a third (30.5%) of the country's total land mass. It is also South Africa's most sparsely populated province with a population of 1 193 780, and a population density of 3.1/km². The capital city is Kimberley, and other important towns include Upington, Springbok, Kuruman, De Aar and Sutherland. It is bordered by the Western Cape, and Eastern Cape provinces to the south and south-east, Free State, and Northwest provinces to the east, Botswana, and Namibia, to the north, and the Atlantic Ocean to the west. The Northern Cape is the only South African province which borders Namibia and plays an important role in terms of providing linkages between Namibia and the rest of South Africa. The Orange River, which is South Africa's largest river, is a significant feature and is also the main source of water in the province, while also constituting the international border between South Africa and Namibia.

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

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

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

The capital city of the Northern Cape Province is Kimberley. Other important towns include Upington, Springbok, Kuruman and De Aar. The province is rich in minerals and has fertile agricultural land in the Orange River Valley. The interior Karoo relies on sheep farming, while the karakul-pelt industry is one of the most important in the Gordonia District of Upington. The Northern Cape Province comprises six (5) district municipalities, namely, Frances Baard, John Taolo Gaetsewe, Namakwa, ZF Mgcawu and Pixley ka Seme Alfred Nzo (refer to **Figure 7.1**), which contain twenty-six local municipalities collectively.

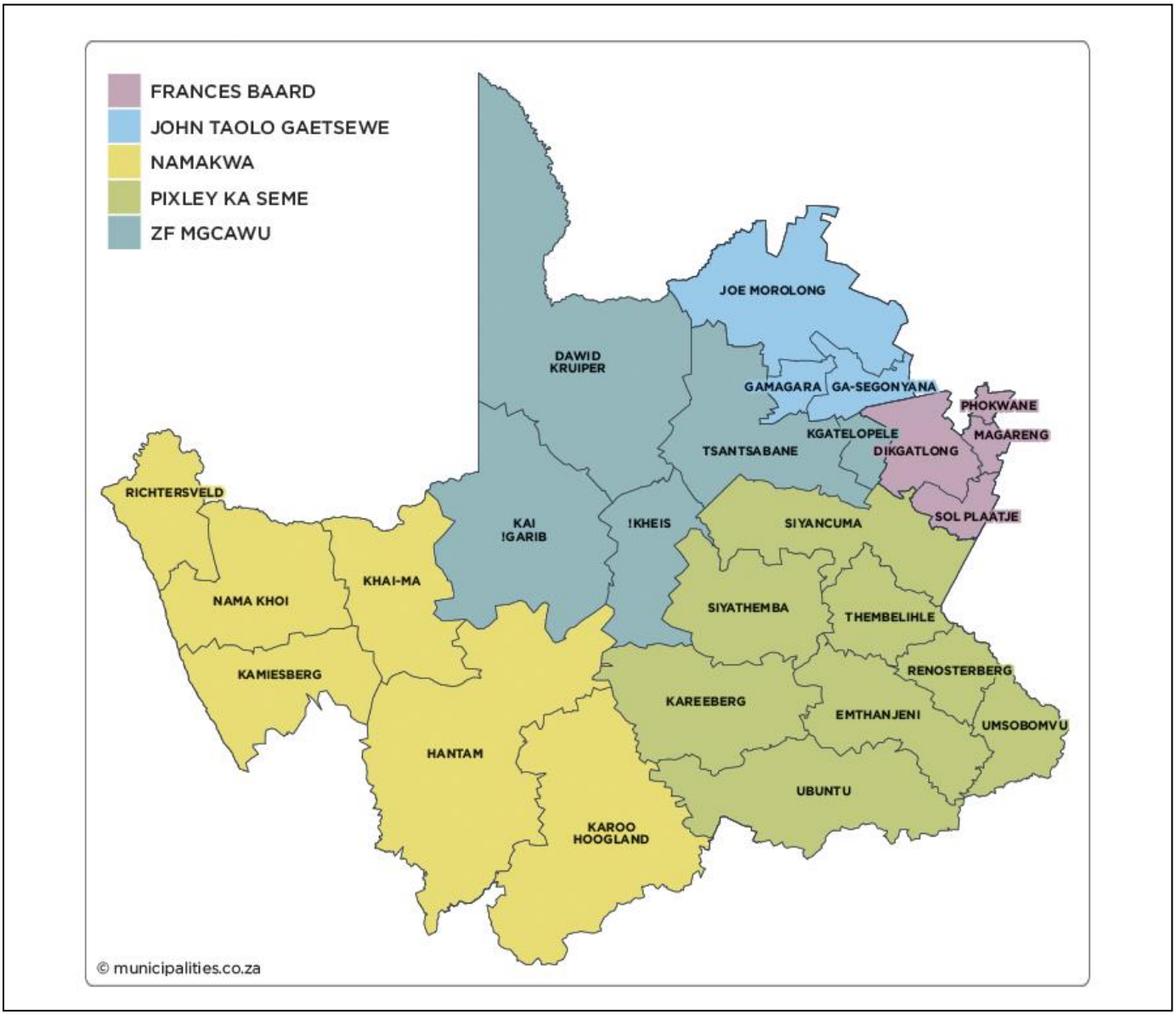


Figure 7.1: District municipalities of the Northern Cape (Source: Municipalities of South Africa)

The Pixley Ka Seme District Municipality (DM) is situated in the south-eastern extent of the Northern Cape Province and is a Category C municipality. It shares its borders with three other provinces, namely the Free State to the east, the Eastern Cape to the south-east, and the Western Cape to the south-west. It is the second-largest district of the five in the province but makes up almost a third of its geographical area. The district is made up of eight local municipalities: Ubuntu, Umsobomvu, Emthanjeni, Kareeberg, Renosterberg, Thembelihle, Siyathemba and Siyancuma (refer to **Figure 7.2**). Its main town is De Aar. According to StatsSA 2011 and the Community Survey 2016, the Pixley ka Seme District Municipality's population sits at 195 595. The main economic sectors in the Pixley ka Seme District Municipality are community services (26.6%), agriculture (16.6%), transport (15.1%), trade (12.9%), finance (12.8%), electricity (7.0%), construction (3.3%), manufacturing (3.2%), and mining (2.6%).

Figure 7.2: Local Municipalities of the Pixley Ka Seme DM (Source: Municipalities of South Africa)

The broader project site for the establishment of the Fountain Solar PV1 Facility and associated infrastructure is located within the Emthanjeni Local Municipality. The Emthanjeni Local Municipality is a Category B municipality within the Pixley Ka Seme District in the Northern Cape Province. It is bordered by all the other local municipalities as it is central within the district, the Western Cape Provinces in the south, the Eastern Cape in the east. Its location is approximately 300 km south-west of Kimberley, 440 km south-east of Upington, 300 km north-east of Beaufort-West and 300 km south-west of Bloemfontein. The land area comprises 11% of the district land area and 3% of the province. It represents approximately 23% of the district population.

The Emthanjeni Local Municipality covers an area of ~ 13 486km², making it one of the averaged eight local municipalities that make up the district. Cities and/or towns within the municipality include De Aar, Hanover, and Britstown. The agricultural sector is the main economic sector in the Local Municipality. According to census 2011, the population grew from 42 356 in 2011 to 44 100 in 2016, indicating an annual population growth rate of 1.6%.

Areas surrounding the project site are generally sparsely populated, with the highest concentration of people living in the town of De Aar. The project site and the areas surrounding the site consist of a landscape that can be described as remote due to its considerable distance from any major metropolitan centres or populated areas. The scarcity of water and other natural resources has influenced settlement within this region, keeping numbers low, and distribution limited to the availability of water. Settlements, where they occur, are usually rural homesteads or farm dwellings.

The project site is situated directly adjacent to the N10 national road. The R389 are located directly through the proposed development area, providing direct access to the project site. The gravel main access road (R389) provides direct access to the project site and the development area and will used to access the project site and development area during the project lifecycle.

7.3. Climatic Conditions

The project area is considered to have a semi-arid (local steppe) climate that receives limited rainfall. This region's rainfall peaks during autumn months, especially March. The Mean Annual Precipitation (MAP) ranges from 190 to 400 mm with the mean minimum and maximum monthly temperatures for Britstown being -3.6 ℃ and 37.9 ℃ for July and January respectively. These arid climate systems receive majority of their rainfall during short rainfall events and likely present surface flow for limited time periods while some rainfall events can be considered as immense with resultant flooding.

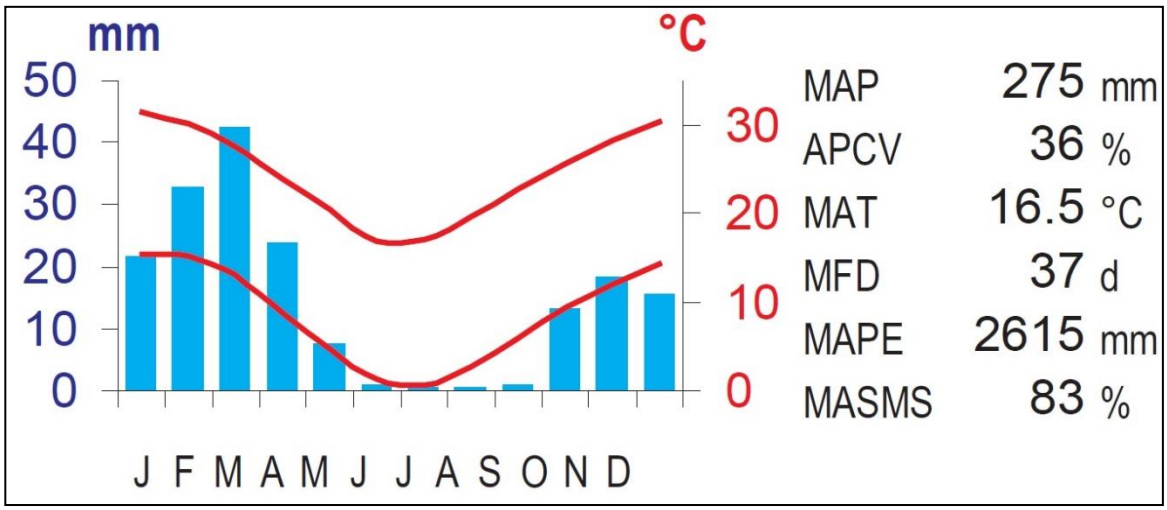


Figure 7.3: Climate graph for De Aar area, Northern Cape Province within which the proposed project site is located

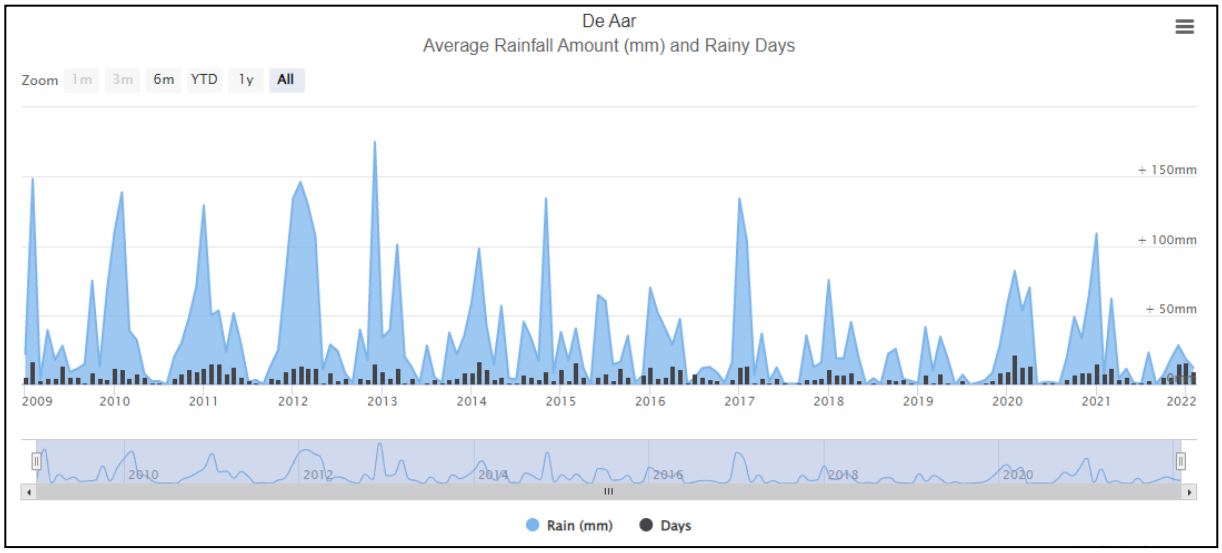


Figure 7.3.b: Rainfall graph for De Aar area, Northern Cape Province within which the proposed project site is located

7.4. Biophysical Characteristics of the Study Area and Development Area

The following section provides an overview and description of the biophysical characteristics of the study area and has been informed by specialist studies (**Appendix D-J**) undertaken for this Scoping Report.

7.4.1. *Topographical profile*

The slope percentage of the project area has been calculated and is illustrated bellow. Most of the project area is characterised by a slope percentage between 0 and 20%, with some smaller patches within the project area characterised by a slope percentage in excess of 66%. This illustration indicates a non-uniform topography with alternating hills and steep cliffs surrounding flatter areas at high elevation. The DEM of the project area (**Error! Reference source not found.**) indicates an elevation between 1 245 to 1 462 Metres Above Sea Level (MASL).

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. Thus, trees are typically absent, except in a few localized habitats. Geophytes (bulbs) are often abundant. Frosts, fire and grazing maintain the grass dominance and prevent the establishment of trees (refer to **Figure 7.4**).

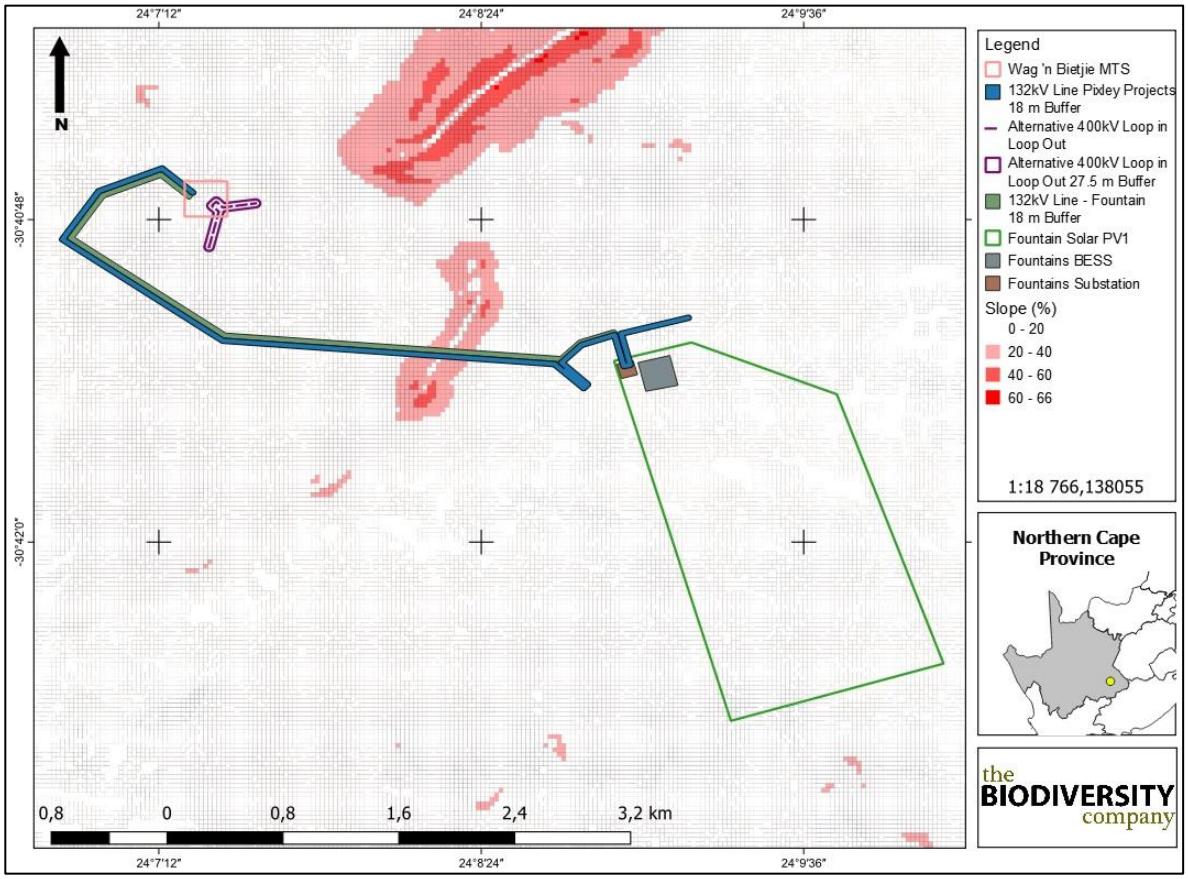


Figure 7.4: Slope percentage calculated for the development area within which the Fountain Solar PV1 Facility is proposed

7.4.2. Geology, Soils and Agricultural Potential

i. Geological profile

The geology of this area is characterised by the Volksrust Formation shales as well as the Prince Albert Formation and the Dwyka Group diamictites (Mucina and Rutherford, 2006). The Jurassic Karoo Dolerite sills and sheets support the vegetation in this area soils varying from shallow to deep. Red and yellow-brown apedal soils are common in this region with the Ae, Fc and Ag land types prominently featuring.

According to the land type database (Land Type Survey Staff, 1972 - 2006), the project area is characterised by the Ae 137, 138 and 140 as well as the Ib 47 and Fb 72 land types . The Ae land type consists of red-yellow apedal soils which are freely drained. The soils tend to have a high base status and is deeper than 300 mm. The Fb land type consists of Glenrosa and/or Mispah soil forms with the possibility of other soils occurring throughout. Lime is generally present within the entire landscape. The Ib land type consists of miscellaneous land classes including rocky areas with miscellaneous soils.

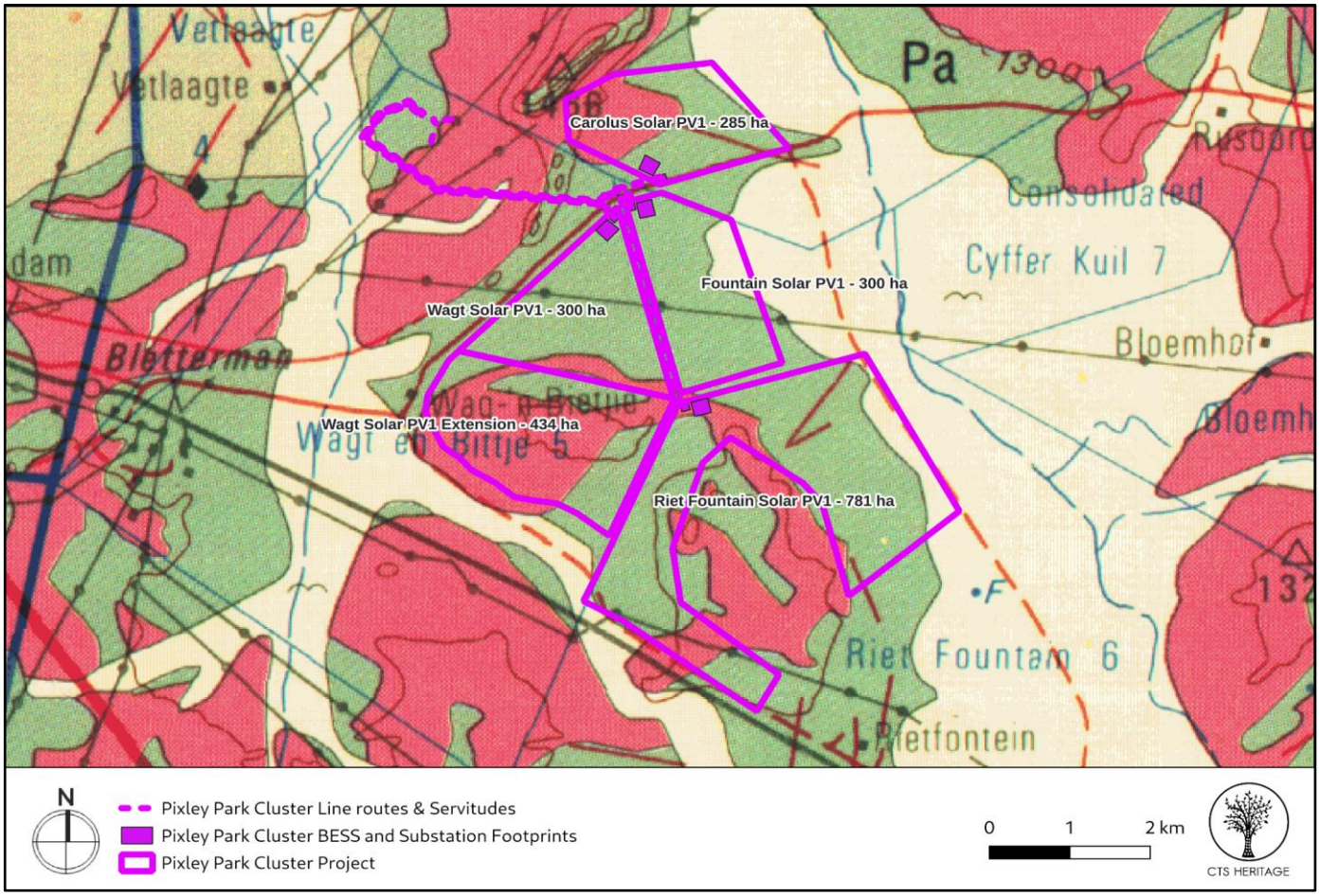


Figure 7.5: Extracted from the Council for GeoSciences Map 3024 for Colesburg indicating that the development area is underlain by Jd: Jurassic Dolerite (red), Pt (lighter green): Tierberg Formation of the Ecca Group and Pa (darker green): Adelaide Subgroup of the Beaufort Group

ii. Soils forms, Land type, Land Capability, and agricultural potential of the project site

Existing soil information was obtained from the Land Type database (Land Type Survey Staff, 1972 – 2006). A land type is an area with similar climate, topography and soil distribution patterns which can be demarcated on a scale of 1:250 000.

According to the land type database (Land Type Survey Staff, 1972 - 2006), the project area is characterised by the Ae 137, 138, 139 and 140 as well as the Ib 47 and Fb 72 land types (refer to **Figure 7.6**). The Ae land type consists of red, yellow apedal soils which are freely drained. The soils tend to have a high base status and is deeper than 300 mm. The Fb land type consists of Glenrosa and/or Mispah soil forms with the possibility of other soils occurring throughout. Lime is generally present within the entire landscape. The Ib land type consists of miscellaneous land classes including rocky areas with miscellaneous soils.

Considering the occurrence of various soil forms that are commonly associated with high land capabilities, it is likely that areas with high land capability sensitivity do occur within the project area. However, due to the poor climatic capability, the ultimate land potential is more likely to be low.

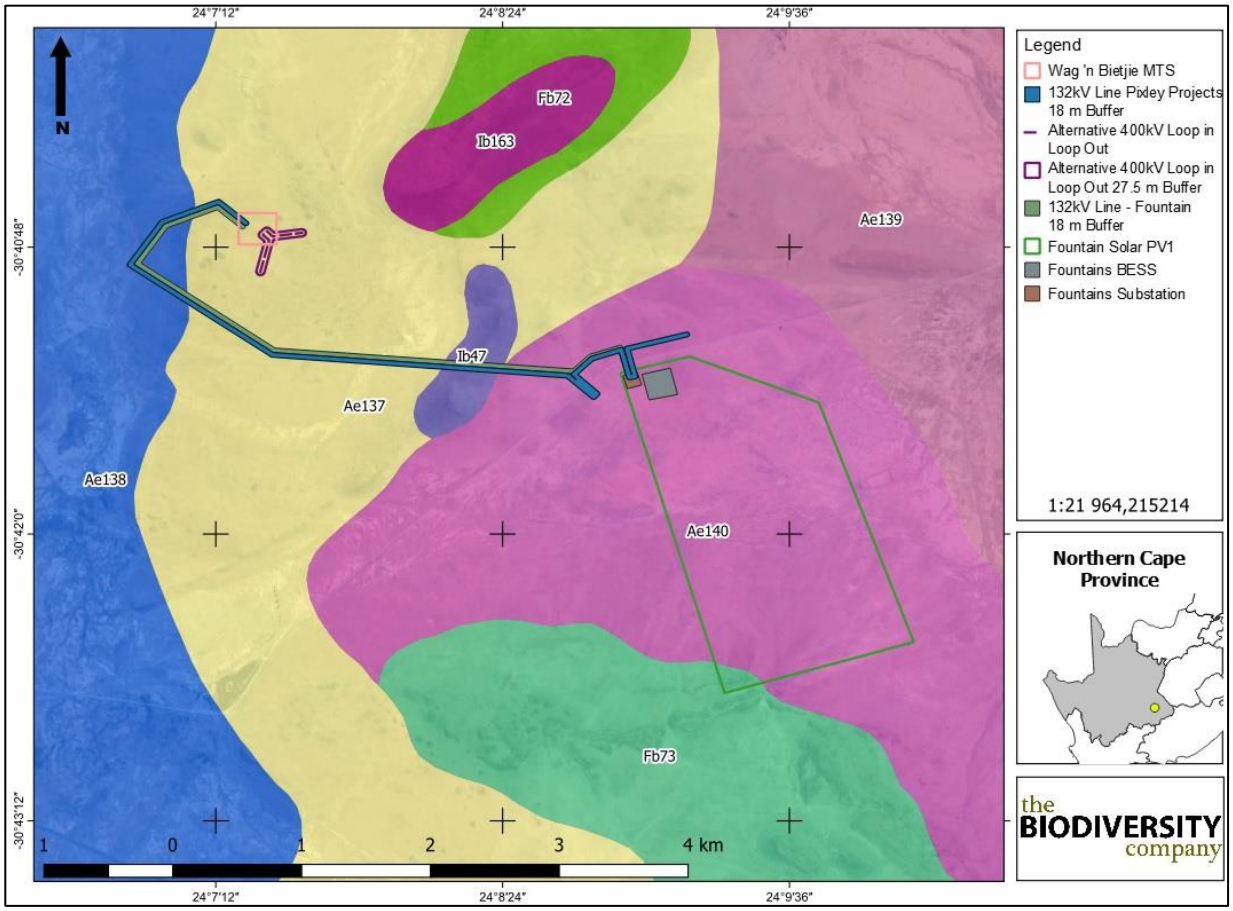


Figure 7.6: Land Types present within the project area

7.4.3. Land Use

The landscape associated with the site is a typical Karoo landscape consisting of dolerite koppies and ridges separated by valley bottoms. The land uses surrounding the project area predominantly includes farming (grazing) activities between natural (open – predominantly mountainous areas) land situated between the aforementioned watercourses. Land use within a catchment influences the ecological integrity of the associated watercourses. Due to the limited land and water use modification within the project related catchment areas, the SQRs were considered largely natural to moderately modified at a desktop level (DWS, 2014). Ephemeral watercourses of the arid regions such as the Karoo are typically dependent on groundwater discharge and are particularly vulnerable to changes in hydrology and are known to be slow to recover from any impacts.

The two major aspects determining the status of the SQRs are water quality and habitat conditions. The physico-chemical (water quality) modifications within the two SQRs have been rated as small with low volumes of return water (effluent) input expected from the agricultural and urban activities (altered land use) present in the catchment areas. Modifications to instream/riparian/wetland habitat continuity, and flow modification were rated to range from small to large within the two SQRs. Additionally, the habitat diversity classes of the SQRs were rated as very low with a low diversity of fish (*Enteromius anoplus* - Chubbyhead Barb and *Labeo umbratus* – Moggel) and macroinvertebrate species expected within these systems. Despite this these taxa maintain a moderate sensitivity to altered flows and water quality, highlighting the need for the project to limit impacts to these aspects.

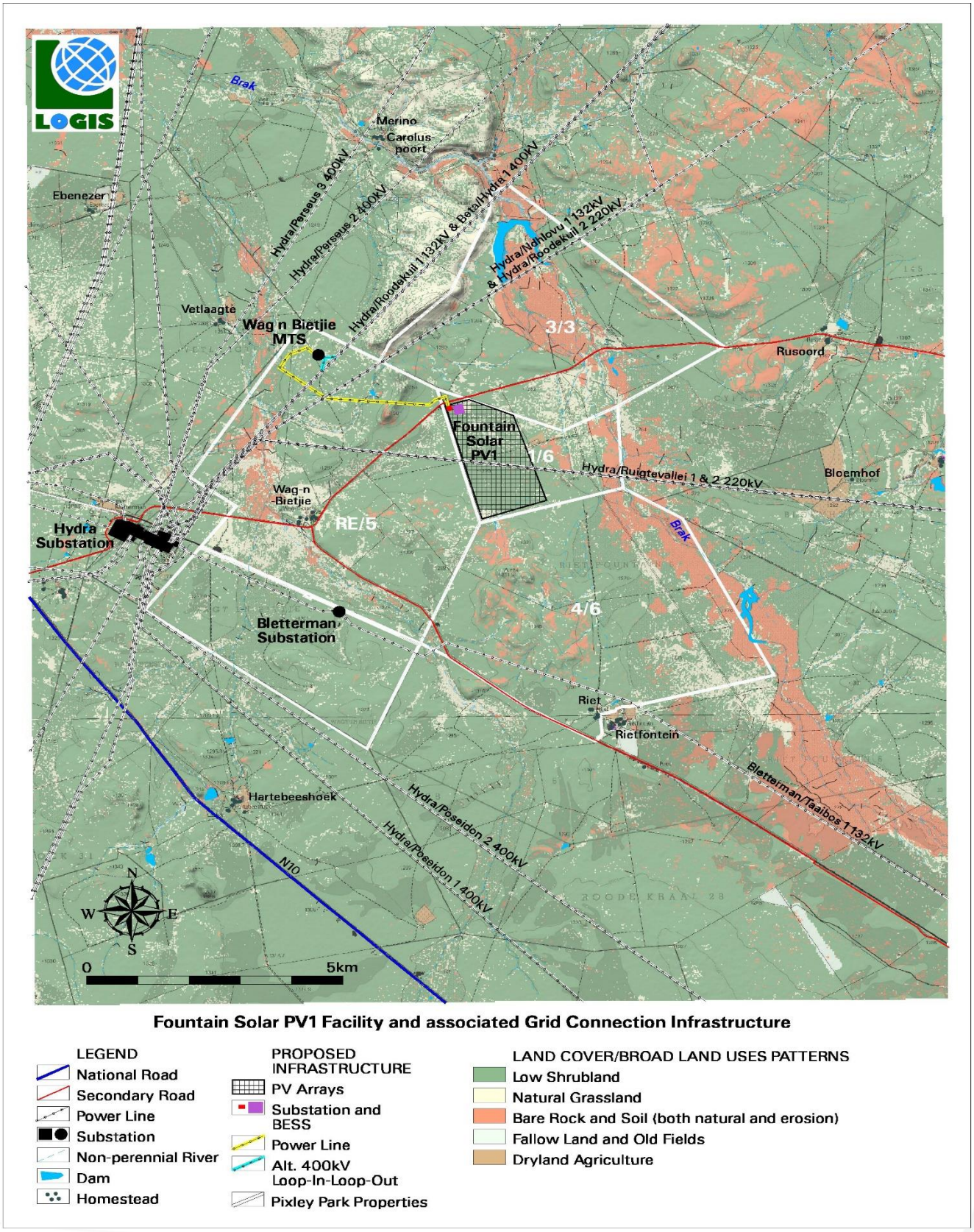


Figure 7.7: Land cover and broad land use patterns.

7.4.4. Ecological Profile of the Study Area and the Development Area

i. Broad-Scale Vegetation Patterns

The Vegetation of South Africa, Lesotho, and Swaziland (Mucina & Rutherford, 2006) and SANBI (2019) was used to identify the vegetation type that would have occurred under natural or pre-anthropogenically altered conditions. Furthermore, the Plants of Southern Africa (POSA) database was accessed to compile a list of expected flora species within the project area. The Red List of South African Plants (Raimondo *et al.*, 2009; SANBI, 2020) was utilized to provide the most current national conservation status of flora species.

The proposed Fountain Solar PV1 Facility is situated within two biomes, the Grassland and Nama Karoo biomes.

The Grassland 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).

The grassland biome is found chiefly on the high central plateau of South Africa, and the inland areas of KwaZulu-Natal and the Eastern Cape. The topography is mainly flat and rolling but includes the escarpment itself. Altitude varies from near sea level to 2 850 m above sea level.

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. Thus, trees are typically absent, except in a few localized habitats. Geophytes (bulbs) are often abundant. Frosts, fire and grazing maintain the grass dominance and prevent the establishment of trees.

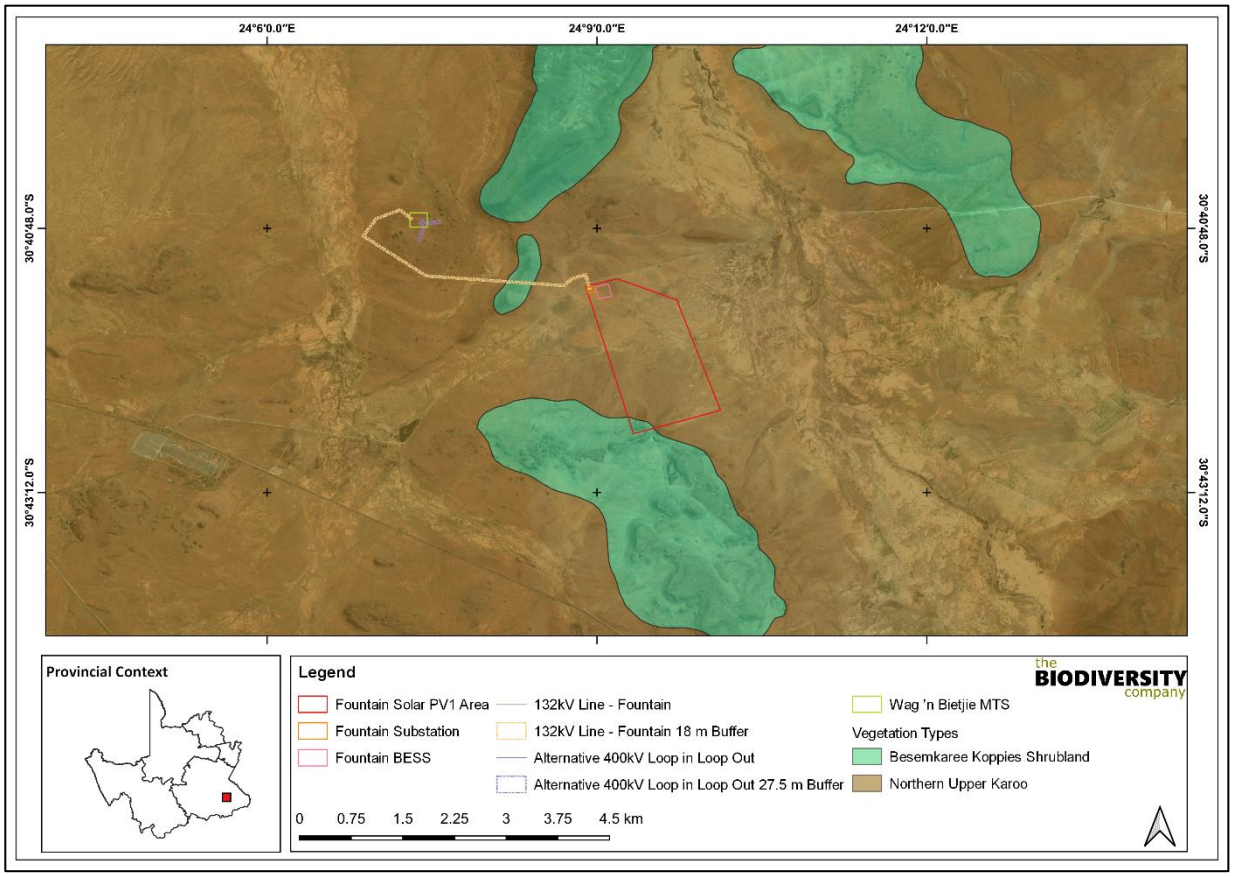


Figure 7.7: Map illustrating the vegetation types associated with the proposed Fountain Solar PV1 Facility

On a fine-scale vegetation type, the project area overlaps with Besemkaree Koppies Shrubland and Northern Upper Karoo.

Northern Upper Karoo

Distribution:

Nama Karoo Biome, which is a large, landlocked region on the central plateau of the western half of South Africa and extends into south-eastern Namibia. This is an arid biome with majority of the river systems being non-perennial. Apart from the Orange River and the few permanent streams in the southwest that originate in higher-rainfall neighbouring areas, the limited number of perennial streams that originate in the Nama-Karoo are restricted to the more mesic east. The low precipitation is unreliable (coefficient of variation of annual rainfall up to 40%) and droughts are unpredictable and prolonged. The unpredictable rainfall impedes the dominance of leaf succulents and is too dry in summer for dominance by perennial grasses alone, and the soils are generally too shallow, and the rainfall is too low for trees. Unlike other biomes of southern Africa, local endemism is very low and consequently, the Nama-Karoo Biome does not contain any centre of endemism.

Vegetation and Landscape Features:

Flat to gently sloping dominated by dwarf shrubs and grasses. Comprising of Shales of the Volksrust Formation and to a lesser extent the Prince Albert Formation (both Ecca Group) as well as Dwyka Group diamictites form the underlying geology. Jurassic Karoo Dolerite sills and sheets support this vegetation complex in places. Wide stretches of land are covered by superficial deposits including calcretes of the

Kalahari Group. Soils are variable from shallow to deep, red, yellow, apedal, freely drained soils to very shallow Glenrosa and Mispah forms.

Important Taxa:

- **Tall Shrubs**: *Lycium cinereum, L. horridum, L. oxycarpum.*
- **Low Shrubs:** *Chrysocoma ciliata, Gnidia polycephala, Pentzia calcarea, P. globosa, P. incana, P. spinescens, Berkheya annectens, Eriocephalus ericoides subsp. ericoides, E. glandulosus, E. spinescens, Euryops asparagoides, Felicia muricata, Osteospermum leptolobum, O. spinescens, Selago geniculata, S. saxatilis.*
- **Succulent Shrubs**: Hertia pallens, Salsola calluna, S. glabrescens, S. rabieana, S. tuberculata, Zygophyllum flexuosum.
- **Semi-parasitic Shrub**: *Thesium hystrix. Herbs: Dicoma capensis, Gazania krebsiana, Hermannia comosa, Indigofera alternans, Lessertia pauciflora, Radyera urens, Sesamum capense, Sutera pinnatifida, Tribulus terrestris, Vahlia capensis.*
- ***Succulent Herb**: Psilocaulon coriarium. Geophytic*
- **Herb**: *Moraea pallida.*
- **Graminoids**: *Aristida adscensionis, A. congesta, A. diffusa, Enneapogon desvauxii, Eragrostis lehmanniana, E. obtusa, E. truncata, Sporobolus fimbriatus, Stipagrostis obtusa, Eragrostis bicolor, E. porosa, Fingerhuthia africana, Heteropogon contortus, Stipagrostis ciliata, Themeda triandra, Tragus berteronianus, T. koelerioides, T. racemosus.*

Biogeographically Important Taxa

- **Herb:** *Convolvulus boedeckerianus.*
- **Tall Shrub:** *Gymnosporia szyszylowiczii subsp. namibiensis.*

Endemic Taxa

- **Succulent Shrubs**: *Lithops hookeri, Stomatium pluridens.*
- **Low Shrubs**: *Atriplex spongiosa, Galenia exigua.*
- **Herb**: *Manulea deserticola.*

Conservation

No portion conserved in statutory conservation areas. About 4% has been cleared for cultivation (the highest proportion of any type in the Nama-Karoo) or irreversibly transformed by building of dams. Areas of human settlements are increasing in the north-eastern part of this vegetation type. Prosopis glandulosa, regarded as one of the most important invasive alien plants in South Africa, is widely distributed in this vegetation type.

This vegetating type dominates the low-lying areas of the project site. As this vegetation type is widespread throughout the region and largely untransformed the floral species found on the site are not at significant risk of negative impact from the development

Besemkaree Koppies Shrubland

Distribution:

Northern Cape, Free State and Eastern Cape Provinces: On plains of Eastern Upper Karoo (between Richmond and Middelburg in the south and the Orange River) and within dry grasslands of the southern and central Free State. Extensive dolerite-dominated landscapes along the upper Orange River belong to this unit as well. Extends northwards to around Fauresmith in the northwest and to the Wepener District in the northeast. Altitude 1120– 1680 m.

Vegetation and Landscape Features:

Slopes of koppies, butts and tafelbergs covered by two-layered karroid shrubland. The lower (closed-canopy) layer is dominated by dwarf small-leaved shrubs and, especially in high precipitation years, also by abundant grasses, while the upper (loose canopy) layer is dominated by tall shrubs. Dolerite koppies and sills embedded within Karoo Supergroup sediments. The dolerite dykes and sills are igneous intrusions that are the result of extensive volcanic activity, which accompanied the break-up of Gondwana in the Jurassic. In places the slopes of mesas and butts carrying this vegetation type have a mixed geology where dolerites occur together with sandstones and mudstones of the Ecca and Beaufort Groups.

Important Taxa:

- **Small Trees:** *Cussonia paniculata, Ziziphus mucronata.*
- ***Tall Shrubs**: Diospyros austro-africana, Euclea crispa subsp. ovata, Olea europaea subsp. cuspidata, Searsia burchellii, S. ciliata, S. erosa, Buddleja saligna, Diospyros lycioides subsp. lycioides, Ehretia rigida, Grewia occidentalis, Gymnosporia polyacantha, Tarchonanthus minor.*
- **Low Shrubs:** *Asparagus suaveolens, Chrysocoma ciliata Diospyros pallens, Eriocephalus ericoides, E. spinescens, Euryops empetrifolius, Felicia filifolia subsp. filifolia, F. muricata, Helichrysum dregeanum, H. lucilioides, Hermannia multiflora, H. vestita, Lantana rugosa, Limeum aethiopicum, Lycium cinereum, Melolobium candicans, M. microphyllum.*
- **Succulent Shrubs:** *Aloe broomii, Chasmatophyllum musculinum, C. verdoorniae, Cotyledon orbiculata var. dactylopsis, Pachypodium succulentum. Graminoids: Aristida adscensionis, A. congesta, A. diffusa, Cenchrus ciliaris, Cymbopogon caesius, Cynodon incompletus, Digitaria eriantha, Eragrostis curvula, E. lehmanniana, Heteropogon contortus, Setaria lindenbergiana, Cymbopogon pospischilii, Enneapogon scoparius, Eragrostis chloromelas, E. obtusa, Eustachys paspaloides, Fingerhuthia africana, Hyparrhenia hirta, Sporobolus fimbriatus.*
- **Herbs***: Convolvulus sagittatus, Dianthus caespitosus subsp. caespitosus, Gazania krebsiana subsp. krebsiana, Hibiscus pusillus, Indigofera alternans, I. rhytidocarpa, Lepidium africanum subsp. africanum, Pollichia campestris. Herbaceous Climber: Argyrolobium lanceolatum.*
- **Geophytic Herbs***: Albuca setosa, Asplenium cordatum, Cheilanthes bergiana, C. eckloniana, Freesia andersoniae, Haemanthus humilis subsp. humilis, Oxalis depressa, Pellaea calomelanos.*
- **Succulent Herbs***: Aloe grandidentata, Crassula nudicaulis, Duvalia caespitosa, Euphorbia pulvinata, Huernia piersii, Stapelia grandiflora, S. olivacea, Tridentea gemmiflora.*

Endemic Taxa:

- **Small Tree***: Cussonia sp. nov. (P.J. du Preez 3666 BLFU)*.
- **Succulent Shrubs***: Euphorbia crassipes, Neohenricia sibbettii, N. spiculata.*

Conservation:

About 5% statutorily conserved in the Rolfontein, Tussen Die Riviere, Oviston, Gariep Dam, Caledon, and Kalkfontein Dam Nature Reserves. In addition, a small patch is also protected in the private Vulture Conservation Area. About 3% of the area has been lost through building of dams. Erosion varies from low to high.

This karoo unit occurs on the slopes and plateau areas on tafelbergs. As this vegetation type is widespread and largely untransformed the floral species found on the site are not at significant risk of negative impact from the development.

ii. Conservation Status of Broad Vegetation Types

Based on a scientific approach used at national level by the South African National Biodiversity Institute (SANBI), vegetation types can be categorised according to their conservation status which is, in turn, assessed according to the degree of transformation compared to the expected extent of each vegetation type. The status of a habitat or vegetation type is based on how much of its original area is still intact compared to various thresholds. On a national scale the thresholds are as depicted in **Table 7.1** below, as decided by 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%.

Table 7.1: Conservation status of different vegetation types occurring in the project site

Vegetation Type	**Target (%)**	**Conserved (%)**	**Transformed (%)**	**Conservation status**	
				Driver *et al.* 2005 ; Mucina *et al.*, 2006	**National Ecosystem List (NEM:BA)**
Norther Upper Karoo	21	0	4	Least Threatened	Not listed
Besemkaree Koppies Shrubland	28	5	3	Least Threatened	Not listed

Determining ecosystem status (Driver *et al.*, 2005). *BT = biodiversity target (the minimum conservation requirement).

remaining			
	80–100	least threatened	LT
	60–80	vulnerable	VU
	*BT–60	endangered	EN

According to scientific literature (Driver *et al.*, 2005; Mucina *et al.*, 2006), as shown in **Table 8.1**, both vegetation types are listed as Least Threatened.

The National List of Ecosystems that are Threatened and in need of protection (GN1002 of 2011), published under the National Environmental Management: Biodiversity Act (Act No. 10, 2004), lists national vegetation types that are afforded protection based on rates of transformation. The thresholds for listing in this legislation are higher than in the scientific literature, which means there are fewer ecosystems listed in the National Ecosystem List versus in scientific literature.

Neither vegetation types are listed in the National List of Ecosystems that are Threatened and in need of protection (GN1002 of 2011).

iii. Protected Areas within the Broader Project Site

The proposed Fountain Solar PV1 Facility is not located within a protected area, nor does it overlap with any NPAES Focus Areas. The De Aar Nature Reserve is located approximately 11.8 km to the west, thereby located outside the 5 km buffer zone. According to the National Parks Area Expansion Strategy (NPAES), there are no areas within the project site that have been identified as priority areas for inclusion in future protected areas. The project site is therefore outside the NPAES focus area. There are many areas outside

of the project site, to the north, south, east, and west that are included as being part of future protected areas, but not within or next to the site itself.

iv. Listed Plant Species

The POSA database indicates that 116 species of indigenous plants are expected to occur within the project area and surrounding landscape. Appendix D provides the list of species and their respective conservation status and endemism. None of the species expected are species of conservation concern (SCC).

v. Plants Protected in terms of the National Environmental Management: Biodiversity Act and the Northern Cape Conservation Act

No plant species protected under the National Environmental Management: Biodiversity Act (No. 10 of 2004) were identified on site. However, several have a geographical distribution that includes the project site. No plant species protected under the Northern Cape Nature Conservation Act (No. 9 of 2009) were identified on site. There is a possibility that there may be additional protected plant species present on site that were not detected during the field survey.

vi. Trees Protected in Terms of the National Forests Act

The grassland biome experiences summer rainfall and dry winters with frost (and fire), which are unfavourable for tree growth. Thus, trees are typically absent, except in a few localized habitats. Geophytes (bulbs) are often abundant. Frosts, fire, and grazing maintain the grass dominance and prevent the establishment of trees.

vii. Critical Biodiversity Areas

Figure 7.9. illustrates that the proposed development overlaps with an Ecological Support Area. The nature of the development, i.e., a solar cluster and associated infrastructure, will lead to destruction of the ESA and consequently, the footprint area will be no longer congruent with an ESA. The adjacent landscape to the east is classified as a CBA1 and CBA2. Critical Biodiversity Areas and Ecological Support Areas may be terrestrial or aquatic.

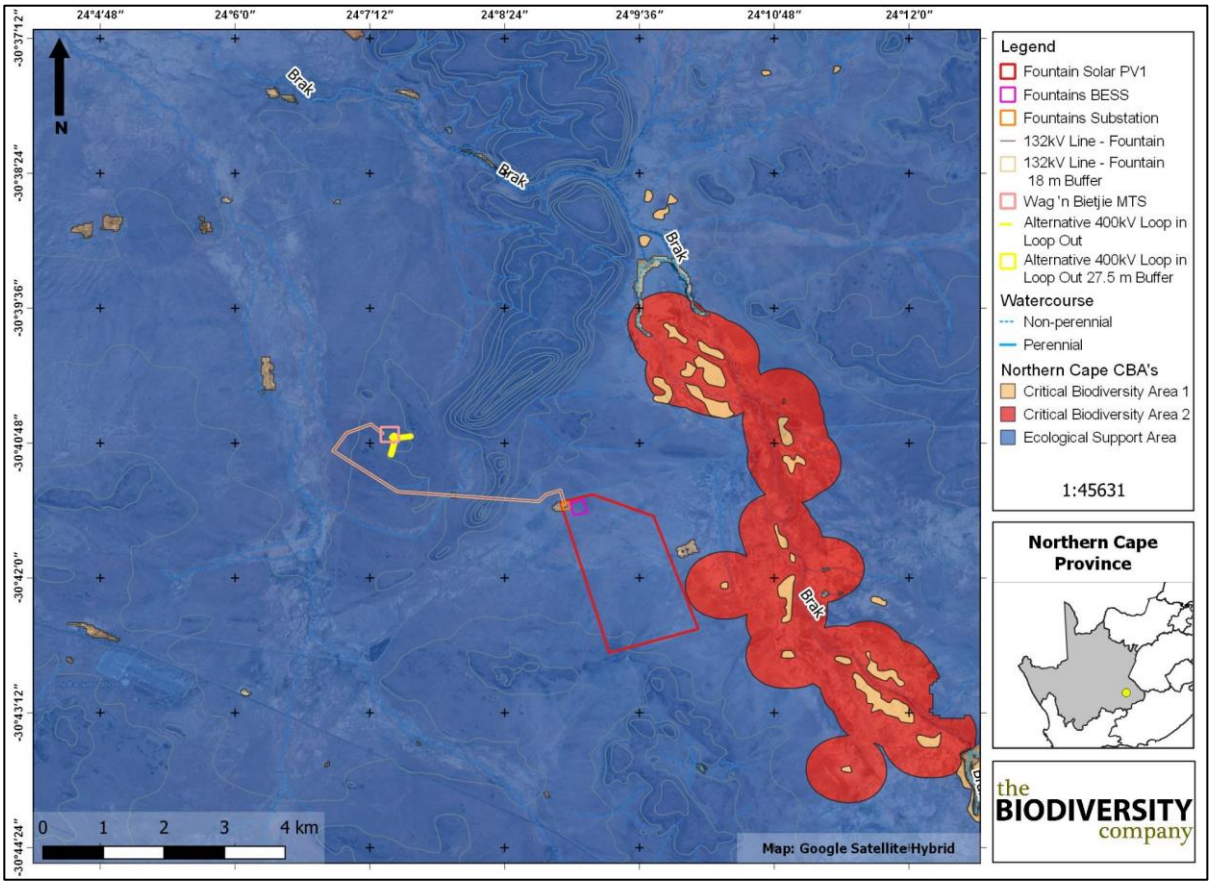


Figure 7.9: Critical Biodiversity Areas (CBAs), as per the 2016 Northern Cape Critical Biodiversity Area Map, located within the Fountain Solar PV1 Facility project site

viii. Wetlands and Freshwater Resources

Catchment

The proposed Fountain Solar PV1 Facility is located within the Brak River Catchment (Secondary Catchment D6). The project area does not overlap with any wetland or river systems that were assessed as part of the SAIIAE. However, there are minor drainage lines traversing the project that drain into the Brak River. The Brak River is near the project area, and the associated reach classified as EN. Wetlands within the surrounding landscape are classified as CR. The NFEPA database indicates that the wetlands within the surrounding landscape are not important for maintaining threatened biodiversity or support large numbers of waterbirds.

National Freshwater Ecosystem Priority Area Status

To better conserve aquatic ecosystems, South Africa has categorised its river systems according to set ecological criteria (i.e., ecosystem representation, water yield, connectivity, unique features, and threatened taxa) to identify Freshwater Ecosystem Priority Areas (FEPAs). The FEPAs are intended to be conservation support tools and envisioned to guide the effective implementation of measures to achieve the National Environment Management Biodiversity Act's (NEM:BA) biodiversity goals.

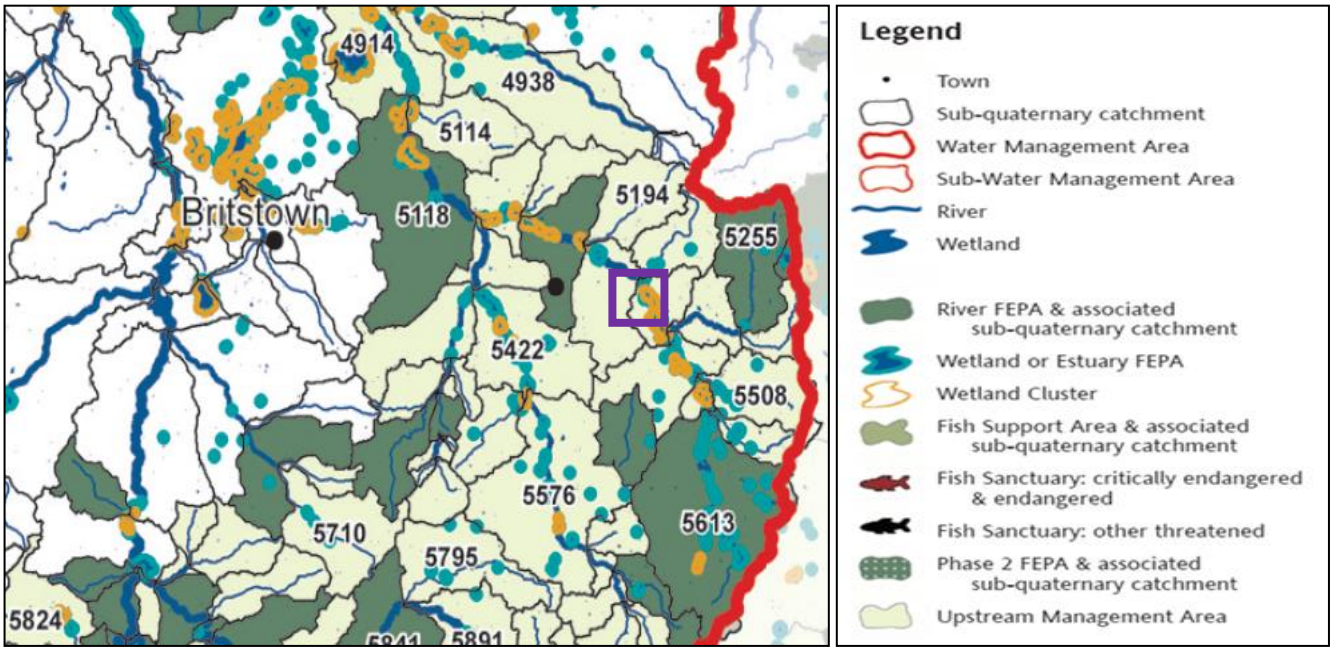


Figure 7.10 As presented by the purple square, the Brak (D62D-5391) and Brak tributary (D62D-5332) river reaches are considered as important upstream management areas as per NFEPAs designation. Based on imagery and the listed NFEPA biodiversity features, the project area presented channelled valley bottom wetland characteristics, which is typical for the gentle sloped reaches of many river systems.

National Wetland Map 5

The NWA sets out to ensure that water resources are used, managed, and controlled in such a way that they benefit all users. To achieve this, the Act has prescribed a series of measures such as Resource Water Quality Objectives (RWQOs) to ensure comprehensive protection of water resources so that they can be used sustainably (DWA, 2011).

In absence of a designated RWQO biophysical node for the Brak Quaternary Catchment D62D for the project area, the RWQOs for the downstream orange River catchment was referred to for river monitoring data (DWAF, 2009). The Brak River drains into the Orange River near site OS08 (Hydro ID D7H008) on the Orange River at Prieska (Orange River Quaternary Catchment D72A) (DWAF, 2009). The Present Ecological Status (PES) of OS08 is moderately modified (class C), while the Recommended Ecological Category (REC) to be maintained is a largely natural (class B). The Ecological Importance and Sensitivity Category for this catchment is rated as Moderate.

The project area activities should be aligned with the RWQOs for the Orange WMA to limit impacts to local watercourses while maintaining biodiversity goals for the directly associated Brak River catchment and those watercourses downstream of the project area.

Aquatic Ecosystems

This spatial dataset is part of the South African Inventory of Inland Aquatic Ecosystems (SAIIAE) which was released as part of the National Biodiversity Assessment (NBA) 2018. National Wetland Map 5 includes inland wetlands and estuaries, associated with river line data and many other data sets within the South African Inventory of Inland Aquatic Ecosystems (SAIIAE) 2018. According to the SAIIAE dataset, several wetland areas were identified in the general project area, which included several rivers. The wetland units were

largely indirectly associated with the project (outside of the 500 m regulated area) warranting no further ecological assessment of the wetland systems for this project, with emphasis rather afforded to the aquatic assessment of the rivers possibly at risk from the proposed project infrastructure.

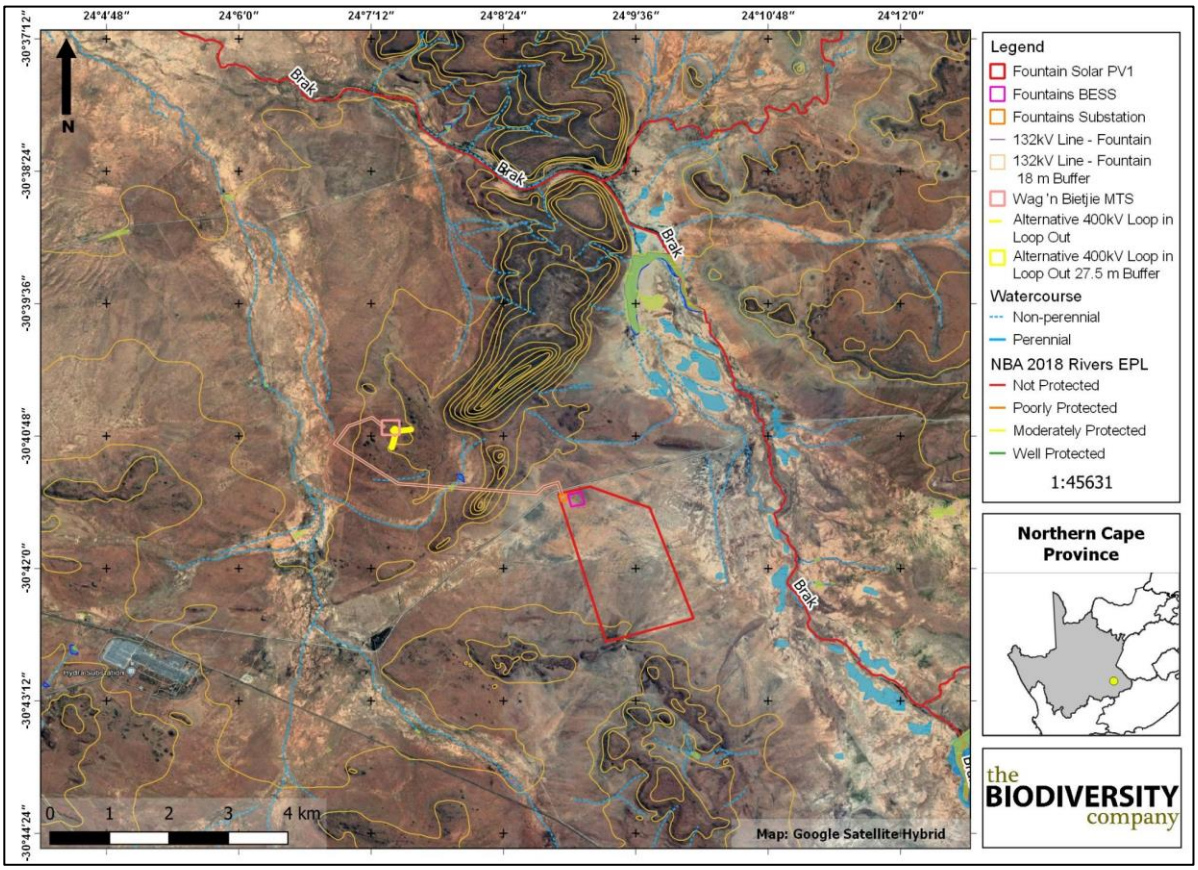


Figure 7.11: Map of the riverine ecological protection level associated with the project area

ix. Terrestrial Fauna Communities in the Study Area

Mammals

The semi-arid area south of De Aar is known for a low diversity of mammals firstly related to the lack of open water and secondly the long history of farming in the region. The impact of the sheep farming is that the migration corridors of larger mammals were restricted and over time, many species have been lost to the area. In recent years with the increase in hunting, some farmers have reintroduced some of the mammals that were previously present in the area. The obvious threat of predators to livestock further contributes to the low diversity of mammals occurring in the area. The IUCN Red List Spatial Data lists 51 mammal species that could be expected to occur within the area. This list excludes large mammal species that are limited to protected areas. Three (3) of these expected species are regarded as SCC.

Table 7.3: Mammal Species of Conservation Concern (SCC) that are expected to occur within the proposed Fountain Solar PV1 Facility

Family	***Genus and species name***	**Common name**	**Conservation status**
Felidae	*Felis nigripes*	Black-footed Cat	Vulnerable

Felidae	*Panthera pardus*	leopard	Vulnerable
Hyaenidae	*Parahyaena brunnea*	Brown Hyaena	Not Threatened

Amphibians

Based on the IUCN Red List Spatial Data and Amphibian Map database, 10 amphibian species are expected to occur within the project area. One of the species is regarded as a SCC.

Table 7.4: Amphibian Species of Conservation Concern (SCC) that are expected to occur within the proposed Fountain Solar PV1 Facility

Family	*Genus and species name*	Common name	Conservation status
Pyxicephalidae	*Pyxicephalus adspersus*	Giant Bullfrog	Least Concern

Reptiles

Based on the IUCN Red List Spatial Data and the Reptile MAP database, 19 reptile species are expected to occur within the area. One (1) is regarded as a SCC. This can be a result of the recent extensive drought and modified landscape (grazing and vegetation modification) associated with the agricultural activities. There are no species listed as red data for the area.

Table 7.5: List of expected reptiles on the area of the proposed development

Family	*Genus and species name*	Common name	Conservation status
Testudinidae	*Psammobates tentorius verroxii*	Verrox's Tent Tortoise	Least Concern

7.5. Integrated Heritage including Archaeology, Palaeontology, and the Cultural Landscape

The area proposed for the Fountain Solar PV1 Facility is located approximately 10km east of De Aar, along the N10. De Aar was originally established on the Farm "De Aar." The name means "the artery," a reference to its underground water supply. The Cape Government Railways were founded in 1872, and the route that the government chose for the line to connect the Kimberley diamond fields to Cape Town on the coast, ran directly through De Aar. Because of its central location, the government also selected the location for a junction between this first railway line, and the other Cape railway networks further east, in 1881. In 1899 two brothers who ran a trading store and hotel at the junction, Isaac, and Wulf Friedlander, purchased the farm of De Aar. Following the Anglo Boer War, the Friedlander brothers surveyed the land for the establishment of a town. The municipality was created a year later in 1900.

7.5.1. Cultural Landscape

In common with much of Bushmanland, the project area is a flat expanse of relatively flat terrain but with many ephemeral drainage lines visible on aerial photography. From the specialist analysis that have been done it can be suggested that vegetation cover is likely to be always very sparse with the ground surface openly visible in terms of expected heritage resources.

Bushmanland is well known for the vast expanses of gravel that occur in places and which frequently contain stone artefacts in varying densities (Beaumont, 1995). Such material is referred to as 'background scatter' and is invariably of very limited significance. development area as "characterised by flat undulating Karoo vegetation comprised of relatively sparse scrub and grasses, with dolerite hills in the surrounding landscape. Large portions of the land are currently devoted to livestock farming but several solar energy facilities are to

be constructed on farms around De Aar. Shallow soils cover a combination of calcrete, shale and dolerite substrates, and large sections in the landscape are exposed to sheet erosion, specifically along low lying areas and drainage lines. Dolerite and sandstone are present, while exotic rocks occur in the gravel of the Orange Riverbed and terraces. These provided suitable material for stone tool production during the Earlier, Middle and Later Stone Ages.

The town of De Aar only dates to 1903, just after the cessation of the 1899-1902 Anglo-Boer War, farms were given out and surveyed in the 1800s. The railway junction dates to 1881 when Cape Town and Kimberley were linked by rail after diamonds were discovered at the latter town. It was very important to the British during the Anglo-Boer War since railway lines from Cape Town and Port Elizabeth joined here and extended on through Kimberly to Mafikeng). De Aar was also the site of the first use of wireless telegraphy in South Africa where the British employed it to maintain communications between their various columns operating in the area. The town was laid out around the railway junction on the farm De Aar which was purchased in 1889 by Isaac and Wolf Friedlander, who ran a trading store and hotel at the railway junction. After the war, the brothers established the town. Two Provincial Heritage Sites occur in De Aar. These are the "Olive Schreiner house" and the "St Paul's Church". At least one other building is listed (SAHRA, n.d.). Many of the older buildings in the town are early 20th century, including some art deco, but most of the structures date to the mid- to late 20th century.

7.5.2. Archaeology

As part of a previous EA application (Vetlaagte Energy Facility located immediately adjacent to the proposed development area), a heritage impact assessment was conducted. This survey noted the findings of widespread Middle Stone Age (MSA) material, including characteristic formal MSA stone tools such as points, blades and scrapers were documented in the survey area along a north-south oriented drainage on the (western) periphery of the property.

The lithic remains occur in three large scatters and, almost without exception, in low lying areas along non-perennial drainage lines and wetland areas where precipitation and groundwater have exposed the stone tools, originally deposited on a decomposed calcrete rock layer approximately 30cm sub surface. Preliminary examinations of some of the lithics indicated that several flakes displayed facetted platforms, characteristic of the MSA. The Pixley park Cluster which Fountain Solar PV1 Facility falls within, also includes part of the study area for the Wagt 'n Bietjie development, which was cumulatively assessed in this report and is located within the drainage described above. It is therefore likely that the proposed development will impact on significant MSA archaeology.

The Heritage Impact assessment previously undertaken documented historical period remains, "specifically the old Vetlaagte homestead with restored farmhouse, outbuildings, midden, and labourers' quarters, as well as a dilapidated dam wall constructed in the drainage line east of the farmstead are present on the property. The date of construction of the farmhouse is denoted by a year count ("1930") on the front gable of the structure. The entire farmstead is situated in an area excluded from the solar farm development. A small family graveyard, associated with the farmstead at Vetlaagte, also occurs in the exclusion zone about 100m north of the farmhouse."

In an assessment of areas adjacent to this proposed development, it was found that all the archaeological finds on surrounding farms were pre-colonial, but nevertheless, different types were present. During the 2012 Heritage assessment LSA artefacts associated with the ridge running through the property assessed were

found, as well as MSA artefacts from a pan-like area. Additionally, several piled stone structures were identified. These appeared to be concentrated on one dolerite ridge and, unlike those from elsewhere in the Karoo, only one may have been a kraal and it was determined that these structures are likely to be pre-colonial in age as similar piles have been recorded in an almost certain pre-colonial context in the Seacow River valley (Hart 1989).

During a recent field assessment on an adjacent farm conducted by CTS Heritage it was found that the overall archaeological sensitivity of the development area with regards to the preservation of Early, Middle and Later Stone Age archaeology as well as Khoe and San heritage, early colonial settlement is regarded as very high.

Despite this, the field assessment conducted for this project has demonstrated that the specific area proposed for development has low sensitivity for impacts to significant archaeological heritage. Two sites were identified which warranted protection on account of an interesting scatter of Still Bay tools on top of a dolerite outcrop with excellent views of the surrounding area, however it is highly unlikely this area will be developed, and it is recommended that infrastructure is not placed on this outcrop.

Another site was found warranting a IIIB rating with pottery, bone, and an extensive stone tool assemblage amongst the dolerite outcrops on the eastern end of the property. Again, this site has been demarcated as sensitive and the project team has been advised to avoid this area when finalising the layouts. A minimum buffer of 100m is recommended from this site (Wagt n Bietjie 014). The rest of the observations are typical of the area and are ubiquitously distributed in low densities of less than 5 artefacts per observation. It is likely that similar archaeological heritage exists within the area proposed for development. **Figure 7.12** shows the heritage resources previously identified within the study area.

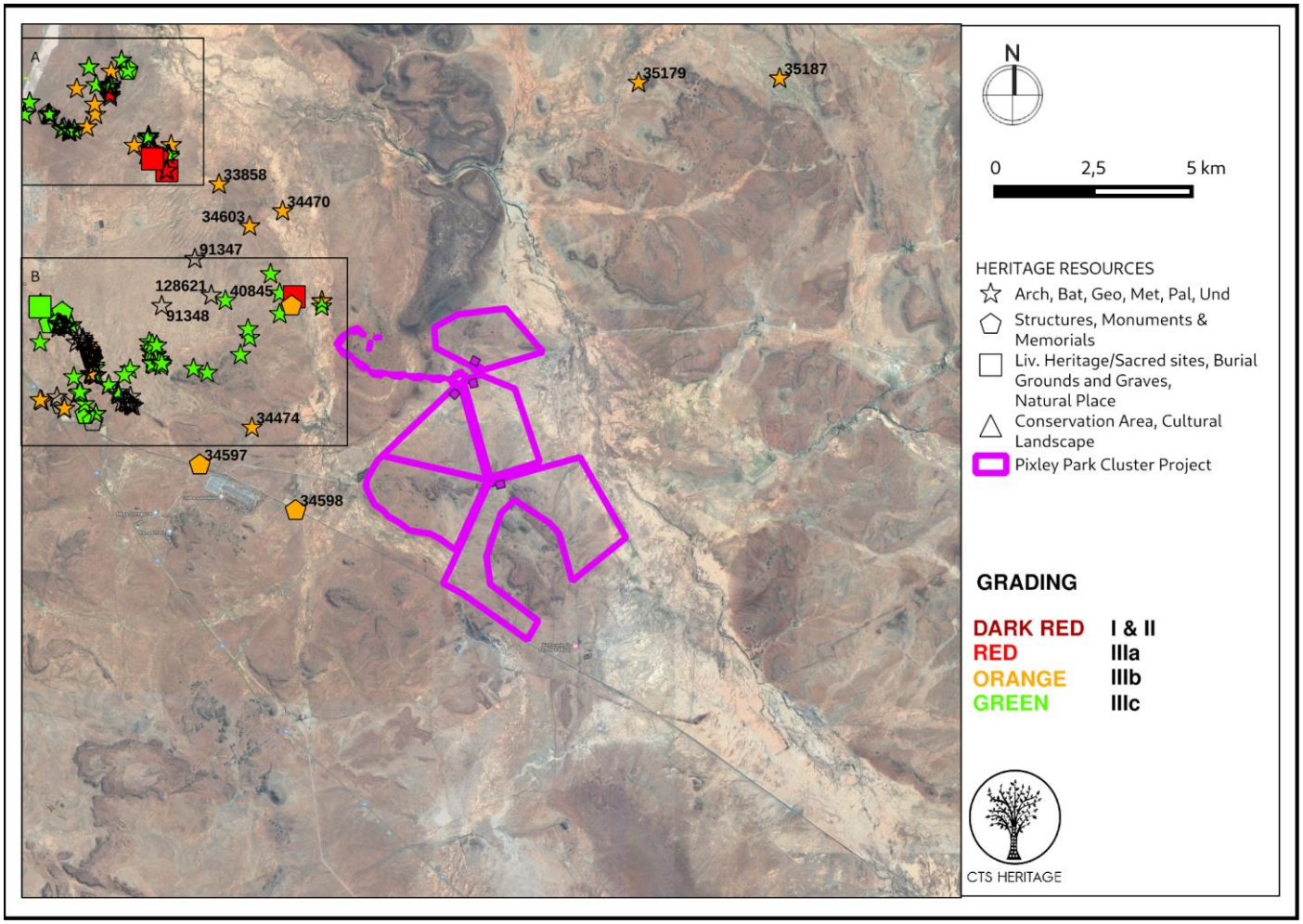


Figure 7.12: Heritage resources previously identified within the study area

7.5.3. Paleo sensitivity

According to the SAHRIS Palaeosensitivity Map, the area proposed for development is underlain by sediments of moderate, high, and very high paleontological sensitivity. The Council for GeoSciences Map 3024 for Colesburg, states that the development area is underlain by Jurassic Dolerite, the Tierberg Formation of the Ecca Group and the Adelaide Subgroup of the Beaufort Group as well as Quaternary sands associated with the drainage lines.

As part of the process completed in 2012 for the approved neighbouring Vetlaagte Solar Energy Facility, a field-based palaeontological assessment was undertaken. In this assessment it was found that the potentially fossiliferous sediments of the Late Palaeozoic Karoo Supergroup (Ecca and Lower Beaufort Groups) that underlie the study area are almost entirely mantled in a thick layer of superficial deposits of probable Pleistocene to Recent age. These include various soils, gravels and – at least in some areas - a well-developed calcrete hardpan. The upper Ecca Group bedrocks in the northern portion of the study area contain locally abundant fossil wood (of palaeontological interest for dating and palaeoenvironmental studies), as well as low diversity non-marine trace fossil assemblages typical of the Waterford Formation, rather than the Tierberg Formation as mapped. No vertebrate fossils and only scattered woody plant impressions of the Permian Glossopteris Flora were observed within the Lower Beaufort Group rocks that are very poorly exposed in the southern portion of the Vetlaagte study area.

Trace fossils, silicified wood and rare vertebrate remains (therapsids, parareptiles) of the Middle Permian Pristerognathus Assemblage Zone have recently been recorded from this succession in the De Aar region (Almond 2010b). Extensive dolerite sills and dykes of the Early Jurassic Karoo Dolerite Suite intruding the Karoo Supergroup sediments are entirely unfossiliferous, as are rare intrusive kimberlite pipe rocks of Cretaceous age.

Based on the information from the survey as referred to above the construction of new access roads and transmission lines in this region are likewise considered to be of low significance as far as fossil heritage is concerned. In view of the overall low significance of the proposed development on palaeontological heritage resources, it is concluded that no further palaeontological heritage studies or specialist mitigation are required for these small PV projects, pending the exposure of any substantial fossil remains (e.g., vertebrate bones and teeth, large blocks of petrified wood) during the construction phase."

Figure 7.13: Palaeosensitivity map indicating fossil sensitivity underlying the study area.

7.6. Visual Quality

The study area for the visual assessment encompasses a geographical area of approximately 382km² (the extent of the full-page maps displayed in this report) and includes a minimum 6km buffer zone (area of potential visual influence) from the proposed project site. The study area includes the Hydra Substation, a section of the N10 national road, and several farm dwellings or homesteads.

The properties for the Pixley Park Cluster of Renewable Energy Facilities are located about 10km east of the town of De Aar within the Emthanjeni Local Municipality. Regionally, the study area is located about 44km east of Britstown, 37km north-west of Hanover and about 67km north of Richmond within the Northern Cape Province.The study area occurs on land that ranges in elevation from approximately 1,230m above sea level

(along the Brak River to the north-west) to 1,560m at the top of the hill northwest of the properties. The terrain surrounding the proposed properties is generally flat, sloping gently to the north and south-west towards the Brak River. A few farm dams are present in the broader area.

The Brak River bisects the north-eastern part of the properties, and two water bodies are located within or near the property boundaries. The terrain type of the region is relatively homogenous and is described as predominantly *lowlands with hills*. Some prominent hills and ridges occur in the study area - a small range of hills lies along the north-western border of the properties.

De Aar is a primary commercial distribution centre for a large area of the central Great Karoo. Major economic activities of the area include wool production and livestock farming. The area is also popular for hunting. The photographs below aid in describing the general environment within the study area and surrounding the proposed project infrastructure.

	
Topography and vegetation of the region. *Note the hills in the background and flat landscape in the middle and foreground*	The Hydra Substation in the west of the study area.
	
Power line infrastructure along the N10 national road.	Landscape character of the study area showing undeveloped wide-open spaces interspersed with power lines.

Figure 7.14: Photographs showing the general environment within the area.

7.6.1. Visual Exposure/visibility

The viewshed analysis was undertaken from a representative number of vantage points within the development footprint at an offset of 5m above ground level. This was done to determine the general visual exposure (visibility) of the area under investigation, simulating the maximum height of the proposed structures (PV panels, inverters, and BESS) associated with the facility.

- The visual exposure for the Fountain PV1 Facility would largely extend to the south-east, along the Brak River floodplain.
- Visual exposure to the north-west is shielded by the hills and ridges located adjacent to the proposed development footprint.
- Exposure to the south and north-east is similarly obstructed by higher–lying ground at these localities.
- The PV facility may be highly visible within a 1km radius of the proposed development. There are no residences (homesteads) located within this zone. Observers travelling along this road will be exposed to the project infrastructure.
- Within a 3 – 6km radius, the visual exposure is more scattered and interrupted due to the undulating nature of the topography.
- 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.

In general terms it is envisaged that the structures, where visible from shorter distances (e.g., less than 1km and potentially up to 3km), and where sensitive visual receptors may find themselves within this zone, may constitute a high visual prominence, potentially resulting in a visual impact. This may include residents of the farm dwellings mentioned above, as well as observers travelling along the roads in closer proximity to the facility.

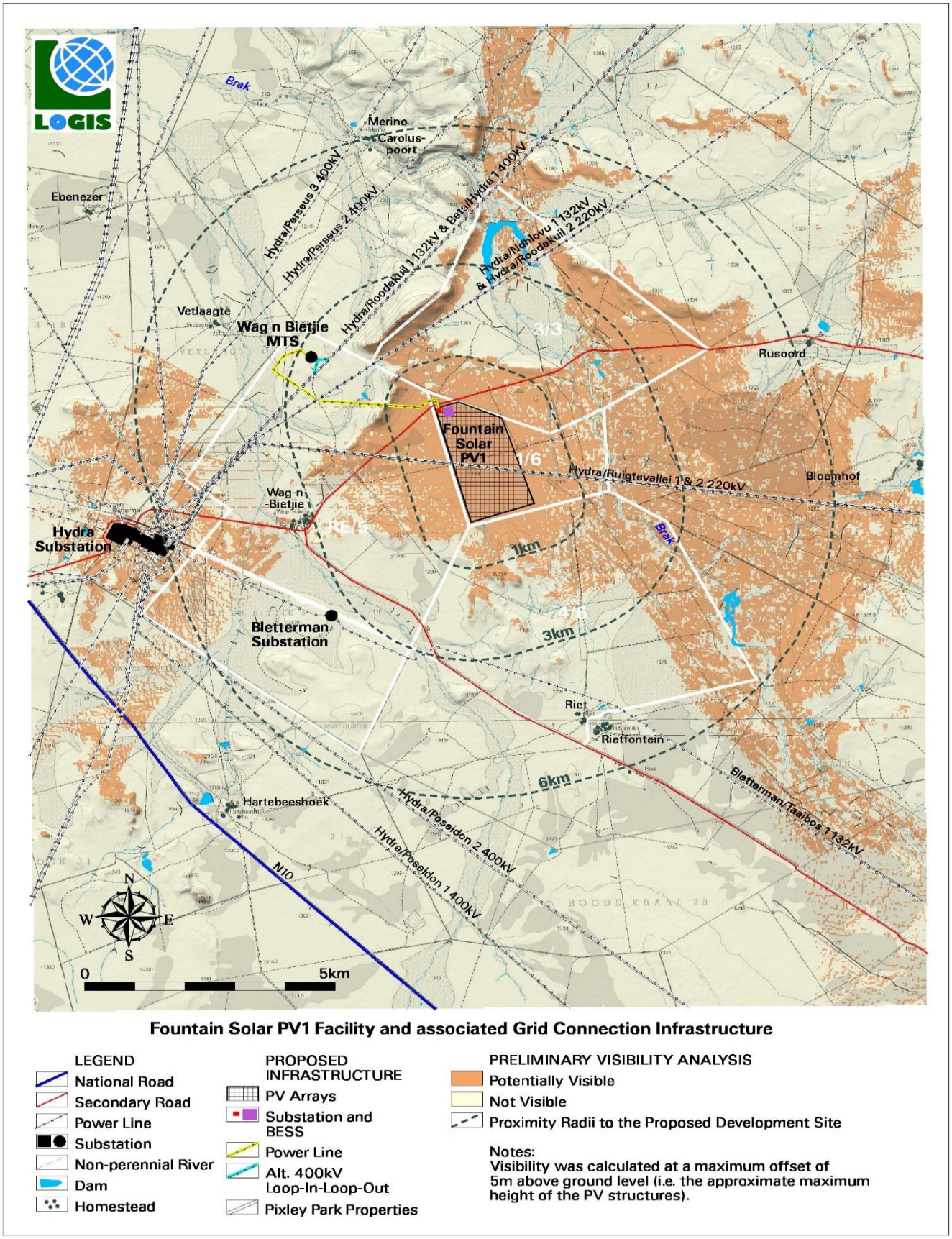


Figure 7.15: Map indicating the preliminary visual exposure

7.7. Traffic Conditions

It is assumed that the transformer will be manufactured locally in South Africa and be transported from the Johannesburg area to site. As the transformer will be transported with an abnormal load vehicle, the route planning needs a more detailed investigation of the feasible routes considering any limitations due to existing road features. Furthermore, a load of abnormal dimensions may cause an obstruction and danger to other traffic and therefore the transformers need to be transported as far as possible on roads that are wide enough for general traffic to pass. It is expected that the transformers can be transported to site via the same route used for normal loads.

There are several bridges and culverts along this route, which need to be confirmed for load bearing and height clearances. The road is straight and will pass through towns such as Bloemfontein and Hanover en route to the site. According to the desktop study, all turning movements along the route are manageable for the abnormal vehicle. However, there are several alternative routes which can be investigated if the above route or sections of the route should not be feasible.

The proposed main access road to the sites is an existing gravel road, known as Hydra Road, with an east-west orientation, located between the R389 in the east and the N10 in the west, as shown in green in Figure 7.16. The proposed main access road will link to individual site access roads.

The **proposed main access road to the development is deemed suitable** as it is an existing road. The existing road is surfaced between the turn-off at the N10 up to the Hydra Substation. The road crosses the railway line via an at-grade level crossing from where it continues east as a gravel road.

The application for wayleaves and permits should be made to the railway authority (Transnet) well in advance of construction commencing. Special safety measures e.g., access booms might be required to protect drivers of vehicles from oncoming railway traffic, especially in instances of poor visibility and increased traffic flow.

Should the railway authority not grant permission for the level crossing to be used during construction and operational phases, accessing the sites from the east via the R389 can be considered as an alternative access road. However, the condition of the road is unknown, and it is recommended that a site visit be conducted to determine the suitability thereof.

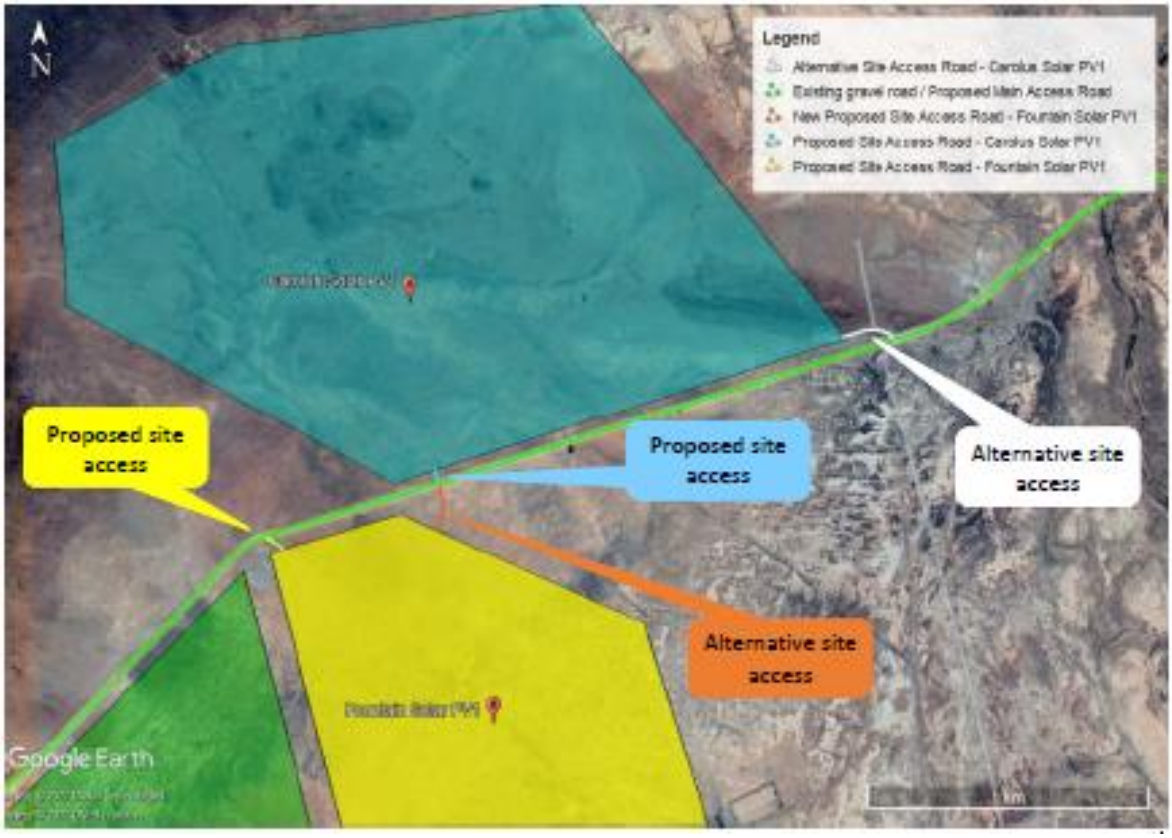


Figure 7.16: Proposed access point to the project site

7.8. Socio-Economic Broader Area

7.8.1. Profile of the Broader Area

The study area is located within the Emthanjeni Local Municipality (ELM), which falls within the Pixley ka Seme District Municipality (PKSDM) in the Northern Cape Province. De Aar is the administrative seat of the EML and PKSDM. The site is located within Ward 6 in the ELM.

Population

The population of the ELM in 2016 was 45 404. Of this total, 36.4% were under the age of 18, 57.9% were between 18 and 64, and the remaining 5.8% were 65 and older. The ELM therefore has a relatively large young population.

In terms of race groups, Coloureds made up 60.9% of the population, followed by Black Africans (32%) and Whites (6.9%). The main first language spoken in the ELM was Afrikaans (69.6%), followed by IsiXhosa (26.5%) and English (0.9%).

The population of Ward 6 in 2011 was 5 784. Of this total, 36.3% were under the age of 18, 58% were between 18 and 64, and the remaining 5.7% were 65 and older. Like the ELM, Ward 6 also had a relatively large young population. In terms of race groups, Coloureds made up 46.4% of the population, followed by Black Africans (45.2%) and Whites (7.3%). The main first language spoken in the Ward 6 was Afrikaans (56.2%), followed by IsiXhosa (32.3%) and English (2.1%).

The high percentage of young people in both the ELM and Ward 6 means that a large percentage of the population is dependent on a smaller productive sector. The dependency ratio for the ELM (2011) was 60.4%. The higher dependency ratio reflects the limited employment opportunities in the area and represent a significant risk to the district and local municipality. The high dependency ratio also highlights the importance to maximising local employment opportunities and the key role played by training and skills development programmes.

Employment

The official unemployment figure in 2011 for the ELM was 14.5%. The figures also indicate that most of the population are not economically active, namely 43.7%. These figures are like the official unemployment rate for the Northern Cape Province (14.5%) and Pixley ka Seme District (14.8%). This reflects the limited employment opportunities in the area, which in turn are reflected in the low income and high poverty levels. Given the impact of COVID-19 pandemic, the unemployment levels are likely to be higher in 2021. The figures for Ward 6 were 11.7% (unemployed) and 44% of the economically active population being employed.

Education

In terms of education levels, the percentage of the population over 20 years of age in the ELM with no schooling was 17.4% in 2011, compared to 7.9% for the Northern Cape Province and 11.9% for the district. The percentage of the population over the age of 20 with matric was 28.3%, compared to 29.1% for the province and 25.3% for the district. Only 1.5% and 1.4% of the population over the age of 20 years in the ELM had an undergraduate and postgraduate qualification, respectively. The relatively poor education levels in the ELM pose a potential challenge to the implementation of an effective training and skills development programme for local community members. The figures for Ward 6 (2011) were 16.4% with no schooling, 18.6% with matric and 1.9% and 1.3% with an undergraduate and postgraduate degree respectively

CHAPTER 8: SCOPING OF POTENTIAL ISSUES

This Chapter provides an overview of the potential impacts and risks associated with the Fountain Solar PV1 Facility, including the BESS and associated infrastructure, as identified at this stage of the process through specialist studies. 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.
- 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.
- Cultural 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.
- Water usage, such as the cumulative water use requirements in arid areas where local communities rely on scarce groundwater resources.

This chapter serves to describe and evaluate the identified potential environmental impacts relevant and specific with the construction and operation phases of the 100MW PV facility, and to make recommendations for further studies required to be undertaken in the EIA phase.

The development area of approximately 300ha in extent considered for the proposed Fountain Solar PV1 Facility is located on Portion 1 of Farm Riet Fountain No 6.. The full extent of the development area 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 considering in the planning of the located of the proposed Fountain Solar PV1 Facility within the development footprint.

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).

In order to appropriately identify, assess and, as far as possible, avoid or mitigate potential impacts and risks that may be associated with the development, construction, operation and decommissioning of Fountain Solar PV1 Facility, Savannah Environmental commissioned a team of independent specialists with relevant scientific knowledge and expertise in the biophysical (i.e. biotic and abiotic) and socio-economic environments. Specialist Scoping level assessments are included in **Appendices D – K** of this Scoping Report.

Section 8.3 provides a summary of the findings of the desktop scoping study undertaken for the construction, operation and decommissioning phases of the Fountain Solar PV1 facility. Those impacts associated with construction can also be expected to be associated with the decommissioning phase (however, to a lesser extent as the development footprint would have previously undergone transformation and disturbance during construction).

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 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 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 Fountain Solar PV1 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, biological, social, economic, heritage and cultural aspects.	The positive and negative impacts associated with the Fountain Solar PV1 facility have been included in **Section 8.3.**
(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. Evaluation of Potential Impacts associated with the Construction Phase, Operation and Decommissioning phases

8.2.1. Impacts on ecology (including flora and fauna)

The study area consists mostly of natural habitat that is used for commercial animal husbandry. The proposal to build the Fountain Solar PV1 facility on site will therefore have significant effects on natural habitat. The existing biodiversity on site is, however, relatively limited in terms of uniqueness or potential presence of species of concern, with the possible presence of one Critically Endangered mammal species listed in appendix D

The vegetation on site is not considered to be part of any threatened ecosystem and has not been assessed as being of high conservation value due to rates of transformation. The regional vegetation types that occur on site, i.e., The proposed Fountain Solar PV1 facility is situated within two biomes, the Grassland and Nama Karoo biomes.

There are no plant species listed as Rare that could potentially occur on site and none have been previously recorded on this site. There are also no plant species protected according to National legislation that could potentially occur in the geographical area. The loss of some individuals, if they are found to occur on site, would not affect the conservation status of any of the species. It is, however, unlikely that any of them would be affected.

Impacts associated with the construction, operation and decommissioning phases of the proposed PV facility and associated infrastructure on ecology include the following:

- Destruction, fragmentation and degradation of habitats and ecosystems
- Spread and/or establishment of invasive alien species
- Direct mortality of fauna
- Reduced dispersal/migration of fauna
- Environmental pollution due to water runoff, spills from vehicles and erosion
- Disruption/alteration of ecological life cycles (breeding, migration, feeding) due to noise, dust and light pollution.
- Staff and others interacting directly with fauna (potentially dangerous) or poaching of animals
- Loss of vegetation (& habitat) within development footprint
- Loss of ecosystem services
- Introduction of alien species, especially plants

Sensitivity Analysis of the Site

Anthropogenic activities drive habitat destruction causing displacement of fauna and flora and possibly direct mortality. Land clearing destroys local wildlife habitat and can lead to the loss of local breeding grounds, nesting sites and wildlife movement corridors such as rivers, streams and drainage lines, or other locally important features. The removal of natural vegetation may reduce the habitat available for fauna species and may reduce animal populations and

species compositions within the area. According to the initial specialist report the loss of An ESA; and Potentially occurring SCC are the biggest anticipated impact.

The different habitat types within the project area will be delineated and identified based on observations during the field assessment, and available satellite imagery. These habitat types are assigned Ecological Importance (EI) categories based on their ecological integrity, conservation value, the presence of species of conservation concern and their ecosystem processes.

Based on this information, a map of habitat sensitivity on site is provided in **Figure 8.1,**

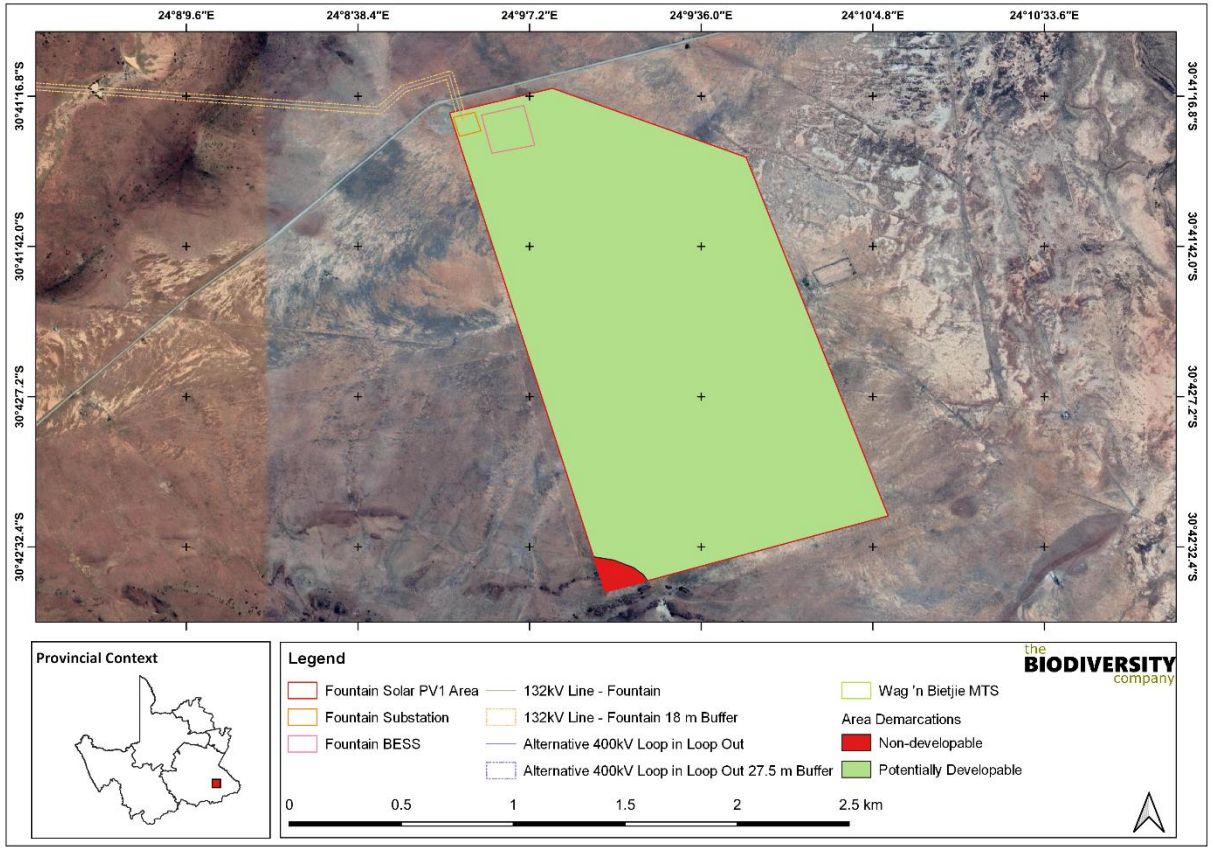


Figure 8.1. Preliminary ecological sensitivity map of the combined study area.

Main Impact	Project activities responsible for destruction, fragmentation and degradation of habitats and ecosystems	Secondary impacts anticipated
1. Destruction, fragmentation and degradation of habitats and ecosystems	Development infrastructure will require vegetation clearing Access roads and servitudes Soil dust precipitation Dumping of waste products Random events such as fire (cooking fires or cigarettes)	Displacement/loss of flora & fauna (including possible SCC) Increased potential for soil erosion Habitat fragmentation Increased potential for encroachment by invasive species
Main Impact	**Project activities that can cause the spread and/or establishment of alien and/or invasive species**	**Secondary impacts anticipated**
2. Spread and/or establishment of invasive alien species	Vegetation removal Vehicles potentially spreading seed Unsanitary conditions surrounding infrastructure promoting the establishment of invasive alien rodents	Habitat loss for indigenous flora & fauna (including SCC) Spreading of potentially dangerous diseases due to invasive and pest species Alteration of fauna assemblages due to habitat modification
Main Impact	**Project activities that can cause direct mortality of fauna**	**Secondary impacts anticipated**
3. Direct mortality of fauna	Clearing of vegetation Roadkill due to vehicle collision Pollution of water resources due to dust effects, chemical spills, etc. Intentional killing of fauna for food (hunting)	Loss of ecosystem services Increase in rodent populations and associated disease risk
Main Impact	**Project activities that can cause reduced dispersal/migration of fauna**	**Secondary impacts anticipated**
4. Reduced dispersal/migration of fauna	Loss of landscape used as corridor Compacted roads	Reduced plant seed dispersal Loss of ecosystem services

	Removal of vegetation	Loss of gene flow leading to genetic bottle-necking
Main Impact	**Project activities that can cause pollution in watercourses and the surrounding environment**	**Secondary impacts anticipated**
5. Environmental pollution due to water runoff, spills from vehicles and erosion	Hazardous chemical spills Erosion	Pollution of water resources Faunal mortality (acute and chronic) Groundwater pollution Loss of ecosystem services
Main Impact	**Project activities that can cause disruption/alteration of ecological life cycles due to sensory disturbance.**	**Secondary impacts anticipated**
6.Disruption/alteration of ecological life cycles (breeding, migration, feeding) due to noise, dust and light pollution.	Operation of machinery (Large earth moving machinery, vehicles) Project activities/infrastructure that can cause noise, vibration, and light pollution Vehicles	Disruption/alteration of ecological life cycles due to noise Loss of ecosystem services
Main Impact	**Project activities that can cause staff to interact directly with potentially dangerous fauna**	**Secondary impacts anticipated**
8. Staff and others interacting directly with fauna (potentially dangerous) or poaching of animals	All unregulated/supervised activities Staff entering 'no-go' or unauthorised areas	Loss of SCC Loss of ecosystem services

Issue	Nature of Impact	Extent of Impact	No-Go Areas
Loss of vegetation (& habitat) within development footprint	Direct impacts: » Disturbance / degradation / loss to vegetation » Destruction of protected plant species Indirect impacts: » Loss of ecosystem services » Introduction of alien species, especially plants » Displacement of faunal community due to habitat loss, direct mortalities and disturbance	Regional	Non-developable Areas indicated in Table 8.1

Description of expected significance of impact

The following potential main impacts on the biodiversity were considered for the construction phase of the proposed development. This phase refers to the period during construction when the proposed features are constructed; and is considered to have the largest direct impact on biodiversity. The following potential impacts to terrestrial biodiversity were considered:

- Destruction, further loss and fragmentation of the of habitats, ecosystems and vegetation community;
- Introduction of alien species, especially plants;
- Destruction of protected plant species; and
- Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, dust, vibration and poaching).

Gaps in knowledge & recommendations for further study

- This is completed at a desktop level only.
- Identification, delineation and characterisation of vegetation communities.
- Undertake a sensitivity assessment of systems where applicable.

Recommendations with regards to general field surveys

- Field surveys to prioritise the development areas.
- Beneficial to undertake fieldwork during the wet season period.

8.2.1. Impacts on Freshwater Features

Impacts on Freshwater features

A key consideration for the scoping level impact assessment is the impacts anticipated for the proposed Fountain Solar PV1 Facility are considered in order to predict and quantify these impacts and assess and evaluate the magnitude on freshwater resources. under the current layout, the proposed Fountain PV1 development area is drained to the centre of the PV1 area by a single ephemeral system draining eastwards into the Brak River. Additionally, a portion of the 132 kV powerline traverses an ephemeral drainage line as well as an instream dam at the same location. Impacts would therefore be expected within the tributary network with potential downstream impacts to the Brak River.

Sensitivity Analysis of the Site

Impacts include changes to the hydrological regime such as alteration of surface run-off patterns, runoff velocities and or volumes associated with vegetation clearing, earthworks, levelling, soil stockpiling and the establishment of infrastructure (powerline pylons, BESS and substation) and road network. This would include watercourse crossing infrastructure for the powerline maintenance road and potential watercourse crossing infrastructure within the PV1 development area. The presence of solar panels and associated compacted road network increases hard surfaces within the catchment, resulting in an increase in runoff during high precipitation events and may be significant if poorly designed stormwater management infrastructure is implemented. The aforementioned alterations will have a direct result on the sediment movement and drainage characteristics both locally within the influenced tributaries and associated

downslope areas such the Brak River. Altered surface run-off patterns, runoff velocities and or volumes above the natural flow regime of the likely ephemeral drainage lines is expected to cause potentially extensive damage to the bed and banks through erosion, scouring and bank collapse with associated sedimentation of instream habitat. Powerline pylons constructed within the tributaries and associated riparian and buffer zone will result in direct loss or the disturbance of watercourse habitat with associated alteration of hydrology. In turn, habitat disturbance may degrade habitat quality and produce watercourse and surrounding corridor (Ecological Support Area) fragmentation. A negative shift in the biotic integrity and PES of the tributaries would be expected based on the severity of alterations or losses. It should be taken into account that the Karoo may take decades to rehabilitate, therefore rehabilitation may be challenging.

It is important to highlight that these arid climate systems receive majority of their rainfall during short rainfall events and only present surface flow for limited time periods. Some rainfall events can be considered as massive with resultant flooding.

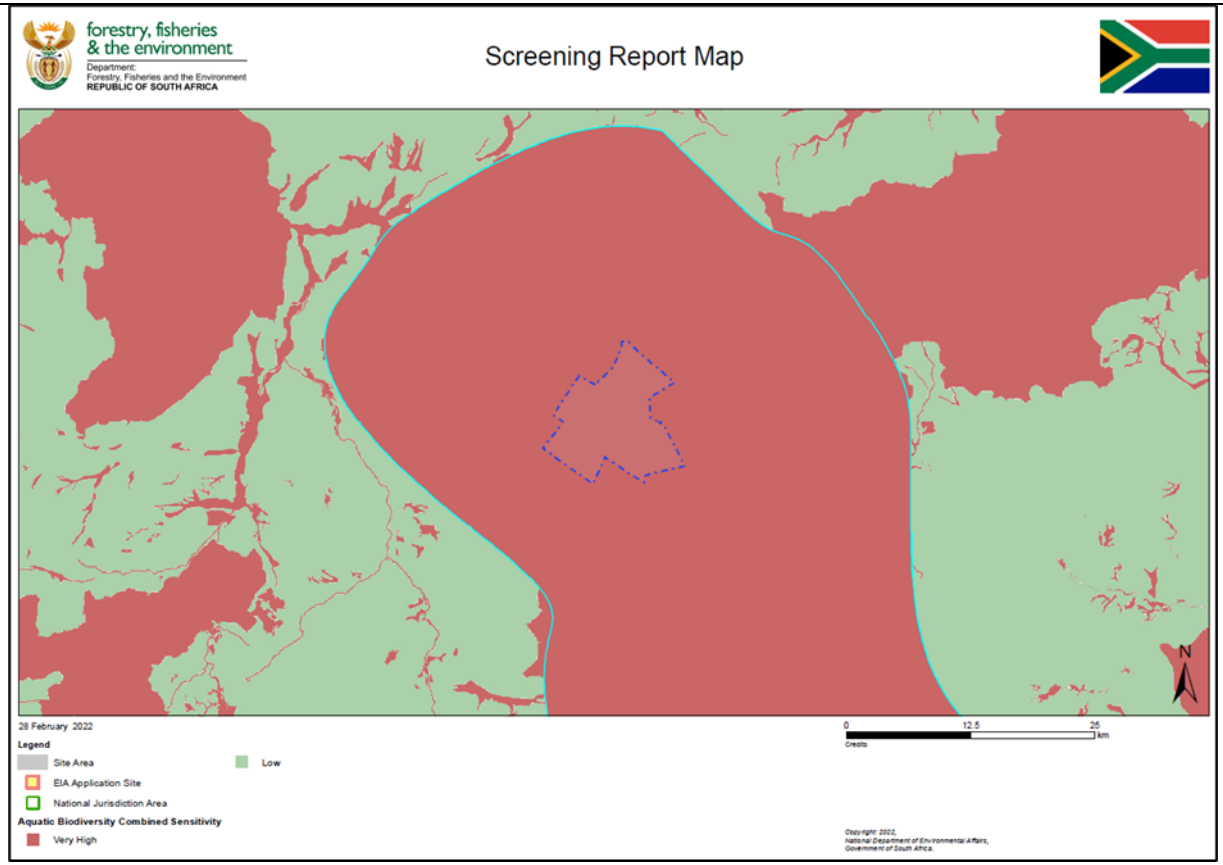


Figure 8.5: The aquatic biodiversity theme sensitivity classification for the Fountain Solar PV1 facility as per the DFFE screening tool.

Issue	Nature of Impact	Extent of Impact	No-Go Areas
Loss of drainage features and loss/disturbance to habitat and buffer zone within development footprint	Direct impacts: » Disturbance / degradation / loss of drainage feature(s). » Altered catchment hydrology with associated erosion and sedimentation.	Regional	Non-developable Areas

	Indirect impacts: » Erosion and sedimentation of downstream watercourse(s). » Habitat disturbances and fragmentation of downstream watercourse(s). » Water quality degradation. » Degradation of ecological integrity and aquatic biota community (sensitive species are lost first).		

Description of expected significance of impact

The following potential main impacts on the watercourses were considered for the construction phase of the proposed development. This phase refers to the period during construction when the proposed features are constructed; and is considered to have the largest direct impact on watercourses. The following potential impacts to freshwater resources were considered:

» Disturbance / degradation / loss of drainage features;
» Destruction and fragmentation of the habitats (instream and riparian) and aquatic community; and
» Degradation of ecological integrity and aquatic biota community (sensitive species are lost first).

Gaps in knowledge & recommendations for further study

» This is completed at a desktop level only.
» Identification, delineation and characterisation of watercourses and biotic community.
» Undertake a sensitivity assessment of systems where applicable.

Recommendations with regards to general field surveys

» Field surveys to prioritise the development areas.
» Beneficial to undertake fieldwork during the wet season period.

8.2.2. Impacts on Soils, Geology, Agricultural Potential

Considering the occurrence of various soil forms that are commonly associated with high land capabilities, it is likely that areas with high land capability sensitivity do occur within the project area. However, due to the poor climatic capability, the ultimate land potential is more likely to be low.

Sensitivity Analysis of the Site

The agriculture theme sensitivity as indicated in the screening report indicates predominantly a combination of "Low" and "Medium" sensitivities, (**Figure 8.4**). This sensitivity is based on the screening tool and considered to be preliminary for this stage of the project. These sensitivities will be confirmed during the impact phase of the project.

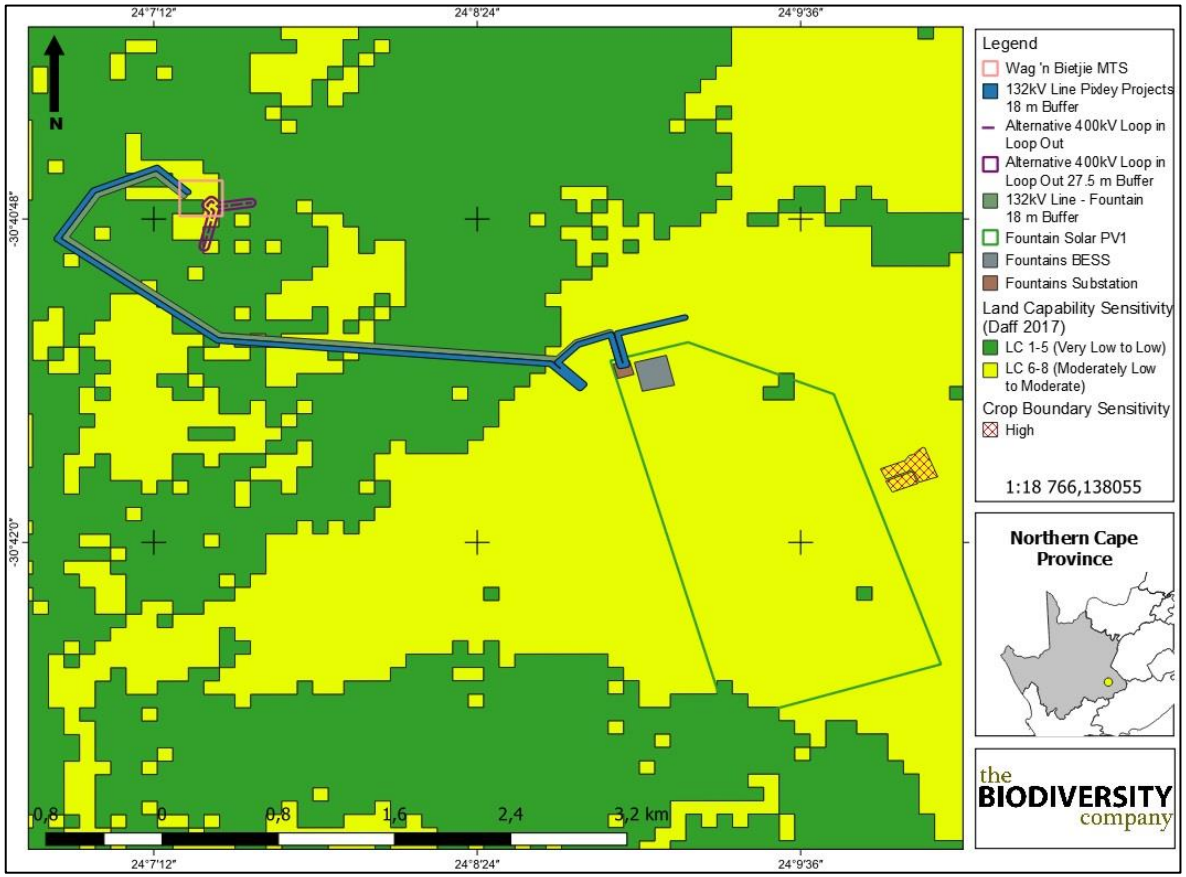


Figure 8.4: Land Capability Sensitivity as per the DFFE screening tool

Impact			
Loss of land capability			
Issue	**Nature of Impact**	**Extent of Impact**	**No-Go Areas**

Compaction/soil stripping/transformation of land use which leads to loss of land capability	Direct impacts: » Loss of soil / land capability Indirect impacts: » Loss of land capability	Regional	None identified at this stage

Description of expected significance of impact

The development of the area could result in the encroachment into areas characterised by high land potential properties, which can ultimately result in the loss of land capability. These disturbances could also result in the infestation and establishment of alien vegetation, which in turn can have a detrimental impact on soil resources. Earthworks will expose and mobilise earth materials which could result in compaction and/or erosion. A number of machines, vehicles and equipment will be required, aided by chemicals and concrete mixes for the project. Leaks, spillages or breakages from any of these could result in contamination of soil resources, which could affect the salinity or pH of the soil, which can render the fertility of the soil unable to provide nutrition to plants. During the operational phase, the impacts associated with the substation and collector sub will be easily managed by best "housekeeping" practices.

Gaps in knowledge & recommendations for further study

» This is completed at a desktop level only.
» Identification and delineation of soil forms.
» Determine of soil sensitivity.

Recommendations with regards to general field surveys

» Field surveys to prioritise the development areas.

8.2.3. Impacts on Heritage (Archaeology and Palaeontology)

Heritage and archaeological resources and cultural landscape

Archaeological sites include caves and rock shelters, open air artefact scatters, rock engravings and historic structures with their associated cultural materials. In the Great Karoo natural elevated features such as dolerite dykes and ridges played a significant role in San settlement patterns. It is likely that similar archaeological heritage exists within the areas proposed for development and as such, impact to these resources must be assessed. The proposed development is located along the N10 which is used as a main transport route from the Western Cape to Gauteng through the Northern Cape. In addition, the area proposed for development has limited topography that could screen the proposed development). It is therefore very likely that the proposed development will have a negative impact on the cultural and scenic value of the landscape.

Palaeontological sensitivity Analysis of the Site

The Palaeosensitivity was identified as very high in terms of the SAHRIS Palaeontological Sensitivity Map (refer to **Figure 8.6**), the geological structure shows that, the development area is underlain by the Abrahamskraal and Teekloof Formations, both of the Adelaide Subgroup of the Beaufort Group of sediments. Based

on the known paleontological sensitivity of this area, it is very likely that activities associated with the development of the proposed PV facility will negatively impact on significant fossil heritage.

Figure 8.6. Palaeosensitivity Map. Indicating fossil sensitivity underlying the study area.

Issue	Nature of Impact	Extent of Impact	No-Go Areas
Destruction of archaeological heritage	Direct impact to archaeological heritage of scientific significance	Local	None identified at this stage
Negative impact to significant cultural	Indirect impact to significant cultural landscapes and cultural landscapes elements	Regional	None identified at this stage

landscapes			
Destruction of palaeontological heritage	Direct impact to palaeontological heritage of scientific significance	Local	None identified at this stage

Description of expected significance of impact

» Field assessment will determine the significance of the resources likely to be impacted. Impacts can be minimised through the implementation of appropriate mitigation measures.

Gaps in knowledge

» The project area and the area more broadly have not been subjected to many heritage impact assessments and therefore substantial gaps in knowledge exist. Field assessment will fill these gaps.

Recommendations with regards to general field surveys

» Archaeological field surveys must provide sufficient ground-coverage of the areas to be developed to be able to determine the nature of the resources likely to be impacted.

» Palaeontological and cultural landscape field surveys will target sensitive geological and cultural landscape features.

8.2.4. Visual Impacts

Visual impact of the facility on observers in close proximity to the proposed PV facility infrastructure and activities. Potential sensitive visual receptors include:

» Residents of homesteads and farm dwellings (in close proximity to the facility)

» Observers travelling along the Rondawel secondary road (and potentially the N10 national road)

Sensitivity Analysis of the Site

The viewshed analysis was undertaken from a representative number of vantage points within the development footprint at an offset of 5m above ground level. This was done to determine the general visual exposure (visibility) of the area under investigation, simulating the maximum height of the proposed structures (PV panels and inverters) associated with the facility.

The viewshed analysis will be further refined once a preliminary and/or final layout is completed and will be regenerated for the actual position of the infrastructure on the site and actual proposed infrastructure during the EIA phase of the project. also indicates proximity radii from the development footprint in order to show the viewing distance (scale of observation) of the facility in relation to its surrounds.

It is clear that the relatively constrained dimensions of the PV facility would amount to a fairly limited area of potential visual exposure. The visual exposure would largely be contained within a 6km radius of the proposed development site, with the predominant exposure to the north-east.

The following is evident from the viewshed analyses:

» Within 0-1km the facility may be highly visible. There are no homesteads within this zone, only a section of the Rondawel secondary road traversing south-west of the site.
» The zone within 3km radius contains the Rondawel homestead[10] (guest farm), a short section of the N10 national road and the Rondawel secondary road. Other than these potential receptor sites, the rest of the visually exposed areas fall within vacant farmland.
» Visual exposure within 6km radius will predominantly be towards the north-east, along the Droërivier/Hydro 1 and 3, Gamma/Perseus and Gamma/Hydra power lines, up to the Bobbejaankrans hills. The only homestead within this zone is the Nieuwefontein dwelling to the north-west
» 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.

Impact

Visual impact of the facility on observers in close proximity to the proposed PV facility infrastructure and activities. Potential sensitive visual receptors include:

- Residents of homesteads and farm dwellings (in closer proximity to the facility)
- Observers travelling along the secondary roads traversing near the proposed developments

Issue	Nature of Impact	Extent of Impact	No-Go Areas
The viewing of the PV facility infrastructure and activities	The potential negative experience of viewing the infrastructure and activities within a predominantly undeveloped setting	Primarily observers situated within a 3km radius of the facility	N.A.

Description of expected significance of impact

Extent: Local
Duration: Long term
Magnitude: Moderate to High (depending on observer proximity)
Probability: Probable
Significance: Moderate to High
Status (positive, neutral or negative): Negative
Reversibility: Recoverable
Irreplaceable loss of resources: No
Can impacts be mitigated: Yes

[10] The names listed are of the homestead or farm dwelling as indicated on the SA 1: 50 000 topographical maps and do not refer to the registered farm name.

Gaps in knowledge & recommendations for further study

A finalised layout of the 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

Additional activities:

- Identify potential cumulative visual impacts
- Undertake a site visit
- Recommend mitigation measures and/or infrastructure placement alternatives

Refer to the Plan of Study for the EIA phase of the project below.

8.2.5. Traffic Impacts

Impact:
Traffic congestion due to an increase in traffic caused by the transportation of equipment, material and staff to site

Desktop Sensitivity Analysis of the Site:
Traffic congestion possible along the N10 during construction.

Issue	Nature of Impact	Extent of Impact	No-Go Areas
Traffic congestion	Potential traffic congestion and delays on the surrounding road network. The associated noise and dust pollution due to the increase in traffic.	Local	None identified

	The traffic generated during the operational phase will be negligible and will not have a significant impact on the surrounding road network. However, the Client/Facility Manager is to ensure that regular maintenance of gravel roads occurs during operation phase to minimise/mitigate dust pollution.		

Description of expected significance of impact

The significance of the transport impact during the construction phase can be rated as medium. However, considering that this is temporary and short term in nature, the impact can be mitigated to an acceptable level. Traffic will return to normal levels after construction is completed. Noise and dust pollution during the construction phase cannot be completely mitigated but mitigation measures will significantly reduce the impact. These potential impacts limited to the construction period.

Gaps in knowledge & recommendations for further study

Gaps

Items such as existing traffic volumes along the N10, local or imported components, water source to be clarified – borehole or transported to site., number of components, number of abnormal loads, dimensions and weight of components, size of water bowser to be used, construction period, number of site staff, Fleet size.

Recommendations

It its recommended to avoid staggered intersections on the N10. Intersections should rather be consolidated or realigned, stagger component delivery to site, reduce the construction period, the use of mobile batch plants and quarries in close proximity to the site, staff and general trips should occur outside of peak traffic periods

8.2.6. Social Impacts

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 development would mainly focus on economic benefits to the area and other dimensions of impacts such as influx of jobseekers into the local area will need to be weighed.

The development of renewable energy projects would make a notable positive economic impact on the local economies of the Local Municipality due to the increase in construction activities in the area and the demand created for various services. It is anticipated that the local unemployment rates would notably decline during the construction period. 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 skills development in the respective industries, increase in government revenue, improved livings standards of households who will benefit from created employment, as well as long-term injections into the local economies through SED and ED commitments during operations.

The social impacts associated with the proposed PV development includes the following:
Positive impacts
» Creation of employment and business opportunities, and opportunity for skills development and on-site training.

Positive negative impacts
» Impacts associated with the presence of construction workers on local communities.
» Impacts related to the potential influx of job-seekers.
» Increased risks to livestock and farming infrastructure associated with the construction related activities and presence of construction workers on the site.
» Increased risk of grass fires associated with construction related activities.
» Nuisance impacts, such as noise, dust, and safety, associated with construction related activities and vehicles.
» Impact on productive farmland.

Issue	Nature of Impact	Extent of Impact	No-Go Areas
Creation of employment and business opportunities during the construction phase	Direct impacts » Creation of temporary employment opportunities » Creation of business and procurement opportunities Indirect impacts » Support for local economy. » Creation of training and skills development opportunities	Local -Regional	No no-go areas identified to date.
Potential impacts on family structures and social networks associated with the presence of construction workers	Direct impacts » Disruption of existing family structures and social networks » Anti-social behaviour of construction workers » Increase in substance abuse, crime, sexually transmitted diseases. » Unplanned pregnancies Indirect impacts	Local -Regional	No no-go areas identified to date.

	» Impact on psychological well-being of local communities. » Resentment of outsiders and tension within local communities			
Potential impacts on family structures, social networks and community services associated with the influx of job seekers	Direct impacts » Disruption of existing family structures and social networks » Anti-social behaviour of construction workers » Increase in substance abuse, crime, sexually transmitted diseases. » Unplanned pregnancies » Pressure on local services Indirect impacts » Impact on psychological well-being of local communities. » Resentment of outsiders and tension within local communities	Local -Regional	No no-go areas have been identified.	
Potential risk to safety of scholars, farmers and farm workers, livestock and damage to farm infrastructure associated with the presence of construction workers on site	Direct impacts » Damage of gates, fences, etc. » Injuries to and loss of livestock » Break-ins, and theft of from local farms. » Damage of local farm roads. Indirect impacts » Exposure to outside people of farming operations and risk to farming operations. » Increased risk of stock-theft.	Local	No no-go areas have been identified.	
Potential loss of livestock, crops and houses, damage to farm infrastructure and threat to human life associated with increased incidence of grass fires	Direct impacts » Damage of structures, grazing, gates, fences, etc. » Injuries to and loss of livestock Indirect impacts » Impact on stocking levels and future farming operations. » Increased risk of stock losses and theft.	Local	No no-go areas have been identified to date.	

Potential noise, dust and safety impacts associated with construction related activities	Direct impacts » Dust impacts, and impact on quality of life and also crops and grazing. » Noise impacts, and impact on quality of life. » Safety of farmers due to movement of construction vehicles » Damage of local farm roads. Indirect impacts » Limited indirect impacts	Local	No no-go areas identified to date.	have been
Damage to farmland and loss of grazing and or crops	Direct impacts » Loss of grazing and or crops Indirect impacts » Impact on future farming operations. » Impact on employment opportunities on the farm.	Local	No no-go areas identified to date.	have been
Improve SA's energy security and reduce reliance on coal	Direct impacts » Improve energy security » Reduce reliance on coal. » Support renewable energy Indirect impacts » Address climate change impacts	Local-International	No no-go areas identified to date.	have been
Creation of employment and business opportunities associated with the operational phase	Direct impacts » Creation of employment opportunities » Creation of business and procurement opportunities Indirect impacts » Support for local economy. » Creation of training and skills development opportunities	Local-Regional	No no-go areas identified to date.	have been
Generation of additional income for affected landowners	Direct impacts » Additional income to support farming	Local	No no-go areas identified to date.	have been

	Indirect impacts » Opportunity to invest and expand farming operations and create more employment opportunities on the farm.			
Support for local economic development and investment	Direct impacts » Support local economic development » Create employment opportunities » Create skills development and training opportunities » Improve basic services Indirect impacts » Up-grade local municipalities and improve quality of life of local communities	Local-Regional	No no-go areas identified to date.	have been
Impact on rural sense of place	Direct impacts » Change in rural sense of place Indirect impacts » Potential impact on property values and hospitality operations.	Local	No no-go areas identified to date.	have been
Impact on rural sense of place and associated impact on property values.	Direct impacts » Change in rural sense of place and impact on property values Indirect impacts » Potential impact on hospitality operations.	Local	No no-go areas identified to date.	have been
Impact on existing and future tourism operations.	Direct impacts » Change in rural sense of place and impact on tourism activities. Indirect impacts » Potential impact on future development of hospitality operations.	Local	No no-go areas identified to date.	have been

Description of expected significance of impact

- Evidence from the other renewable energy projects indicates that the construction phase of 100 MW PV will extend over a period of approximately 18-24 months and create in the region of 350 employment opportunities. Members from the local communities in the area, would be in a position to qualify for most of the low skilled and semi-skilled opportunities. The business-related opportunities will be linked to the hospitality (accommodation) and services sector (catering, security, transport).
- Evidence from the other renewable energy projects indicates that presence and behaviour of construction workers can impact negatively on local communities. Members from the local communities in the area, would be at potential risk depending on where non-local construction workers are accommodated during the construction phase.
- Evidence from the other renewable energy projects indicates that the construction phase can result in the influx of jobseekers to the area and that this has the potential to impact negatively on local communities. However, the potential for the influx of jobseekers is also influenced by the location of the project. Projects located in relatively remote, rural areas are less likely to attract jobseekers
- Evidence from the other renewable energy projects indicates that the movement and activities of construction workers can impact on farming operations. The impacts include damage to fences and gates, gates being left open resulting in loss of livestock, increased risk of petty theft and stock theft.
- Evidence from the other renewable energy projects indicates that the activities associated with the construction phase can increase the risk of grass fires, which in turn can impact on farming operations. The impacts include loss of grazing, damage to structures, fences, and gates, etc. These impacts impact on the livelihood of farmers.
- Evidence from the other renewable energy projects indicates that the activities associated with the construction phase do result in dust, noise and safety impacts that can impact on local farmers and farm workers.
- Evidence from the other renewable energy projects indicates that the activities associated with the construction phase will result in the loss of farmland, including grazing and or crops depending on the location. These impacts impact on the livelihood of farmers. However, loss of land and crops can be addressed by minimising the disturbance footprint and compensation for losses.
- The direct employment opportunities associated with the operational phase of renewable energy projects are relatively limited. However, a review of the REIPPPP indicates that the benefits associated with the operation of renewable energy projects are significant and extend beyond direct employment opportunities.
- Evidence from the other renewable energy projects indicates that the generation of additional income represents a significant benefit for the local affected farmer(s) and reduces the risks to their livelihoods posed by droughts and fluctuating market prices for sheep and farming inputs, such as feed.
- The revenue from the proposed SEF can be used to support a number of social and economic initiatives in the area such as Creation of jobs, Education., Support for and provision of basic services, School feeding schemes, Training and skills development, Support for SMMEs.
- Renewable energy projects do have the potential to impact on an area's sense of place. In some instances, this can impact on property values. In other cases, local landowners have indicated that the potential visual impacts and impact on property values are not regarded as an issue.
- Renewable energy projects do have the potential to impact on an areas sense of place. In some instances, this can impact on tourism activities. In other cases, local landowners have indicated that the potential visual impacts and impact on tourism activities are not regarded as an issue.

Gaps in knowledge & recommendations for further study

- Local skills, education levels.
- Recommendations with regards to general field surveys
- Site visit and interviews with representatives from local chamber of commerce, hospitality associations, community, local farmers, local farming associations local municipality, and the hospitality and services sector.
- Collection of information on accommodation options and capacity, existing community challenges and needs, existing farming operations and activities, and risk of grass fires in the area.
- Collection and review of information on REIPPPP.

8.3. 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 Fountain Solar PV1 facility are described below and will be assessed in detail as part of the subsequent EIA phase to be conducted for the project.

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 Fountain Solar PV1 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).

Cumulative effects are commonly understood as the impacts which combine from different projects, and which result in significant change, which is larger than the sum of all the impacts (DEAT, 2004). The complicating factor is that the projects that need to be considered are from past, present, and reasonably foreseeable future development. Cumulative effects can be characterised according to the pathway they follow. One pathway could be the persistent additions from one process. Another pathway could be the compounding effect from one or more processes. Cumulative effects can therefore occur when impacts are:

» Additive (incremental);
» Interactive.
» Sequential; or
» Synergistic.

Canter and Sadler (1997) describe the following process for addressing cumulative effects in an EIA:

» Delineating potential sources of cumulative change (i.e. GIS to map the relevant renewable energy facilities in close proximity to one another);
» Identifying the pathways of possible change (direct impacts);
» Indirect, non-linear or synergistic processes; and
» Classification of resultant cumulative changes.

The site for the proposed development (Fountain Solar PV1 is located within 30km from several other authorised solar PV facilities. These projects include the following (refer to **Figure 8.8**):

Project Name	Project Status
Longyuan Mulilo Wind Energy Facility Maanhaarberg	(Operational)
Inca Solar PV Energy Project	(Approved)
Renosterberg Solar PV Facility	(Approved)
Castle Wind Energy Facility	(In Process)
Proposed PV facility on farm Blaauwkratz	(In Process)
Proposed PV facility on farm Caroluspoort	(In Process)
Proposed PV facility on farm Jakhalsfontein	(In Process)
Proposed PV facility on farm Loskop	(Approved)
Renosterberg Solar PV Facility	(Approved)
Ilanga Lethemba Solar PV Energy Facility	(Approved)
Mulilo Renewable Energy Wind Energy Facility	(Approved)
Photovoltaic Solar Energy Facility on Paarde Valley Farm	(Approved)
Solar PV Plant on farm Paarde	(Approved)
Scatec Solar PV Energy Facility	(Operational)

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 include impacts such as those listed below. The role of the cumulative assessment is to test if such impacts are relevant to the Fountain Solar PV1 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 other solar energy facilities within the surrounding areas 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.
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.

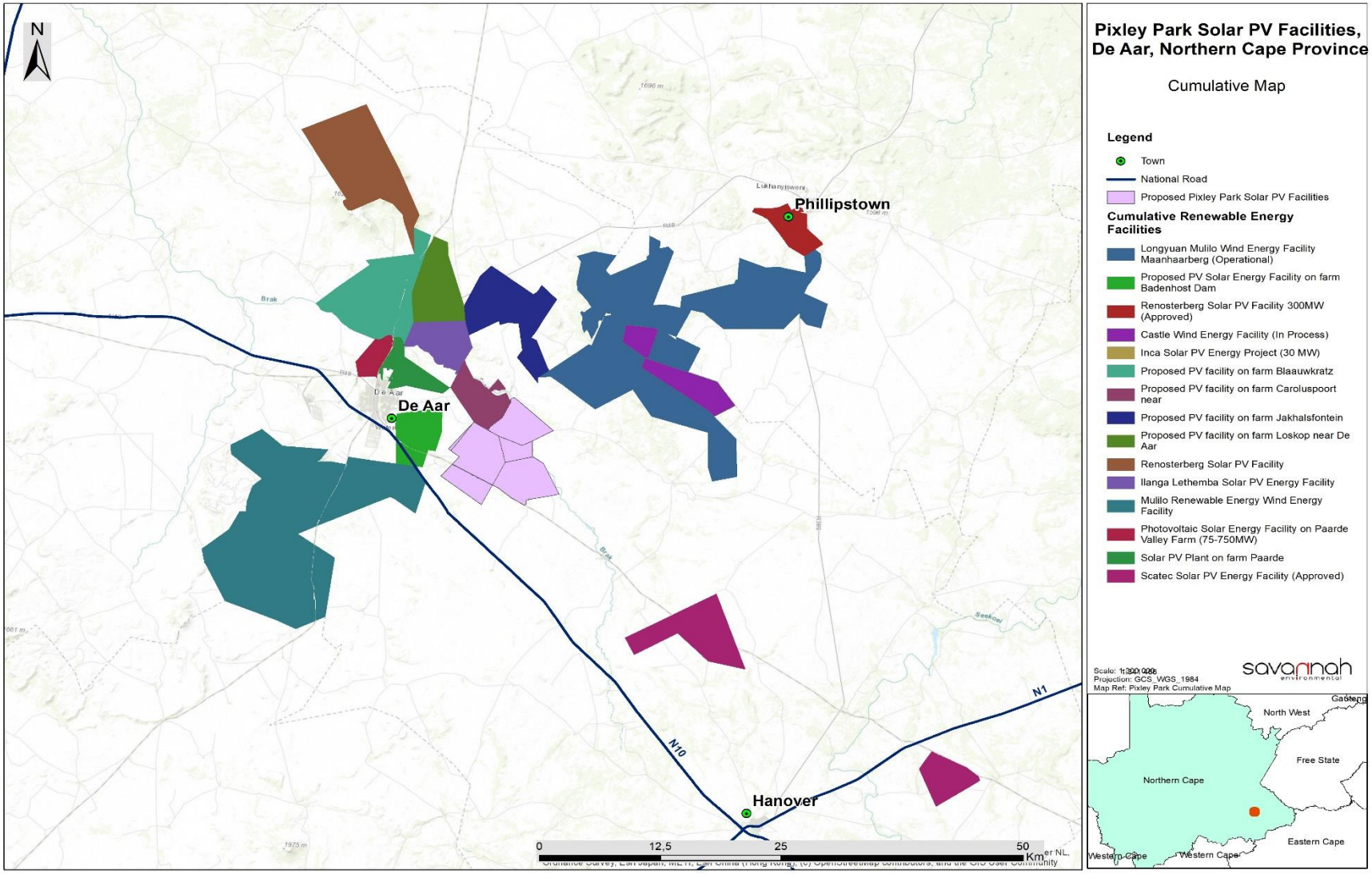


Figure 8.8: Cumulative map illustrating other approved and/or constructed PV facilities located within the vicinity of the Fountain Solar PV1 facility project site (**Appendix M**).

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 Fountain Solar PV1 facility and associated infrastructure on the identified site, 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 was achieved through an evaluation of the proposed project, involving the project proponent, and specialist consultants. This Scoping Report has been compiled in terms of the 2014 EIA Regulations (GNR 326) 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 Fountain Solar PV1 facility is included within this chapter as a whole.

9.2. Overview of the Fountain Solar PV1 facility

This Scoping Report documents the procedure for determining the extent of, and approach to, the Environmental Impact Assessment (EIA) Phase. The Scoping Phase included the following key tasks:

- Involvement of relevant authorities and Interested and Affected Parties (I&APs) through the Public Involvement Process.
- Consideration of feasible alternatives to be assessed during the EIA Phase.
- Identification of potential impacts (positive and negative) associated with feasible project alternatives to be assessed during the EIA Phase.
- Defining Terms of Reference for any specialist studies required to inform the EIA Phase (Plan of Study (PoS) for the Environmental Impact Assessment Report.

The Fountain Solar PV1 facility is proposed on a site located approximately 10km east of De Aar. The project site falls within Ward 6 of the Emthanjeni Local Municipality and the Pixley Ka Seme District Municipality in the Northern Cape Province on the following affected property:

- Portion 1 of Farm Riet Fountain No. 6.

The Fountain Solar PV1 facility project site is proposed to accommodate the following infrastructure which will enable the PV facility to supply a contracted capacity of up to 100MW:

- Solar PV array comprising bifacial PV modules and mounting structures, using single axis tracking technology
- Inverters and transformers
- Cabling between the panels
- Battery Energy Storage System (BESS)
- Laydown areas, construction camps, site offices
- 12m wide Access Road and entrance gate to the project site and switching station
- 6m wide internal distribution roads
- Operations and Maintenance Building, Site Offices, Ablutions with conservancy tanks, Storage Warehouse, workshop, Guard House
- Onsite Switching Station (SwS), adjacent to each of the IPP IPP substations (SS).
- A 132kV Overhead Power Line (OHPL) from each of the SwS connecting back to a Main Transmission Substation (MTS)
- There is a MTS proposed on either the farm Vetlaagte (i.e. Vetlaagte MTS) or the farm Wagt 'n Bietjie (i.e. Wagt 'n Bietjie MTS)

The Scoping study included the identification of potential impacts associated with the project through specialist inputs and consultation with affected parties and key stakeholders. A preliminary evaluation of the extent and expected significance of potential impacts associated with the development of the Fountain Solar PV1 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 sensitive areas within the development area to assist in focussing the location of the development footprint for the Fountain Solar PV1 facility to minimise the potential for environmental impact. The extent of the project site is ~ 500 ha and has been considered in this Scoping Report. A development area of ~ 300 ha was demarcated within this project site and allows an adequate footprint for the installation of a PV energy facility with a contracted capacity of up to 100MW, while allowing for the avoidance of environmental site sensitivities. 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 majority of potential impacts identified to be associated with the construction of the Fountain Solar PV1 facility and associated infrastructure are anticipated to be localised and restricted to the development area itself, while operation phase impacts/benefits range from local to regional. No environmental fatal flaws were identified to be associated with the development area. Areas of high and very high sensitivity were identified to be avoided by the development footprint.

The potentially significant issues related to the construction and operation of the Fountain Solar PV1 facility include:

- Disturbance/destruction to and loss of vegetation and fauna and associated habitats
- Introduction and/or spread of declared weeds and alien invasive plants.
- Disturbance / degradation / loss of agricultural soils.
- Increased erosion and sedimentation & contamination of soil and water resources.

- Loss of land with agricultural capability.
- Destruction of archaeological and palaeontological heritage.
- Negative impact to significant cultural landscapes.
- Visual impacts on the landscape and sense of place.
- Increase in noise level at sensitive receptors.
- Traffic congestion during construction.
- Social impacts, both positive and negative (job creation and business opportunities, impacts associated with construction workers in the area, and economic benefits).

9.3. Sensitivity Analysis for the Fountain Solar PV1 facility

This section considers the sensitive features located within the development area, as identified by the independent specialists within each respective field, and also indicates the locations of the sensitive features within 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 detail is based on the desktop review of available baseline information for the project site, as well as the sensitivity data from specialist studies undertaken during the scoping phase, which included field surveys. During the site and desktop surveys, the affected area was investigated in sufficient detail in order to provide definitive insight into the potential for constraining factors on the site. The sensitivity map must be used as a tool by the developer to avoid any areas flagged to be of higher risk or sensitivity and inform the location/layout of the development footprint for the facility and associated infrastructure. The development footprint is the area which will be assessed further in detail in the EIA Phase, in order to provide an assessment of environmental acceptability and suitability of the facility layout of the Fountain Solar PV1 facility .

9.3.1. Ecological Sensitive Features

The majority of the site is considered low sensitivity on account of the generally low abundance of species of concern. High sensitivity areas which should preferably be avoided by the PV development is indicated in **Figure 9.2.** The non-developable areas were delineated based on the 50 m buffer of the drainage lines which are recommended for maintaining species diversity (Macfarlane *et al*, 2009), as well as the dolerite koppies and sills. The potentially developable areas are still subject to the outcomes of the Biodiversity Impact Assessment. Overall, provided that the PV development footprint can be accommodated within the lower sensitivity parts of the site, the impact of the development would be relatively low and would be considered acceptable.

At a regional level, the Critical Biodiversity Area (CBA) map for Northern Cape indicates the eastern part of the broader project site as being important for conservation as the remaining drainage lines of the broader project site are indicated as being Ecological Support Areas (ESAs).

In terms of species of concern and overall biological diversity, including both plants and animals, the low hills and mountain ranges are the areas with the most species recorded as well as being most likely to contain any species of concern.

9.3.2. Freshwater Sensitive Features

As per the DFFE screening reports the aquatic biodiversity theme sensitivity indicates a dominance of "Very High" sensitivity for the project area, with a small area classified as "Low" sensitivity. No natural wetland areas are expected for the Fountain Solar PV1 facility. Desktop information suggests the presence of drainage features and river networks. The freshwater ecology of the immediate project area and further downstream is sensitive to disturbance from a hydrological and biological perspective, however due to the ephemeral nature of the watercourses, this sensitivity applies more to the watercourses physical characteristics that influence the hydrological and biological aspects in times of flow.

9.3.3. Soils and Agricultural Potential Sensitive Features

According to DAFF (2017), eight land capability classes were identified throughout the project area. These land capability classes are classified as having "Very Low to "Low" (land capability classes 1 to 5) sensitivities with the land capability classes 6 to 8 regarded as having "Moderately Low to "Moderate" sensitivities. These sensitivities are considered to be preliminary and will be confirmed during the impact phase of the project.

Considering the lack of sensitivity, together with holistic mitigation measures, it has been determined that none of the aspects scored during the impact assessment (post-mitigation) are associated with any scores higher than "Low". It is recommended that the site assessment to be conducted for focus areas that potentially are characterised by greater micro-climates (i.e., aspect) and low laying areas characterised by deep soils.

9.3.4. Heritage sensitive features, the cultural landscape (incl. archaeology, palaeontology, and cultural landscape)

Heritage sensitivity relates to archaeological resources, palaeontological resources, heritage resources, and the cultural landscape. According to the CTS Heritage, the area proposed for development's overall archaeological sensitivity with regard to the preservation of Early, Middle and Later Stone Age archaeology as well as Khoe and San heritage, early colonial settlement is regarded as extremely high.

Despite this, the field assessment conducted for this project has demonstrated that the specific area proposed for development has low sensitivity for impacts to significant archaeological heritage. The observations are typical of the area and are ubiquitously distributed in low densities of less than 5 artefacts per observation. Similar heritage resources are likely to be located within the area proposed for development.

9.3.5. Palaeontology

According to the SAHRIS Palaeosensitivity Map the area proposed for development is underlain by sediments of moderate. high and extremely high paleontological sensitivity. According to the extract from the Council for GeoSciences Map 3024 for Colesburg, the development area is underlain by Jurassic Dolerite, the Tierberg Formation of the Ecca Group and the Adelaide Subgroup of the Beaufort Group as well as Quaternary sands associated with the drainage lines. The superficial deposits within the study areas (e.g., soils, gravels, alluvium, calcrete hardpans) are of low palaeontological sensitivity as a whole.

There are no areas identified which are required to be excluded from the proposed development footprint.

9.3.6. Visual Sensitive Features

A preliminary viewshed analysis for the proposed Fountain Solar PV1 facility was undertaken in order to determine the general visual exposure of the area under investigation. The viewshed analyses was undertaken from preliminary vantage points within the proposed development area at offsets of 5m above average ground level.

It is envisaged that the structures, where visible from shorter distances, and where sensitive visual receptors may find themselves within this zone, may constitute a high visual prominence, potentially resulting in a visual impact. This may include residents of the farm dwellings, as well as observers travelling along the roads in closer proximity to the facility.

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 Fountain Solar PV1 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 areas of a 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 an extensive 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.

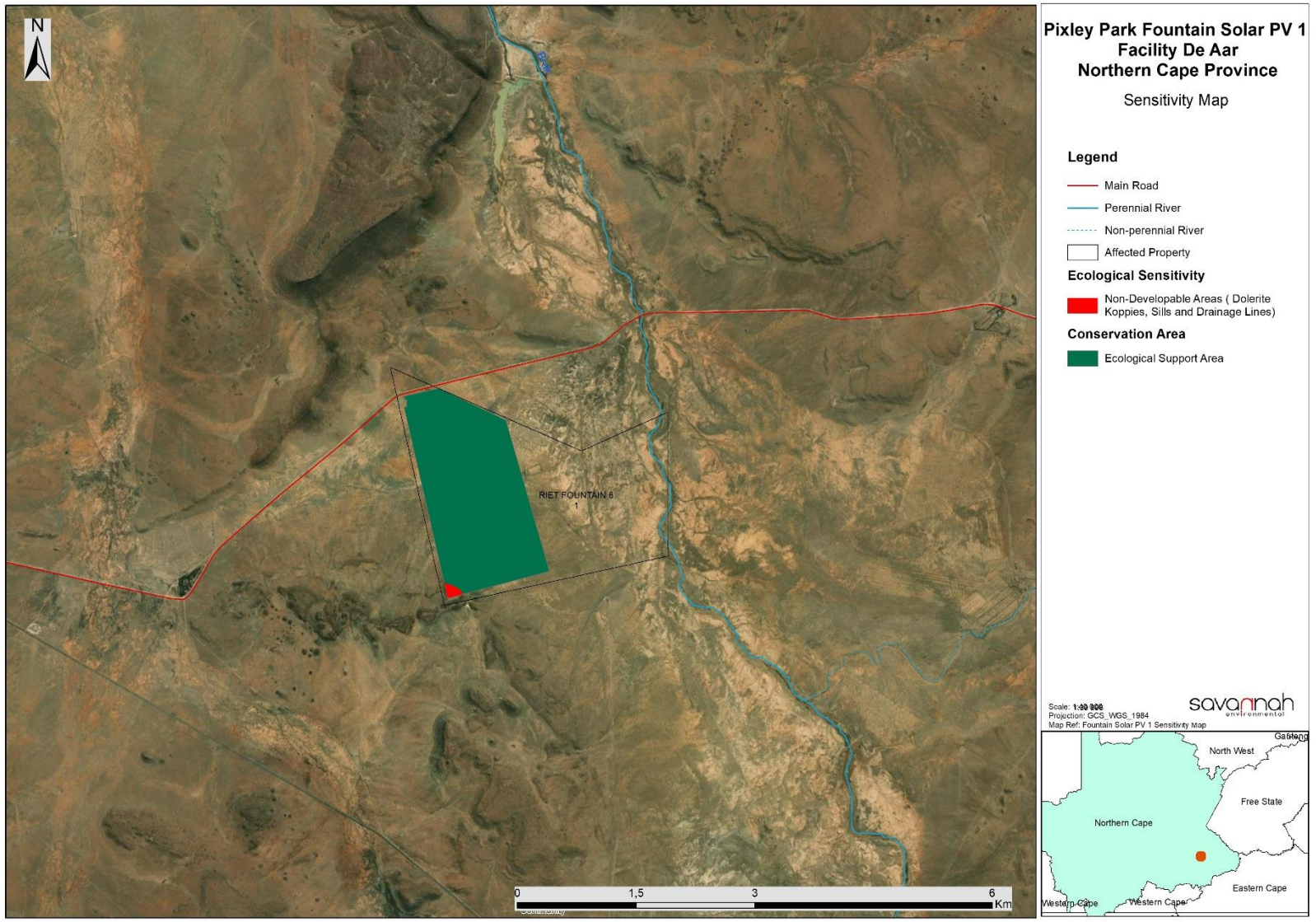


Figure 9.1: Environmental Sensitivity Map from the results of the scoping evaluation for the Fountain Solar PV1 facility, indicating the recommended development envelope (area excludes any areas of significant biodiversity and do not contain any areas considered to be no-go areas)

CHAPTER 10: PLAN OF STUDY FOR The ENVIRONMENTAL IMPACT ASSESSMENT

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 Fountain Solar PV1 facility, which 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 a Scoping 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
(h) a plan of study for undertaking the environmental impact assessment process to be undertaken, including - (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.	A plan of study for the undertaking of the EIA Phase for the Fountain Solar PV1 facility is included within this chapter.

10.2. Objectives of the EIA Phase

The EIA Phase to be undertaken for the Fountain Solar PV1 facility and associated infrastructure will aim to achieve the following:

- Provide an overall description and detailed assessment of the social and biophysical environment affected by the development of the Fountain Solar PV1 facility and associated infrastructure.
- Assess potentially significant impacts (direct, indirect, and cumulative, where required) associated with the PV facility.
- Identify and recommend appropriate avoidance strategies and 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 comments are recorded.

The EIA will assess potential environmental impacts and benefits (direct, indirect, and cumulative impacts) associated with each phase of the development including design, construction, operation, and decommissioning; and will aim to provide the Competent Authority with sufficient information to make an informed decision regarding the proposed development. The site layout being proposed for the Fountain Solar PV1 facility will be assessed through detailed independent specialist studies. As required in terms of the 2014 EIA Regulations (GNR 326), as amended, the assessment will include consideration of the 'do nothing' alternative.

10.3. Consideration of Alternatives

The following project alternatives will be investigated in the EIA:

Nature of Alternatives Considered	Description of the Alternatives relating to the Fountain Solar PV1 facility
Site-specific and Layout Alternatives	One preferred project site has been identified for the development of the Fountain Solar PV1 facility due to site specific characteristics such as the solar resource, land availability, topographical considerations, proximity to a viable grid connection and environmental features. A development area of ~300ha has been identified by the proponent within the project site for the development.
Activity Alternatives	Only the development of a renewable energy facility is considered by Fountain Solar PV1 (Pty) Ltd. Due to the location of the project site and the suitability of the solar resource, only the development of a PV facility is considered feasible considering the natural resources available to the area and the current land-use activities undertaken within the project site (i.e., livestock farming).
Technology Alternatives	Only the development of a Solar PV is considered due to the characteristics of the site, including the natural resources available. The use of solar PV for the generation of electricity is the most efficient technology for the project site.
'Do-nothing' Alternative	This is the option to not construct the Fountain Solar PV1 facility. No impacts (positive or negative) are expected to occur on the social and environmental sensitive features or aspects located within the project site or the surrounds. The opportunities associated with the development of the solar PV for the affected area and other surrounding towns in the area will not be made available.

10.4. Description of project to be assessed during the EIA Phase

10.4.1. Project description

The aspects or nature and extent of the project to be assessed as part of the EIA are detailed in **Table 10.1** below. A more detailed description of the activities associated with the construction and operation of the project is included in Chapter 2 of this Scoping Report.

Table 10.1: Activities and associated infrastructure to be assessed in the EIA

Infrastructure	Footprint and dimensions
Number of Panels	To be determined in the EIA phase
Panel Height	Up to 5m
Technology	Use of fixed-tilt, single-axis tracking PV technology. Monofacial or bifacial panels are both considered.
Contracted Capacity	Up to 100MW
Area occupied by the solar array	~300ha
Area occupied by the on-site facility substation	~1000m x 700m
Capacity of on-site facility substation	33kV/132kV
Underground cabling between the PV array and the onsite substation	Underground cabling will be installed at a depth of up to 1.5m to connect the PV array to the on-site facility substation. The cabling will have a capacity of up to 35kV.
Cabling from the onsite substation to the 132kV IPP substation	Underground cabling will be installed at a depth of up to 1.5m to connect the on-site substation to the 132kV IPP substation. The cabling will have a capacity of up to 35kV.
Area occupied by the electrical and auxiliary equipment required at the IPP substation	100mx100m
Area occupied by laydown area	~1000m x 700m
Access and internal roads	Wherever possible, existing access roads will be utilised to access the project site and development area. Access roads will need to be upgraded as part of the proposed development of up to 12m. Internal roads of up to 6m in width will be required to access the PV panels and the on-site substation.
Grid connection	The 33/132kV on-site substation will be connected to the proposed 132kV central IPP substation. A new 132kV single circuit power line will run from the central IPP substation and tie into the existing Eskom Hydra Substation. the grid connections and infrastructure will be assessed as part of a separate Basic Assessment process in support of an application for Environmental Authorization.
Temporary infrastructure	Temporary infrastructure, including laydown areas, hardstand areas and a concrete batching plant, will be required during the construction phase. All areas affected by temporary infrastructure will be rehabilitated following the completion of the construction phase, where it is not required for the operation phase.

10.4.2. Scope of the EIA phase and EIA report

The EIA Report will be compiled in terms of the requirements of the EIA Regulations and include the information as required in Appendix 3 of GNR 326. The results of the specialist studies and other available information will be integrated, synthesised, and presented in the EIA Report by the Savannah Environmental project team. The EIA report will assess the overall environmental impacts associated with the development, consider mitigation measures as may be required, and make recommendations regarding the best development alternative. The EIA Report will also identify mitigation measures and provide management recommendations to minimise negative impacts and enhance benefits. The EIA Report will include:

- The details and expertise of the **EAP** who prepared the report.
- The **location** of the development footprint 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 as contemplated in the accepted scoping report.
- 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 way 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 location of the preferred alternative development location; and
  - 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.
- An **Environmental Management Programme** (EMPr), as per Appendix 4 of GNR326, containing the recommendations from specialists, the impact management **objectives,** and the impact management **outcomes**.
- 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.
- 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 under **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 and comment 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 the authorities for decision-making.

10.5 Specialist Assessments to be undertaken during the EIA Phase

A summary of the aspects which require further investigation within the EIA Phase through specialist studies, as well as the proposed activities to be undertaken to assess and ground truth the significance of the potential impacts is provided within **Table 10.2**. The specialists proposed to undertake detailed studies in the EIA Phase are also reflected within this table. These specialist studies will consider the development footprint proposed for the PV facility and all associated infrastructure, as well as feasible and reasonable alternatives identified for the project. The terms of reference for each specialist includes the following:

Issue	Activities to be undertaken to assess significance of impacts	Specialist
Ecology (Flora and Fauna)	The fieldwork will be placed within targeted areas perceived as ecologically sensitive based on the preliminary interpretation of satellite imagery (Google Corporation) and GIS analysis (which included the latest applicable datasets) available prior to the fieldwork. biodiversity » The focus of the fieldwork is therefore to maximise coverage and navigate to each target site in the field, to perform a rapid vegetation and ecological assessment at each sample site. Emphasis will be placed on sensitive habitats, especially those overlapping with the proposed project area. » Homogenous vegetation units will be subjectively identified using satellite imagery and existing land cover maps. The floristic diversity and search for flora SCC will be conducted through timed meanders within representative habitat units delineated during the scoping fieldwork. Emphasis will be placed mostly on sensitive habitats overlapping with the proposed project areas. » The timed meander search will be performed based on the original technique described by Goff *et al.* (1982 **Fauna Survey** » The faunal assessment within this report pertains to herpetofauna (amphibians and reptiles) and mammals. The faunal field survey will comprise of the following techniques: » Visual and auditory searches – This typically comprises of traversing the project area and using binoculars to view species from a distance without them being disturbed or listening for species calls. Tracks, scat, and other signs will also be included as part of the visual search. » Active hand-searches – This will be used for species that shelter in or under micro-habitats (e.g., under rocks, exfoliating bedrock, fallen trees, leaf litter and peeling bark); and » Passive sampling – Camera traps will be used to survey for secretive and nocturnal species. » Identify any additional mitigation and avoidance measures for inclusion in the EMPr that should be implemented to further reduce the impacts of the development on terrestrial biodiversity.	
Freshwater resources (including all waterbodies and wetlands)	<u>The EIA Phase will include the following activities:</u> Freshwater resources located within the development area will be further assessed during the EIA Phase. The following activities will be undertaken: » Identify, delineate, and characterise water resources. » Undertake a functional assessment of systems, where applicable. » Determine a suitable buffer width for the resources. » Undertake a field survey during the wet season period that prioritises the development areas, but also considers the 500m regulated area.	

	Assessment of Impacts for the EIA: The methodology described in **Section 10.6** 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). 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. 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 EMPrs.	
Soils, Land Use, Land Capability and Agricultural Potential	The soils impact assessment will include the consideration of aspects related to agricultural aspects in accordance with the protocols and procedures of GN 320 of 2020. ***Sensitivity Analysis and EIA assessment*** The following activities are proposed during the EIA Phase: » Soil and agricultural survey all proposed infrastructure. The survey will include soil classification according to the Soil Classification: A Natural and Anthropogenic System for South Africa (Soil Classification Working Group, 2018). » The landowners and/or land users will be consulted individually for discussion of the productivity and employment data associated with the areas that will impacted by the proposed development. The discussion will also address the limitations and risks of livestock production in the area to compare it to renewable energy production. » Assess the impacts identified considering the site-specific findings and the final layout to be provided by the developer. » Appropriate mitigation measures as far as the disturbance of agricultural practices is concerned. ***Assessment of Impacts for the EIA*** 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).	

	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. ***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 EMPrs.	
Visual impact	***Sensitivity Analysis and EIA assessment*** The Visual Impact Assessment study to be undertaken in the EIA phase will include a level 3 assessment which includes: » Determine Visual Distance/Observer Proximity to the facility - The proximity radii (calculated from the boundary lines of the facility). » Determine Viewer Incidence/Viewer Perception - Identify areas of high viewer incidence and to classify certain areas according to the observer's visual sensitivity towards the proposed facility and its related infrastructure. » Determine the Visual Absorption Capacity (VAC) of the landscape - The VAC is primarily a function of the vegetation, and will be low if the vegetation is, low growing sparse and patchy vegetation. » Determine the Visual Impact Index - The site-specific issues and potential sensitive visual receptors will be measured against this visual impact index and be addressed individually in terms of nature, extent, duration, probability, severity, and significance of visual impact. » Identification and assessment of all potential impacts (direct, indirect, and cumulative) identified in this scoping phase report and. » Recommendations will be made for the management of identified impacts. ***Assessment of Impacts for the EIA*** 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 the criteria of extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral, or positive). 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. ***Environmental Management Programme***	Lourens du Plessis (LOGIS)

	For each overarching anticipated impact, management recommendations for the design, construction, and operational phase (where appropriate) will be drafted for inclusion in the project EMPrs.	
Social	***Sensitivity Analysis and EIA assessment*** The specialist study to be undertaken in the EIA phase will include: » Describing and obtaining an understanding of the proposed development (type, scale, location), the communities likely to be affected and determining the need and scope of the SIA » Collecting baseline data on the current social environment and historical social trends » 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). » 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. » Identify mitigation measures with which to reduce negative impacts and enhance positive impacts for inclusion in the Environmental Management Programme (EMPrs). 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). » Provide a reasoned opinion regarding the acceptability of the project. ***Assessment of Impacts for the EIA*** 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 the criteria of extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral, or positive). 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. ***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 EMPrs.	Tony Barbour

Traffic	The EIA Phase will include the following activities: » Undertake additional site visit. » Confirmation of trip generation based on the activities related to traffic movement for the construction and operation (maintenance) phases of the facility. » Access assessment based on the preferred access point. » Impact assessment and mitigation measure. » Cumulative impact assessment. Assessment of Impacts for the EIA: The methodology described in **Section 10.6** 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). 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. 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.	Iris Wink of JG Afrika
Cumulative Assessment	Assess the cumulative impacts associated with the construction and operation of more than one development (i.e., renewable energy developments) within the immediate surrounding areas of the project site on the ecological, heritage, soil and agricultural potential, bats, avifaunal, social, traffic, visual and noise impacts of the area. The objective is to identify and focus on potentially significant cumulative impacts so these may be taken into consideration in the decision-making process. The following will be considered: » 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 infrastructures. » 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).	Savannah Environmental

	» Unacceptable increase in ambient noise conditions. » Complete or whole-scale change in the sense of place and character of an area and unacceptable visual intrusion. » Unacceptable impact on traffic and road conditions. » Unacceptable impact to socio-economic factors and components.	

10.6 Methodology for the Assessment of Potential Impacts

Direct, indirect, and cumulative impacts of the above issues identified through this Scoping Study 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; or
  - 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; or
  - 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); and
  - 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 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); and
  - 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).
- Other aspects to be taken into consideration in the specialist studies and EIA report are:
- Impacts should be described in terms of before and after the proposed mitigation and management measures have been implemented.
- All impacts should be evaluated for the full lifecycle of the proposed development, including construction, operation, and decommissioning.
- The impact assessment should take into consideration the cumulative effects associated with this and other similar developments which are either developed or in the process of being developed in the region. The purpose of the cumulative assessment is to evaluate if such impacts are relevant to the proposed project in the proposed location (i.e., whether the addition of the proposed project in the area will increase the impact). In this regard, specialist studies will consider whether the construction of the proposed development will result in:
- Unacceptable risk
- Unacceptable loss
- Complete or whole-scale changes to the environment or sense of place
- Unacceptable increase in impact

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

As Fountain Solar PV1 (Pty) Ltd has the responsibility to avoid and/or minimise impacts as well as plan for their management (in terms of the EIA Regulations), the mitigation of significant impacts will be discussed. Assessment of mitigated impacts will demonstrate the effectiveness of the proposed mitigation measures.

10.7 Authority Consultation

Consultation with the regulating authorities (i.e., DFFE and Northern Cape DAEARD&LR has been undertaken in the Scoping Phase and will continue throughout the EIA process. On-going consultation will include the following:

- Submission of a Final Scoping Report following a 30-day review period which will include all comments and issues raised during the review period as well as appropriate responses to the comments.
- Submission of an EIA Report and EMPr for a 30-day review and comment period.
- Submission of a Final EIA Report and EMPr following a 30-day review period which will include all comments and issues raised during the review period as well as appropriate responses to the comments received.

» Consultation and an authority site visit (if required) to discuss the findings and conclusions of the EIA Report.

10.8 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 DFFE (**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, identify additional issues of concern, or highlight positive aspects of the proposed project, and comment on the findings of the EIA Phase. 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).
» One-on-one consultation meetings (for example with directly affected and surrounding landowners) via telephone or virtual platforms.
» Telephonic consultation sessions (consultation with various parties from the EIA project team, including the public participation consultant, lead EIA consultant, as well as specialist consultants).
» Written, faxed or e-mail correspondence.

The public participation process will include the following activities:

» Placement of advertisements in one local newspaper (De Aar Echo Newspaper).
» Maintenance and finalisation of the I&AP database.
» Release of the EIA Report for a 30-day review and comment period.
» Ongoing consultation with all registered I&APs regarding the progress of the EIA process and the outcomes or findings of the EIA Report through stakeholder consultation via notification letters, telephone calls, focus group meetings and open house/information sharing meetings, depending on the specific needs of the stakeholders in the area.
» Facilitate comments on the EIA Report.
» Compile a Comments and Responses Report and evidence of the public participation process undertaken to be included in the final EIA Report for decision-making.

10.9 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
Make the Scoping Report available to the public, stakeholders, and authorities for 30 days	
Finalisation of Scoping Report, and submission of the Final Scoping Report to DFFE	

Key Milestone Activities	Proposed timeframe
Authority acceptance of the Final Scoping Report and Plan of Study to undertake the EIA	
Undertake specialist studies and public participation process	
Make Draft EIA Report and EMPr available to the public, stakeholders, and authorities	
Finalisation of EIA Report, and submission of the Final EIA Report to DFFE	
Authority review period and decision-making (107 calendar days)	

CHAPTER 11: References

Ecology Scoping Report

Alexander, G. & Marais, J. (2007). A guide to the Reptiles of Southern Africa. Struik, Cape Town.

Andersen, A.N., Hoffmann, B.D., Müller, W.J., Griffiths, A.D. 2002. Using ants as bioindicators in land management: Simplifying assessment of ant community responses. Journal of Applied Ecology, 39:8–17. https://doi.org/10.1046/j.1365-2664.2002.00704.x

Bates, M.F., Branch, W.R., Bauer, A.M., Burger, M., Marais, J., Alexander, G.J & de Villiers, M.S. (Eds). (2014). Atlas and Red List of Reptiles of South Africa, Lesotho, and Swaziland. Suricata 1. South African Biodiversity Institute, Pretoria.

Beatty, B., Macknick, J., McCall, J. and Braus, G. 2017. Native Vegetation Performance under a Solar PV Array at the National Wind Technology Center. National Renewable Energy Laboratory. Technical Report No: NREL/TP-1900-66218

Bennun, L., van Bochove, J., Ng, C., Fletcher, C., Wilson, D., Phair, N., Carbone, G. 2021. Mitigating biodiversity impacts associated with solar and wind energy development. Guidelines for project developers. Gland, Switzerland: IUCN and Cambridge, UK: The Biodiversity Consultancy.

Bohlweki-SSI, Environmental Sector. 2011. Environmental Impact Assessment for a Proposed 75 MW Concentrating Solar Thermal Power Plant and Associated Infrastructure in the Siyanda District, Northern Cape. Bohlweki-SSI project number: E02.JNB.000674.

Davidson, A.D., Detling, J.K. and Brown, J.H. 2012. Ecological roles and conservation challenges of social, burrowing, herbivorous mammals in the world's grasslands. Frontiers in Ecology and the Environment, 10(9): 477-486.

Department of Forestry, Fisheries, and the Environment (DFFE). 2021a. SACAD (South Africa Conservation Areas Database) and SAPAD (South Africa Protected Areas Database). http://egis.environment.gov.za.

Department of Forestry, Fisheries, and the Environment (DFFE). 2021b. Renewable Energy EIA Application Database. http://egis.environment.gov.za.

Driver, A., Nel, J.L., Snaddon, K., Murray, K., Roux, D.J., Hill, L., Swartz, E.R., Manuel, J. & Funke, N. (2011). Implementation Manual for Freshwater Ecosystem Priority Areas. Report to the Water Research Commission, Pretoria.

Du Preez, L. & Carruthers, V. (2009). A Complete Guide to the Frogs of Southern Africa. Struik Nature, Cape Town.

Fish, L., Mashau, A.C., Moeaha, M.J. & Nembudani, M.T. (2015). Identification Guide to Southern African Grasses: An Identification Manual with Keys, Descriptions, and Distributions. SANBI, Pretoria.

FitzPatrick Institute of African Ornithology. 2022a. FrogMAP Virtual Museum. Accessed at https://vmus.adu.org.za/?vm=FrogMAP on 2022-02-28

Goff, F., Dawson, G., & Rochow, J. (1982). Site examination for threatened and endangered plant species. *Environmental Management,* 6(4), 307-316.

Gollan, J.R., Bruyn, L.L. De, Reid, N., Smith, D., Wilkie, L. 2011. Can ants be used as ecological indicators of restoration progress in dynamic environments? A case study in a revegetated riparian zone. Ecological Indicators, 11: 1517–1525. https://doi.org/10.1016/j.ecolind.2009.09.007

Griffiths, C., Day, J. & Picker, M. (2016). Freshwater Life: A Field Guide to the Plants and Animals of Southern Africa. Struik Nature, Cape Town.

Hofmeyr, M.D., Leuteritz, T. & Baard, E.H.W. 2018b. *Psammobates tentorius*. The IUCN Red List of Threatened Species 2018: e.T170524A115656793. https://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T170524A115656793.en.

IUCN SSC Amphibian Specialist Group. 2013. *Pyxicephalus adspersus*. The IUCN Red List of Threatened Species 2013: e.T58535A3070700. https://dx.doi.org/10.2305/IUCN.UK.2013-2.RLTS.T58535A3070700.en. Accessed on 28 February 2022.

Jacques, H., Reed-Smith, J. & Somers, M.J. 2015. *Aonyx capensis*. The IUCN Red List of Threatened Species 2015: e.T1793A21938767. https://dx.doi.org/10.2305/IUCN.UK.2015-2.RLTS.T1793A21938767.en.

Johnson, S. & Bytebier, B. (2015). Orchids of South Africa: A Field Guide. Struik publishers, Cape Town.

Marais, J. 2004. A Complete Guide to the Snakes of Southern Africa. Struik Nature, Cape Town.

Measey, G.J. (2011). Ensuring a Future for South Africa's Frogs: A Strategy for Conservation Research. South African National Biodiversity Institute, Pretoria.

Minter, L., Burger, M., Harrison, J.A. & Kloepfer, D. (2004). Atlas and Red Data Book of the Frogs of South Africa, Lesotho, and Swaziland. Smithsonian Institute Avian Demography Unit, Washington; Cape Town.

Mucina, L. & Rutherford, M.C. (Eds.). (2006). The vegetation of South Africa, Lesotho, and Swaziland. Strelizia 19. South African National Biodiversity Institute, Pretoria South African.

Nel, J. L., Driver, A., Strydom, W. F., Maherry, A. M., Petersen, C. P., Hill, L., Roux, D. J., Nienaber, S., van Deventer, H., Swartz, E. R. & Smith-Adao, L. B. (2011). Atlas of Freshwater Ecosystem Priority Areas in South Africa: Maps to support sustainable development of water resources, WRC Report No. TT 500/11. Water Research Commission, Pretoria.

NPAES. (2021). National Protected Areas Expansion Strategy. www.environment.gov.za (Accessed: March 2021).

Pietersen, D., Jansen, R. & Connelly, E. 2019. *Smutsia temminckii*. The IUCN Red List of Threatened Species 2019: e.T12765A123585768. https://dx.doi.org/10.2305/IUCN.UK.2019-3.RLTS.T12765A123585768.en.

POSA. 2016. Plants of South Africa - an online checklist. POSA ver. 3.0. http://newposa.sanbi.org/. (Accessed: June 2021).

Raimondo, D., von Staden, L., Foden, W., Victor, J.E., Helme, N.A., Turner, R.C., Kamundi, D.A. and Manyama, P.A. 2009. Red List of South African Plants. Strelitzia 25. South African National Biodiversity Institute, Pretoria.

Roemer, G.W., Gompper, M.E. and Van Valkenburgh, B. 2009. The Ecological Role of the Mammalian Mesocarnivore. BioScience, 59: 165–173.

RoyalHaskoningDHV. 2020. Basic Assessment for the Proposed Development of Eight 200MW Photovoltaic (PV) Plants on the Remaining Extent of Farm Bokpoort 390, Groblershoop, Northern Cape. Report No: MD4195-RHD-ZZ-XX-R-YE-001

Sinha, P., Hoffman, B., Sakers, J. & Althouse, L. 2018. Best practices in responsible land use for improving biodiversity at a utility-scale solar facility. Case Studies in the Environment 2(1): 1–12. https://doi.org/10.1525/cse.2018.001123

Skinner, J.D. & Chimimba, C.T. (2005). The Mammals of the Southern African Subregion (New Edition). Cambridge University Press, South Africa.

Skowno, A.L., Raimondo, D.C., Poole, C.J., Fizzotti, B. & Slingsby, J.A. (eds.). (2019). South African National Biodiversity Assessment 2018 Technical Report Volume 1: Terrestrial Realm. South African National Biodiversity Institute, Pretoria.

Sliwa, A., Wilson, B., Küsters, M. & Tordiffe, A. 2016. *Felis nigripes* (errata version published in 2020). The IUCN Red List of Threatened Species 2016: e.T8542A177944648. https://dx.doi.org/10.2305/IUCN.UK.2016-1.RLTS.T8542A177944648.en.

Smith, G.F., Chesselet, P., van Jaarsveld, E.J., Hartmann, H., Hammer, S., van Wyk, B., Burgoyne, P., Klak, C. & Kurzweil, H. (1998). Mesembs of the world. Briza Publishers, Pretoria.

South African National Biodiversity Institute (SANBI). 2016. Lexicon of Biodiversity Planning in South Africa. Beta Version, June 2016. South African National Biodiversity Institute, Pretoria. 72 pp.

South African National Biodiversity Institute (SANBI). 2017. Technical guidelines for CBA Maps: Guidelines for developing a map of Critical Biodiversity Areas & Ecological Support Areas using systematic biodiversity planning. Driver, A., Holness, S. & Daniels, F. (Eds). 1st Edition. South African National Biodiversity Institute, Pretoria.

South African National Biodiversity Institute (SANBI). 2020. Species Environmental Assessment Guideline. Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for environmental impact assessments in South Africa. South African National Biodiversity Institute, Pretoria. Version 1.2020.

Stein, A.B., Athreya, V., Gerngross, P., Balme, G., Henschel, P., Karanth, U., Miquelle, D., Rostro-Garcia, S., Kamler, J.F., Laguardia, A., Khorozyan, I. & Ghoddousi, A. 2020. *Panthera pardus* (amended version of 2019 assessment). The IUCN Red List of Threatened Species 2020: e.T15954A163991139. https://dx.doi.org/10.2305/IUCN.UK.2020-1.RLTS.T15954A163991139.en.

Stuart, C and Stuart, M. A. 2013. Field guide to the tracks & signs of Southern, Central & East African Wildlife. Penguin Random House, Cape Town.

Stuart, C and Stuart, M. A. 2015. Stuarts' Field Guide to Mammals of Southern Africa including Angola, Zambia & Malawi. Struik Nature, Cape Town.

Taylor, M.R., Peacock, F. & Wanless, R.M. (Eds). 2015. The 2015 Eskom Red Data Book of birds of South Africa, Lesotho, and Swaziland. BirdLife South Africa, Johannesburg.

Van Deventer H, Smith-Adao L, Collins NB, Grenfell M, Grundling A, Grundling P-L, Impson D, Job N, Lötter M, Ollis D, Petersen C, Scherman P, Sieben E, Snaddon K, Tererai F., and Van der Colff D. 2019. *South African National Biodiversity Assessment 2018: Technical Report.* Volume 2b: Inland Aquatic (Freshwater) Realm. CSIR report number CSIR/NRE/ECOS/IR/2019/0004/A. South African National Biodiversity Institute, Pretoria. http://hdl.handle.net/20.500.12143/6230.

Van Oudtshoorn, F. (2004). Guide to the Grasses of Southern Africa. Second Edition. Briza Publikasies, Pretoria.

Van Rooyen, N & Van Rooyen, G. 2019. Flowering Plants of the Southern Kalahari. Novus Print, Somerset West

Wiesel, I. 2015. *Parahyaena brunnea*. The IUCN Red List of Threatened Species 2015: e.T10276A82344448. https://dx.doi.org/10.2305/IUCN.UK.2015-4.RLTS.T10276A82344448.en.

Freshwater Scoping Report

Department of Water Affairs and Forestry (DWAF), 2009. Orange River: Assessment of water quality data requirements for planning purposes. Resource Water Quality Objectives (RWQOs): Upper and Lower Orange Water Management Areas (WMAs 13 and 14). Report No. 5 (P RSA D000/00/8009/2). ISBN No. 978-0-621-38691-2, Pretoria, South Africa.
Department of Water Affairs (DWA). 2011. Procedures to Develop and Implement Resource Quality Objectives. Department of Water Affairs, Pretoria, South Africa
Department of Water and Sanitation (DWS). 2020. National Environmental Management Act (NEMA). Act 107 of 1998. 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. National Gazettes, No. 320 of 20 March 2020
Department of Water and Sanitation (DWS). 2014. A Desktop Assessment of the Present Ecological State, Ecological Importance and Ecological Sensitivity per Sub Quaternary Reaches for Secondary Catchments in South Africa. Draft. Compiled by RQS-RDM. Accessed 25 February 2022.
Desmet PG, Holness S, Skowno A & Egan VT. 2013. Limpopo Conservation Plan v.2: Technical Report. Contract Number EDET/2216/2012. Report for Limpopo Department of Economic Development, Environment & Tourism (LEDET) by ECOSOL GIS.
Driver A, Nel JL, Snaddon K, Murray K, Roux DJ, Hill L, Swartz ER, Manuel J, Funke N. 2011. Implementation Manual for Freshwater Ecosystem Priority Areas. Water Research Commission. Report Number 1801/1/11, ISBN 978-1-4312-0147-1.
Macfarlane DM and Bredin IP. 2017. Part 1: technical manual. Buffer zone guidelines for wetlands, rivers and estuaries
Mucina, L. & Rutherford, M.C. (Eds.). (2006). The vegetation of South Africa, Lesotho and Swaziland. Strelizia 19. South African National Biodiversity Institute, Pretoria South African.
National Water Act (NWA). 1998. Act 39 of 1998. Regulation GN1199
National Water Act (NWA). 2016. Act 36 of 1998. New Nine (9) Water Management Areas of South Africa. National Gazettes, No. 40279 of 16 May 2016
Rountree KM, Wadeson RA and O'Keeffe J. 2000. The Development of a Geomorphological Classification System for the Longitudinal Zonation of South African Rivers. South African Geographical Journal 82 (3): 163-172.
Skowno, A.L., Raimondo, D.C., Poole, C.J., Fizzotti, B. & Slingsby, J.A. (eds.). 2019. South African National Biodiversity Assessment 2018 Technical Report Volume 1: Terrestrial Realm. South African National Biodiversity Institute, Pretoria
South African National Biodiversity Institute (SANBI). 2013. GIS metadata for the Strategic Water Source Areas (SWSAs) of South Africa, Lesotho and Swaziland.
South African National Biodiversity Institute (SANBI). 2017. Technical guidelines for CBA Maps: Guidelines for developing a map of Critical Biodiversity Areas & Ecological Support Areas using systematic biodiversity planning. Driver, A., Holness, S. & Daniels, F. (Eds). 1st Edition. South African National Biodiversity Institute, Pretoria.
Van Deventer, H., Smith-Adao, L., Mbona, N., Petersen, C., Skowno, A., Collins, N.B., Grenfell, M., Job, N., Lötter, M., Ollis, D., Scherman, P., Sieben, E. & Snaddon, K. 2018. South African National Biodiversity Assessment 2018: Technical Report. Volume 2a: South African Inventory of Inland Aquatic Ecosystems (SAIIAE). Version 3, final released on 3 October 2019. Council for Scientific and Industrial Research (CSIR) and South African National Biodiversity Institute (SANBI): Pretoria, South Africa. Report Number: CSIR report number CSIR/NRE/ECOS/IR/2018/0001/A; SANBI report number http://hdl.handle.net/20.500.12143/5847.
Wepener V, Van Vuren JHJ, Chatiza FP, Mbizi Z, Slabbert L, Masola B. 2005. Active biomonitoring in freshwater environments: early warning signals from biomarkers in assessing biological effects of diffuse sources of pollutants. *Physics and Chemistry of the Earth* 30: 751–761.

Soils Scoping Report

Land Type Survey Staff. (1972 - 2006). Land Types of South Africa: Digital Map (1:250 000 Scale) and Soil Inventory Databases. Pretoria: ARC-Institute for Soil, Climate, and Water.

Mucina, L. & Rutherford, M.C. (Eds.). (2006). The vegetation of South Africa, Lesotho, and Swaziland. Strelizia 19. South African National Biodiversity Institute, Pretoria South African.
Smith, B. (2006). The Farming Handbook. Netherlands & South Africa: University of KwaZulu-Natal Press & CTA.
Soil Classification Working Group. (1991). Soil Classification A Taxonomic system for South Africa. Pretoria: The Department of Agricultural Development.
Soil Classification Working Group. (2018). Soil Classification A Taxonomic system for South Africa. Pretoria: The Department of Agricultural Development.

Heritage Scoping Report

Heritage Impact Assessments				
Nid	**Report Type**	**Author/s**	**Date**	**Title**
104574	Heritage Scoping	Wouter Fourie	10/10/2012	Heritage Scoping Report for the Proposed Wind Farm Facility for Renosterberg Wind Energy Company (RWEC) near Petrusville, Northern Cape Province
104576	Heritage Scoping	Wouter Fourie	10/10/2012	Heritage Scoping Report for the Proposed Solar PV Facility for Renosterberg Wind Energy Company (RWEC) near Petrusville, Northern Cape Province
104804	PIA Desktop	John E Almond	01/09/2012	Palaeontological specialist assessment: desktop study PROPOSED RENOSTERBERG SOLAR PV AND WIND ENERGY FACILITIES NEAR DE AAR, NORTHERN CAPE PROVINCE
104804	PIA Desktop	John E Almond	01/09/2012	Palaeontological specialist assessment: desktop study PROPOSED RENOSTERBERG SOLAR PV AND WIND ENERGY FACILITIES NEAR DE AAR, NORTHERN CAPE PROVINCE
109347	AIA Phase 1	David Morris	01/12/2012	ARCHAEOLOGY SPECIALIST INPUT ON THE PROPOSED ACCESS ROAD FOR THE VANDERLINDESKRAAL PHOTOVOLTAIC SITE SITUATED NEAR HANOVER, NORTHERN CAPE
109627	PIA Phase 1	Gideon Groenewald	24/01/2013	PALAEONTOLOGICAL FIELD INVESTIGATION PHASE 1 REPORT FOR THE PROPOSED ACCESS ROAD ON THE REMAINDER OF THE FARM VAN DER LINDES KRAAL NO. 79, HANOVER, NORTHERN CAPE
114648	PIA Desktop	John E Almond	01/09/2012	Palaeontological specialist assessment: desktop study PROPOSED 16 MTPA EXPANSION OF TRANSNETâ€™S EXISTING MANGANESE ORE EXPORT RAILWAY LINE & ASSOCIATED INFRASTRUCTURE BETWEEN HOTAZEL AND THE PORT OF NGQURA, NORTHERN & EASTERN CAPE. Part 1: Hotazel to Kimberley, Northern Cape
125945	AIA Phase 1	Thomas Huffman	31/03/2013	ARCHAEOLOGICAL IMPACT ASSESSMENT FOR THE DE AAR PROJECT, NORTHERN CAPE

125963	PIA Desktop	John E Almond		PALAEONTOLOGICAL IMPACT ASSESSMENT: DESKTOP STUDY Proposed windfarm at Maanhaarberg near De Aar, Northern Cape Province
129751	HIA Phase 1	Elize Becker	20/02/2013	Phase 1 Heritage Impact Assessment Hotazel to Kimberley and De Aar to Port of Ngqura
133138	HIA Phase 1	Jayson Orton, Lita Webley	09/07/2013	HERITAGE IMPACT ASSESSMENT FOR MULTIPLE PROPOSED SOLAR ENERGY FACILITIES
133536	Palaeontological Specialist Reports	John E Almond	01/07/2013	PALAEONTOLOGICAL SPECIALIST STUDY
138865	HIA Phase 1	Jayson Orton	10/07/2013	HERITAGE IMPACT ASSESSMENT FOR MULTIPLE PROPOSED SOLAR ENERGY FACILITIES ON DU PLESSIS DAM 179, DE AAR, NORTHERN CAPE
138940	PIA Phase 1	John E Almond	10/07/2013	Palaeontological Specialist Study: Combined desktop and field-based assessments for the proposed Photovoltaic (Solar) Energy Facilities on Du Plessis Dam Farm near De Aar, Northern Cape
151280	Archaeological Specialist Reports	Jaco van der Walt	26/08/2013	Archeological Scoping Report for the Proposed Castle WEF near De Aar, Northern Cape Province
151284	PIA Desktop	John E Almond	31/08/2013	Palaeontological Heritage Assessment: Desktop Study
155456	Archaeological Specialist Reports	Jonathan Kaplan	20/01/2014	RECOMMENDED EXEMPTION FROM HAVING TO CONDUCT AN ARCHAEOLOGICAL SURVEY OF 67 WIND TURBINES, PROPOSED DE AAR 1 (MAANHAARBERG) WIND ENERGY FARM, DE AAR, NORTHERN CAPE PROVINCE (CaseID 2944)
160512	Archaeological Monitoring	Lita Webley, Dave Halkett	17/03/2014	HERITAGE IMPACT ASSESSMENT: WALKDOWN OF FINAL LAYOUT OF THE LONGYUAN MULILO DE AAR 2 NORTH WIND ENERGY FACILITY, NORTHERN CAPE PROVINCE
163982	Palaeontological Specialist Reports		31/08/2013	Palaeontological specialist assessment: combined desktop and field study: Proposed development PV Solar Facility near De Aar, Northern CApe Province
163994		Wouter Fourie	03/08/2013	Proposed PV Facility: Heritage Impact Report
166300	Archaeological Specialist Reports	Jonathan Kaplan	28/02/2014	Archaeological Impact Assessment: Proposed Construction Yards and Sub Station, Longyuan Mulilo De Aar Wind Energy Facility, Northern Cape.
177599	AIA Phase 1	Jonathan	01/04/2010	ARCHAEOLOGICAL IMPACT ASSESSMENT PROPOSED

		Kaplan		PHOTOVOLTAIC POWER GENERATION FACILITY IN DE AAR NORTHERN CAPE
177600	Site Inspection Report	Will Archer, Jonathan Kaplan	01/05/2012	Reconnaissance and plan for further mitigation: sites impacted on by proposed photovoltaic power generation facility in De Aar Northern Cape
183142	Archaeological Specialist Reports	Jaco van der Walt	30/10/2014	Archaeological Impact Assessment Report for the Proposed Castle Wind Energy Facility, De Aar, Northern Cape
183143	Heritage Impact Assessment Specialist Reports	Barry Millsteed	24/11/2014	Full Palaeontological Heritage Impact Assessment Report on a Portion of a Proposed Wind Energy Generation Facility (The Castle Project); This Being on the Eastern Extent of the Farm Knapdaar 8 near De Aar, Northern Cape Province
256363	Palaeontological Specialist Reports	John Almond	15/06/2013	Palaeontological Specialist Study: Combined Desktop and Field-based Assessments: Proposed Photovoltaic (Solar) Energy Facilities on Du Plessis Dam Farm near De Aar, Northern Cape.
256364	Heritage Impact Assessment Specialist Reports	Jayson Orton	10/07/2013	Heritage Impact Assessment for Multiple Proposed Solar Energy Facilities on Du Plessis Dam 179, De Aar, Northern Cape
256408	Palaeontological Specialist Reports	John E Almond	16/07/2013	Palaeontological Specialist Study: Combined Desktop and Field-based Assessments - Proposed Photovoltaic (Solar) Energy Facilities on Badenhorst Dam Farm near De Aar, Northern Cape
256413	Heritage Impact Assessment Specialist Reports	Jayson Orton	09/07/2013	Heritage Impact Assessment for Multiple Proposed Solar Energy Facilities on De Aar 180/1 (Badenhorst Dam Farm), De Aar, Northern Cape
26827	AIA Phase 1	William Archer	01/06/2012	Archaeological Impact Assessment: proposed photovoltaic power generation facility in De Aar, Northern Cape
339820	Heritage Impact Assessment Specialist Reports	Lita Webley, Jayson Orton	01/12/2011	Proposed De Aar Wind Energy Facility on the North and South Plateau, Northern Cape Province
339824	Heritage Impact Assessment Specialist Reports	Lita Webley, David Halkett	01/06/2015	Addendum: Proposed Wind Energy Facility situated on the Eastern plateau (South) near De Aar, Northern Cape Province.
4052	HIA Phase 1	Albert van Jaarsveld	01/03/2006	Hydra-Perseus and Beta-Perseus 765 kV Transmission Power Lines Environmental Impact Assessment. Impact on Cultural Heritage Resources

45021	HIA Phase 1	Wouter Fourie	13/04/2012	CONCENTRATED SOLAR POWER EIAâ€ "DE AAR Heritage Impact Assessment
49745	AIA Phase 1	Neels Kruger	01/03/2012	ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA) OF DEMARCATED SURFACE AREAS ON THE OF THE FARM VETLAAGTE 4, DE AAR, NORTHERN CAPE PROVINCE
49843	PIA Phase 1	John E Almond	01/05/2012	PALAEONTOLOGICAL SPECIALIST STUDY: COMBINED DESKTOP AND FIELD-BASED ASSESSMENTS Proposed solar power generation facilities on the remaining extent of the farm Vetlaagte No. 4, De Aar, Northern Cape Province
50006	HIA Phase 1	Jayson Orton	20/02/2012	HERITAGE IMPACT ASSESSMENT FOR THREE SOLAR ENERGY FACILITIES AT DE AAR, WESTERN CAPE
53198	HIA Phase 1	Elize Becker	20/04/2012	Phase 2 Heritage Impact Assessment De Aar Solar One Photovoltaic Power Project Heritage Impact Assessment Phase 2
53200	Heritage Scoping	Elize Becker	18/01/2012	HERITAGE IMPACT ASSESSMENT SCOPING REPORT Prepared for De Aar Solar One Photovoltaic Power Plant, Nothern Cape
58989	PIA Desktop	James Brink	10/08/2012	A Palaeontological Desktop Study of the Area to be Affected by the Proposed Photovoltaic Power Project on Portion 3 of Farm Hartebeestplaats 135
6475	AIA Phase 1	Jonathan Kaplan	10/10/2010	ARCHAEOLOGICAL IMPACT ASSESSMENT OF A PROPOSED WIND ENERGY FACILITY NEAR De Aar, Northern Cape
6970	AIA Phase 1	David Morris	02/09/2011	Paarde Valley. Ilanga Lethemba PV Solar Energy Facility. Specailist input for the environmental impact asssessment phase and environmental management programme for the proposed Ilanga Lethemba Solar Energy Facility, near De Aar, Northern Cape province
6970	AIA Phase 1	David Morris	02/09/2011	Paarde Valley. Ilanga Lethemba PV Solar Energy Facility. Specailist input for the environmental impact asssessment phase and environmental management programme for the proposed Ilanga Lethemba Solar Energy Facility, near De Aar, Northern Cape province
6971	AIA Desktop	Johnny Van Schalkwyk	30/04/2011	Heritage Impact Scoping report for the proposed establishment of the Ilanga Lethemba PV Solar Energy Facility, near De Aar, Northern Cape Province.
7020	AIA Phase 1	David Morris	03/09/2011	Archaeology specialist input on the site of the proposed Kalkbult Photovoltaic construction site north of De Aar, Northern Cape
7243	AIA Desktop	Jonathan Kaplan	08/04/2010	ARCHAEOLOGICAL SCOPING STUDY OF A PROPOSED WIND ENERGY FACILITY ON THE MAANHAARBERGE & KOMBUISFONTEINBERGE DE AAR NORTHERN CAPE

7368	AIA Phase 1	William Archer	18/05/2012	Archer, W. May 2012. RECONNAISSANCE AND PLAN FOR FURTHER MITIGATION: SITES IMPACTED ON BY PROPOSED PHOTOVOLTAIC POWER GENERATION FACILITY IN DE AAR NORTHERN CAPE
7634	AIA Phase 1	Jonathan Kaplan	08/04/2010	ARCHAEOLOGICAL IMPACT ASSESSMENT PROPOSED PHOTOVOLTAIC POWER GENERATION FACILITY IN DE AAR NORTHERN CAPE
8023	AIA Phase 1	David Morris	03/09/2011	Archaeology specialist input on the site of the proposed Taaiboschfontein Photovoltaic construction site between De Aar and Hanover, Northern Cape
8023	AIA Phase 1	David Morris	03/09/2011	Archaeology specialist input on the site of the proposed Taaiboschfontein Photovoltaic construction site between De Aar and Hanover, Northern Cape
8023	AIA Phase 1	David Morris	03/09/2011	Archaeology specialist input on the site of the proposed Taaiboschfontein Photovoltaic construction site between De Aar and Hanover, Northern Cape
8023	AIA Phase 1	David Morris	03/09/2011	Archaeology specialist input on the site of the proposed Taaiboschfontein Photovoltaic construction site between De Aar and Hanover, Northern Cape
8167	AIA Phase 1	David Morris	03/09/2011	Archaeology specialist input on the site of the proposed Vanderlindeskraal Photovoltaic construction site near Hanover, Northern Cape
8378	HIA Phase 1	Jayson Orton	29/02/2012	HIA for three solar energy facilities at the De Aar, Northern Cape (Paarde Valley, Badenhorst Dam Farm and Annex Du Plessis Dam Farm)
8493	HIA Phase 1		28/02/2011	CULTURAL HERITAGE REVIEW OF PROPOSED ESTABLISHMENT OF PHOTO VOLTAIC (SOLAR POWER) PANELS ON THE FARM TAAIBOSCHFONTEIN, NO 41, HANOVER DISTRICT, NORTHERN CAPE
8512	HIA Phase 1		03/09/2011	Cultural Heritage Review of Proposed Establishment Of Photo Voltaic (Solar Power) Panels On The Farm Taaiboschfontein, No 41, Hanover District, Northern Cape
8523	HIA Phase 1		03/08/2011	Annexure 2 Cultural heritage Survey of sites for the Solar Power Project Report: Farm Vanderlindeskraal no 79, Northern Cape Province
89361	HIA Phase 1	Neels Kruger	01/03/2012	ENNEX DEVELOPMENTS: PROPOSED ESTABLISHMENT OF A SOLAR ENERGY FACILITY NEAR DE AAR, NORTHERN CAPE PROVINCE Phase 1 Archaeological Impact Assessment Report
8992	PIA Phase 1	John E Almond	29/01/2012	Palaeontological Specialist Study: Combined Desktop and Field -based Assessments. Two wind energy facilities on the

				Eastern Plateau near De Aar, Northern Cape Province proposed by Mulilo Renewable Eneergy (Pty) Ltd

Visual Scoping Report

Chief Directorate National Geo-Spatial Information, varying dates. *1:50 000 Topographical Maps and Data.*

CSIR, 2015. *The Strategic Environmental Assessment for wind and solar photovoltaic energy in South Africa.*

DFFE, 2018. *National Land-cover Database 2018 (NLC2018).*

DFFE, 2020. *South African Protected Areas Database (SAPAD_OR_2020_Q3).*

DFFE, 2020. *South African Renewable Energy EIA Application Database (REEA_OR_2021_Q1).*

DEA&DP, 2011. Provincial Government of the Western Cape. *Guideline on Generic Terms of Reference for EAPS and Project Schedules.*

Department of Environmental Affairs and Tourism (DEA&T), 2001. *Environmental Potential Atlas (ENPAT) for the Northern Cape Province.*

JAXA, 2021. Earth Observation Research Centre. *ALOS Global Digital Surface Model (AW3D30).*

National Botanical Institute (NBI), 2004. *Vegetation Map of South Africa, Lesotho and Swaziland (Unpublished Beta Version 3.0)*

Oberholzer, B. (2005). *Guideline for involving visual and aesthetic specialists in EIA processes: Edition 1.*

The Environmental Impact Assessment Amendment Regulations. In Government Gazette Nr. 33306, 18 June 2010.

Traffic Scoping Report

Google Earth Pro
SANS 10280/NRS 041-1:2008 - Overhead Power Lines for Conditions Prevailing in South Africa
Road Traffic Act (Act No. 93 of 1996)
National Road Traffic Regulations, 2000
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

Social Scoping Report

The National Energy Act (2008).
The White Paper on the Energy Policy of the Republic of South Africa (December 1998).
The White Paper on Renewable Energy (November 2003).
Integrated Resource Plan (IRP) for South Africa (2010-2030).
The National Development Plan (2011).
Northern Cape Provincial Growth and Development Strategy (2004-2014).
Northern Cape Climate Change Response Strategy.

Northern Cape Spatial Development Framework (2012).
Northern Cape Province Green Document (2017/2018).
Pixley Ka Seme Integrated Development Plan (2019-2020).
Pixley Ka Seme Spatial Development Framework (2017).
Emathanjeni Integrated Development Plan (2021-2022).
Green Jobs Study (2011), IDC, DBSA Ltd and TIPS.
Independent Power Producers Procurement Programme (IPPPP): An Overview (2017), Department of Energy, National Treasury and DBSA.
Powering the Future: Renewable Energy Roll-out in South Africa (2013), Greenpeace South Africa.