FINAL BASIC ASSESSMENT REPORT

THE PROPOSED NOTSI PV 5 NEAR DEALESVILLE, FREE STATE PROVINCE

1 September 2023

PROJECT DETAIL

DFFE Reference No.	**:**	To be confirmed
Project Title	**:**	The proposed Notsi PV 5 near Dealesville, Free State Province
Authors	**:**	Ms. Hanlie Stander Mary-Jane Khanyile
Reviewer	:	Ms. Carli van Niekerk
Client	**:**	Notsi PV (Pty) Ltd
Report Status	**:**	Final Basic Assessment Report
Report Date	**:**	1 September 2023

When used as a reference this report should be cited as: Solis-Environmental (2023) Final Basic Assessment Report: The proposed Notsi PV 5 near Dealesville, Free State Province.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

PLATES

APPENDICES

Appendix A: Details of EAP

Appendix B: Screening Report

Appendix C: Public Participation

- Appendix C1: Press advertisements
- Appendix C2: On site notice
- Appendix C3: List of I&AP's
- Appendix C4: Proof of correspondence
- Appendix C5: Written comments received
- Appendix C6: Comments and Response Report

Appendix D: Specialist Reports

- Appendix D1: Terrestrial Biodiversity Impact Assessment
- Appendix D2: Avifaunal Impact Assessment
- Appendix D3: Visual Impact Assessment
- Appendix D4: Soil and Agricultural Compliance Statement
- Appendix D5: Heritage Impact Assessment
- Appendix D6: Social Impact Assessment
- Appendix D7: Wetland Impact Assessment
- Appendix D8: Transport Impact Assessment
- Appendix D9: Specialist Terms of Reference

Appendix E: Site Verification Report

Appendix F: Environmental Management Programme (EMPr)

- Appendix F1: EMPr for Notsi PV 5
- Appendix F2: EMPr for substation – DFFE Generic EMPr template
- Appendix F3: Alien Invasive Plant Species Management and Rehabilitation Plan

Appendix G: Preferred Layout plan

Appendix H: Maps

Appendix I: Project Description

GLOSSARY OF TERMS AND ACRONYMS

BA	Basic Assessment
BAR	Basic Assessment Report
BESS	Battery Energy Storage System
CEA	Cumulative Effects Assessment
DFFE	Department of Forestry, Fisheries and the Environment
DM	District Municipality
DMRE	Department of Mineral Resources and Energy
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EP	Equator Principles
EPFI	Equator Principles Financial Institutions
Environmental impact	Any change to the environment, whether adverse or beneficial, wholly, or partially resulting from an organization's environmental aspects.
GNR	Government Notice Regulation
I&AP	Interested and affected party
IDP	Integrated Development Plan
IFC	International Finance Corporation
IPP	Independent Power Producer
kV	Kilo Volt
LM	Local Municipality
Mitigate	Activities designed to compensate for unavoidable environmental damage.
MW	Megawatt
NEMA	National Environmental Management Act No. 107 of 1998
NERSA	National Energy Regulator of South Africa
NWA	National Water Act No. 36 of 1998
PPP	Public Participation Process
PV	Photovoltaic
REDZ	Renewable Energy Development Zone
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
SAHRA	South African Heritage Resources Agency
SDF	Spatial Development Framework
SPP	Solar Power Plant
VU	Vegetation Unit

CONTEXT FOR THE DEVELOPMENT

According to Eskom, the demand for electricity in South Africa has been growing at approximately 3% per annum. This growing demand, fuelled by increasing economic growth and social development, is placing increasing pressure on South Africa's existing power generation capacity. Coupled with this, is the growing awareness of environmentally responsible development, the impacts of climate change and the need for sustainable development. The use of renewable energy technologies, as one of a mix of technologies needed to meet future energy consumption requirements is being investigated as part of the national Department of Mineral Resources and Energy's (DMRE) (previously referred to as the Department of Energy) long-term strategic planning and research process.

The primary rationale for the proposed solar photovoltaic (PV) facility is to add new generation capacity from renewable energy to the national electricity mix and to aid in achieving the goal of 42% share of all new installed generating capacity being derived from renewable energy forms, as targeted by DMRE (2019 Integrated Resource Plan Update 2010-2030). The IRP also identifies the preferred generation technologies required to meet the expected demand growth up to 2030 and incorporates government objectives including affordable electricity, reduced greenhouse gas (GHG) emissions, reduced water consumption, diversified electricity generation sources and localisation and regional development. In terms of the Integrated Resource Plan Update (2019 IRP Update, 2010-2030), over the short term, clear guidelines arose; namely to continue with the current renewable bid programme with additional annual rounds of 1000MW PV, with approximately 8.4GW of the renewable energy capacity planned to be installed from PV technologies over the next twenty years.

The proposed project is intended to form part of the Department of Mineral Resources and Energy's (DMREs) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme or any other programmes/opportunities to generate and supply power in South Africa[1]. The REIPPP Programme aims to secure 14 725 Megawatts (MW) of new generation capacity from renewable energy sources, while simultaneously diversifying South Africa's electricity mix. According to the 2021 State of the Nation Address, Government will be initiating the procurement of an additional 11 800 MW of power from renewable energy, natural gas, battery storage and coal in line with the Integrated Resource Plan 2019 and fulfilling their commitments under the United Nations Framework Convention on Climate Change and its Paris Agreement which include the reduction of greenhouse gas emissions. Eskom, our largest greenhouse gas emitter, has committed in principle to net zero emission by 2050 and to increase its renewable capacity. During the 2022 State of the Nation Address it was indicated that the government had taken "firm steps" to bring additional generation capacity online as quickly as possible to close the shortfall in terms of electricity. As a result, it was confirmed that several new generation projects will be coming online over the next few years.

In response to the above, Notsi PV (Pty) Ltd (Notsi) is proposing the development of a cluster of solar energy facilities (to be known as the Notsi PV Cluster) located southwest of the town of Dealesville in the Free State Province. The Cluster includes five (5) individual solar energy facilities that are considered as separate projects. The development of the photovoltaic solar facility cluster, and the

[1] Should Notsi not be successful in the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) process it could also be used for private off-take. However, the Applicant confirms that the main intention is to bid the proposed development as part of the REIPPP Programme. Government Gazette No. 44989, dated 12 August 2021, amended the threshold for self-generation facilities from 1MW to 100MW. This amendment allows an Independent Power Producer (IPP) of up to 150MW to sell electricity to an end-user customer who consumes the power itself.

associated infrastructure is proposed for the purpose of commercial electricity generation. This Basic Assessment Report is specific to the Notsi PV 5 solar energy facility which forms part of the larger cluster. Refer to Figure 1-1 below.

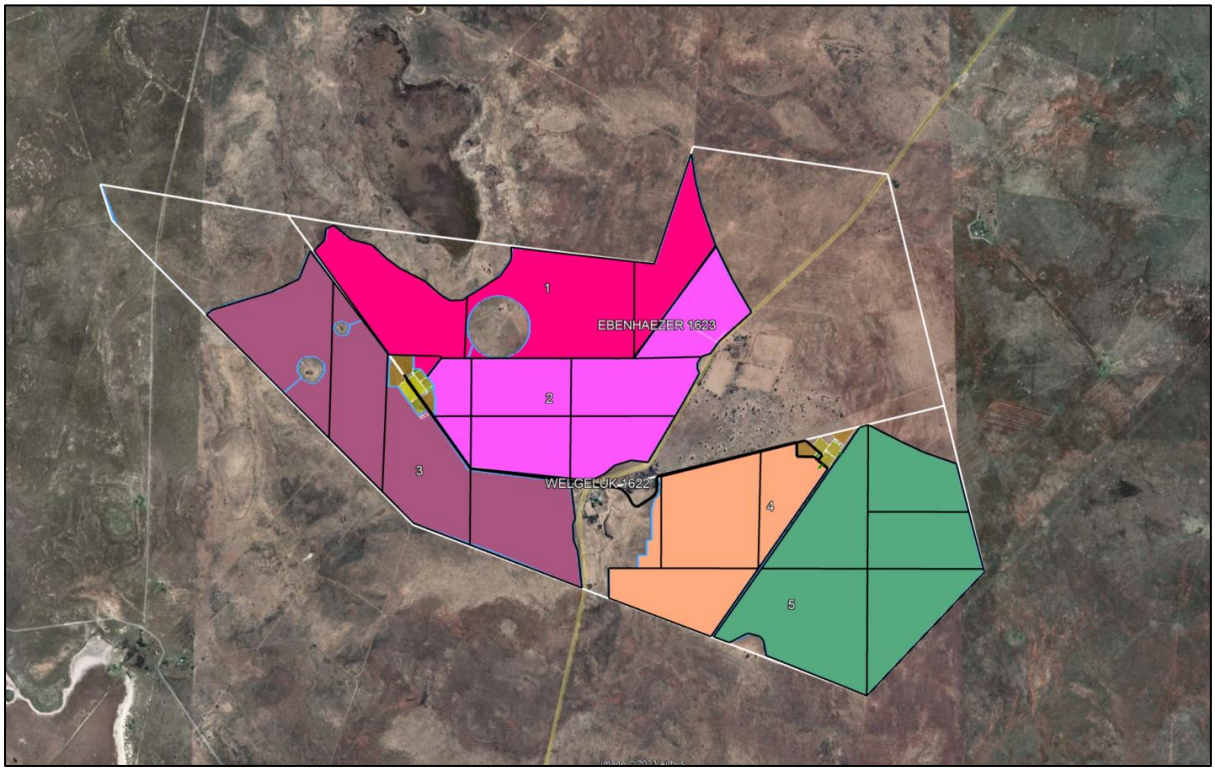


Figure 1-1: Notsi PV Cluster

Notsi PV 5 is proposed to be developed on an identified site located on the Farm Welgeluk No. 1622, Registration Division Boshof, Free State Province (refer to Figure A for the locality map and Figure 1 above (blue polygon)). The project entails the generation of up to 100MW electrical power through photovoltaic (PV) technology. The total development footprint of the project will approximately be 195 hectares (including supporting infrastructure on site, however excluding the main grid connection infrastructure to connect to the national electricity grid). Please note that a separate application associated with the grid connection infrastructure will be submitted to the relevant authority in due course.

From a regional site selection perspective, this region is preferred for solar energy development due to its global horizontal irradiation value of around 2146 kwh/m^2. The region is also preferred based on its inclusion within the Kimberley Renewable Energy Development Zone (REDZ) 5.

EXECUTIVE SUMMARY

Like many other small and developing municipalities in the country, the Tokologo Local Municipality, within which the Notsi PV 5 is proposed, faces several challenges in addressing the needs and improving the lives of the community. The Draft Integrated Development Plan (2023/2024) of the Tokologo Local Municipality indicates that the municipality has since its existence upheld the principles of sustainable development. Despite this, there are still however challenges facing the municipality which are developmental in nature. The main challenges relate to economic growth (which includes lack of funding for projects, lack of participation by the business sector, no available LED strategy and inadequate funds for LED, as well as poor agricultural support), service delivery improvement, governance (which includes inequalities and disparity in implementation), integrated human settlement and social and community development.

Notsi intends to develop a photovoltaic solar facility and associated infrastructure on the Farm Welgeluk No. 1622, Registration Division Boshof, Free State Province situated within the Tokologo Local Municipality and the greater Lejweleputswa District Municipality. The solar facility will have a generating capacity of up to 100MW.

The town of Dealesville is located approximately 13 km to the northeast of the proposed development (refer to Figure A and Figure B for the respective locality and regional maps). The total development footprint of the project will approximately be 195 hectares (including supporting infrastructure on site, however excluding the main grid connection infrastructure to connect to the national electricity grid) as assessed as part of the Basic Assessment process. The site[2] was identified as being highly desirable due to its suitable climatic conditions, topography (i.e., in terms of slope), environmental conditions (i.e. ecological and wetland sensitivity), proximity to a grid connection point (i.e. for the purpose of electricity evacuation into the national grid), as well as site access off of a Regional road (i.e. to facilitate the movement of machinery, equipment, infrastructure and people during the construction phase). Grid connection infrastructure specifically associated with the solar facility is also being proposed and assessed within this report, which includes an on-site facility substation.

In terms of the National Environmental Management Act (Act 107 of 1998), with specific reference to Sections 24 and 24D, as read with GNR 324-327, as amended (2017), Environmental Authorisation is required for Notsi PV 5. The following listed activities have been identified with special reference to the proposed development and is listed in the EIA Regulations (as amended):

- Activity 11(i) (GNR 327): *"The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."*
- Activity 14 (GNR 327): *"The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres."*

[2] The site is defined as the Farm Welgeluk No. 1622. The full extent of the site has been assessed as part of this BA process for the development by the EAP and the independent specialists.

- Activity 24 (ii) (GN.R 327): *"The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters."*
- Activity 28 (ii) (GN.R 327): *"Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare."*
- Activity 56 (ii) (GN.R 327): *"The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres…"*
- Activity 1 (GN.R 325): *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more."*
- Activity 15 (GN.R 325): *"The clearance of an area of 20 hectares or more of indigenous vegetation."*

Activities required for the development of the solar facility which are listed under Listing Notice 1 and 2 (GNR 327 & 325) implies that the development could potentially have an impact on the environment that will require mitigation. The proposed Notsi PV 5 is located within a Renewable Energy Development Zone (REDZ) and subsequently a Basic Assessment process is required to be followed as described in Regulations 19 and 20 of the EIA Regulations (as amended). Solis-Environmental has been appointed as the independent Environmental Assessment Practitioner to undertake the Basic Assessment (BA) on behalf of Notsi PV (PTY) LTD.

Regulation 19 of the EIA Regulations (2017) requires that a Basic Assessment Report (BAR) must contain the information set out in Appendix 1 of the Regulations or comply with a protocol or minimum information requirements relevant to the application as identified and gazetted by the Minister in a government notice. Appendix 1 of GNR326 requires that the environmental outcomes, impacts and residual risks of the proposed activity be set out in the BAR. It has been determined through the BA process that the proposed development will have a net positive impact for the area and will subsequently ensure the optimal utilisation of resources and land. All negative environmental impacts can be effectively mitigated through the recommended mitigation measures and no residual negative impacts are foreseen. The potentially most significant environmental impacts associated with the development are briefly summarized below.

Impacts during the construction phase:

Construction of the solar power plant will potentially result in the following impacts: habitat fragmentation, introduction of IAP species and invasive fauna, displacement of the indigenous faunal community, loss of resident avifauna, habitat loss and displacement, and destruction or permanently seal-in of fossils. Socio-economic impacts such as the direct and indirect employment opportunities and skills development, economic multiplier effect, potential loss of productive farmland, in-migration of people, safety, and security impacts, impacts on daily living and movement patterns, nuisance impacts (noise and dust), increased risk of potential veld fires, and visual and sense of place impacts.

Impacts during the operational phase:

During the operational phase, the site will serve as a solar power plant and the potential impacts will take place over a period of 20 – 30 years. The negative impacts are generally associated with impacts

on habitat fragmentation, continuing spread of IAP and weed species, ongoing displacement and direct mortalities of the faunal community, loss of resident avifauna, collisions with PV Panels and associated infrastructure, electrocution risks leading to injury or loss of avian life which decreases avian diversity, potential visual impacts on sensitive visual receptors, lighting Impacts of the solar facility, and visual and sense of place impacts of the solar facility. The operational phase will have a direct positive impact through direct and indirect employment opportunities and skills development, development of non-polluting, renewable energy infrastructure, contribution to Local Economic Development (LED) and social upliftment, improvement of safety and security, and increase in household earnings.

Impacts during the decommissioning phase:

The physical environment will benefit from the closure of the solar power plant since the site will be rehabilitated to an acceptable state. The decommissioning phase will however potentially result in habitat fragmentation, introduction of Invasive Alien Plants (IEP) species and invasive fauna, displacement of the indigenous faunal community, displacement of resident avifauna through increased disturbance.

Cumulative impacts:

According to the DFFE's database twenty-six (26) PV solar plant applications have been submitted to the Department within the geographic area of investigation. Majority of the cumulative impacts will be of a medium or low significance, with the exception of visual cumulative impacts, which is of a high significance due to the current industrial developments in the area (i.e., mining activities), as well as the amount of proposed solar energy development which will further add to the change of the landscape. Considering the extent of the project and information presented in section 7 of this report, it can be concluded that the cumulative impacts will not result in large scale changes and impacts on the environment, especially since the environment and general area has experienced transformation including the undertaking of mining and agricultural activities which has created disconnect between natural systems within the landscape.

In accordance with the EIA Regulations, this final BAR evaluates and rates each identified potential impact and identifies and recommends mitigation measures which will be required in order to ensure the reduction of the impact significance of negative impacts to acceptable levels and the avoidance of negative residual risks. This final BAR also contains information that is required by the competent authority (Department of Forestry, Fisheries and the Environment (DFFE)) to consider the Application for Environmental Authorisation and to reach a decision as contemplated in Regulation 20 of GNR 326.

No fatal flaws or impacts with unacceptable levels of significance were identified and the impacts from the proposed development are expected to be at an acceptable level with the implementation of mitigation measures and therefore the project can be authorised subject to the implementation of the recommended mitigation measures.

1 INTRODUCTION

This section aims to introduce the Basic Assessment Report (BAR) and specifically to address the following requirements of the regulations:

Appendix 1. (3) A basic assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include-
(a) details of:

(i) the EAP who prepared the report; and

(ii) the expertise of the EAP, including a curriculum vitae.

1.1 LEGAL MANDATE AND PURPOSE OF THE REPORT

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

The EIA Regulations No. 324, 325, and 327 outline the activities that may be triggered and therefore require EA. The following listed activities with special reference to the proposed development is triggered:

Table 1-1: Listed activities

Relevant notice:	**Activity No (s)**	**Description of each listed activity as per project description**:
GNR. 327 (as amended in 2017)	Activity 11(i)	• *"The development of facilities or infrastructure for the transmission and distribution of electricity (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."* • Activity 11(i) is triggered as the proposed photovoltaic solar facility will transmit and distribute electricity of 132 kilovolts outside an urban area. The infrastructure for the distribution of electricity will include an on-site facility substation (33kV/132kV) that will be located within the development footprint of the solar facility.
GNR. 327 (as amended in 2017)	Activity 14	• *"The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres."* • Activity 14 is triggered since the proposed BESS will contain electrolyte solutions considered to be dangerous goods.

Relevant notice:	Activity No (s)	Description of each listed activity as per project description:
		Although the BESS itself is not considered to be a facility for storage of dangerous goods, rather the function of BESS is to store energy. The total volume of electrolytes solution used in the BESS may exceed 80m^3 but will be less than 500m^3, which depending on the technology selected may be stored temporarily on-site during battery assembly. • The solar energy facility will only require the installation of a standard diesel storage tank, which will have a capacity of less than 30m^3.
GNR. 327 (as amended in 2017)	Activity 24(ii)	• *"The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters;"* • Activity 24(ii) is triggered as the internal roads will vary between 6 and 8 meters in width. Some sections of road may be slightly wider than 8 meters.
GNR. 327 (as amended in 2017)	Activity 28(ii)	• *"Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare."* • Activity 28(ii) is triggered as portions of the affected property have been used for grazing and crop production in the past and the property will be re-zoned to "special" use for the proposed development. The development footprint of Notsi PV 5 will be up to 195 hectares in extent.
GNR. 327 (as amended in 2017)	Activity 56 (ii)	• *"The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres…"* • Activity 56 (ii) is triggered as the existing access to the affected property will need to be widened by more than 6 metres. It is expected that only certain sections of the road will need to be upgraded, where relevant.
GNR. 325 (as amended in 2017)	Activity 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."*

Relevant notice:	Activity No (s)	Description of each listed activity as per project description:
		• Activity 1 is triggered since the proposed photovoltaic solar facility will generate up to 100 megawatts electricity through the use of a renewable resource.
GNR. 325 (as amended in 2017)	Activity 15	• *"The clearance of an area of 20 hectares or more of indigenous vegetation."* • In terms of vegetation type the site falls within the Western Free State Clay Grassland which is described by Mucina and Rutherford (2006) respectively as 'Least Concern'. Activity 15 is triggered since portions of the site have not been lawfully disturbed during the preceding ten years; therefore, more than 20 hectares of indigenous vegetation will be removed. The development footprint of the solar facility will be up to 195 hectares.

The activities triggered under Listing Notice 1 and 2 (Regulations 327 and 325) for the project implies that the development is considered as potentially having an impact on the environment and therefore require the implementation of appropriate mitigation measures. Based on the location of the entire extent of the project within the Kimberley REDZ (see Figure D), the process to be followed will be as per GNR 114, as gazetted on 16 February 2018. Therefore, Notsi PV 5 is subject to a Basic Assessment process and not a full EIA process, as well as a shortened timeframe for the processing of the Application for Environmental Authorisation by the Department of Forestry, Fisheries and the Environment (DFFE). The Basic Assessment was undertaken in line with the requirements stipulated under Regulations 19 – 20 of the EIA Regulations. According to Appendix 1 of Regulation 326, the objective of the basic assessment process is to, through a consultative process:

- Determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;
- Identify the alternatives considered, including the activity, location, and technology alternatives;
- Describe the need and desirability of the proposed alternatives;
- Through the undertaking of an impact and risk assessment process, inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine —
    - The nature, significance, consequence, extent, duration and probability of the impacts occurring; and
    - degree to which these impacts-
        - can be reversed;
        - may cause irreplaceable loss of resources, and

        - can be avoided, managed or mitigated; and
- Through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to –
    - Identify and motivate a preferred site, activity and technology alternative;
    - Identify suitable measures to avoid, manage or mitigate identified impacts; and
    - Identify residual risks that need to be managed and monitored.

1.2 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

Solis-Environmental has been appointed by the Applicant as the independent EAP to conduct the BA and prepare all required reports. All correspondence to the EAP can be directed to:

Contact person:	Hanlie Stander
EAPASA Registration:	2019/1997
Postal Address:	14 Kingfisher Street, Tuscany Ridge Estate, Potchefstroom, 2531
Telephone:	082 412 5592 (Cell)
Electronic Mail:	hanlie@solis-environmental.co.za
And/or	
Contact person:	Mary-Jane Khanyile
EAPASA Registration:	In process
Postal Address:	14 Kingfisher Street, Tuscany Ridge Estate, Potchefstroom, 2531
Telephone:	060 953 7164 (Cell)
Electronic Mail:	mary-jane@solis-environmental.co.za

Regulation 13(1)(a) and (b) determines that an independent and suitably qualified and experienced EAP should conduct the BA. In terms of the independent status of the EAP, a declaration is attached as Appendix A to this report. The expertise of the EAP responsible for conducting the BA is also summarized in the curriculum vitae included as part of Appendix A.

1.3 DETAILS OF SPECIALISTS

Table 1-2 provides information of the independent specialists that have been appointed as part of the Basic Assessment process. Regulation 13(1)(a) and (b) determines that an independent and suitably qualified and experienced specialist should conduct the specialist study. In the event where the specialist is not independent, a specialist should be appointed to externally review the work of the specialist as contemplated in sub regulation (2), which must comply with sub regulation 1. In terms of the independent status of the specialists, their declarations are attached as Appendix D to this report. The expertise of the specialists is also summarized in their respective curriculum vitae's.

Table 1-2: Details of specialists

Study	Prepared by	Contact Person	Postal Address	Tel	e-mail
Terrestrial Biodiversity Impact Assessment	The Biodiversity Company	Michael Schrenk / Andrew Husted	-	Cell: 081 319 1225	info@thebiodiversitycompany.com
Wetland Baseline and Risk Assessment	The Biodiversity Company	Rian Pienaar / Andrew Husted	-	Cell: 081 319 1225	info@thebiodiversitycompany.com
Avifaunal Impact Assessment	Holland and Associates Environmental Consultants	Anja Albertyn	P O Box 31108 Tokai, 7966	Cell: 076 265 8933	anja@hollandandassociates.net
Heritage Impact Assessment (including archaeology and palaeontology)	CTS Heritage	Jenna Lavin	Bon Espirance, 238 Queens Road, Simons Town	Cell: 083 619 0854	jenna.lavin@ctsheritage.com
Agricultural Compliance Statement	Johann Lanz Soil Scientist	Johann Lanz	P. O. Box 6209 Uniedal, Stellenbosch 7612	Tel: 021 866 1518 Cell: 082 927 9018	johann@johannlanz.co.za
Visual Impact Assessment	Donaway Environmental Consultants	Johan Botha	30 Fouche Street Steynsrus, 9515	Tel: 082 316 7749	johan@donaway.co.za
Social Impact Assessment	Donaway Environmental Consultants	Johan Botha	30 Fouche Street Steynsrus, 9515	Tel: 082 316 7749	johan@donaway.co.za
Transport Impact Assessment	iWink Consulting	Iris Wink	Plattekloof Glen Cape Town	-	iris@iwink.co.za

1.4 STATUS OF THE BA PROCESS

The BA process is conducted strictly in accordance with the stipulations set out in Regulations 19 – 20 and Annexure 1 of Regulation No. 326. Table 1-3 provides a summary of the BA process and future steps to be taken. It can be confirmed that to date:

- A pre-application meeting request was submitted to DFFE on 13 September 2022. The DFFE advised on 14 September 2022 that no meeting is required for the proposed development.
- A site visit was conducted on 14 September 2022.
- Site notices were erected on 14 September 2022.
- A Background Information Document was distributed to registered I&APs via email on 28 September 2022.
- A newspaper advertisement was placed in the NoordKaap Bulletin and Bloemnuus Newspaper on 29 September 2022 and 13 July 2023 respectively to notify the public of the Basic Assessment process and commence with the public participation process.
- An application for Environmental Authorisation and the draft BAR was submitted to the DFFE on 14 July 2023.
- The draft Basic Assessment report was made available for a 30-day review and comment period from 14 July 2023 to 15 August 2023.
- The current document (Final Basic Assessment Report) was submitted to DFFE on the 1st of September 2023.

It is envisaged that the BA process should be completed within approximately five months of submitting the Application for EA and the BAR – see Table 1.3.

Table 1-3: Project schedule

Activity	Prescribed timeframe	Timeframe
Site visit	-	14 September 2022
Placement of Site Notices		14 September 2022
Placement of advertisement		29 September 2022
Submit application form and DBAR to DFFE and I&APs (including notification of report availability)	-	14 July 2023
Public participation (DBAR)	30 Days	14 July –15 August 2023
Submit FBAR	90 Days	1 September 2023
Department acknowledges receipt	10 Days	August 2023
Decision	57 Days	October 2023

Activity	Prescribed timeframe	Timeframe
Department notifies of decision	5 Days	October 2023
Registered I&APs notified of decision	14 Days	October 2023
Appeal	20 Days	November 2023

1.5 SPECIALIST STUDIES IDENTIFIED IN THE DFFE SCREENING TOOL REPORT

The table included below provides an indication of the specialist studies identified by the DFFE Screening Tool Report (Appendix B), an indication of whether the studies were undertaken or not and a motivation or confirmation of the studies being included or not. A Site Verification Report is included as Appendix E of this Basic Assessment Report.

Table 1-4: Specialist Studies identified in the DFFE Screening Tool Report

Study identified in the DFFE Screening Tool and sensitivity	Study included?	Confirmation / motivation
Agricultural Impact Assessment Sensitivity: High Feature(s): Annual Crop Cultivation / Planted Pastures Rotation; Land capability ranging from 01. Very Low-Moderate to 08. Moderate.	Yes	A Soil and Agricultural Compliance Statement is included in Appendix D4.
Animal Species Assessment Sensitivity: High Feature(s): Sensitive species, namely: Aves- *Aquila rapax*, *Cursorius rufus*, and *Neotis ludwigii*	Yes	A Terrestrial Biodiversity Impact Assessment is included in Appendix D1, which also includes an assessment of the animal species present within the site. This assessment has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report.
Aquatic Biodiversity Impact Assessment Sensitivity: Very High Feature(s): Wetlands, Dry Highveld Grassland Bioregion (Depression)	Yes	A Wetland Impact Assessment is included in Appendix D7. This assessment has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report.

Study identified in the DFFE Screening Tool and sensitivity	Study included?	Confirmation / motivation
Archaeological and Cultural Heritage Impact Assessment Sensitivity: Low	Yes	A Heritage Impact Assessment (including consideration of the archaeology of the area) is included in Appendix D5. This assessment is undertaken to comply with the requirements of the National Heritage Resources Act.
Avifaunal Impact Assessment Sensitivity: Low	Yes	An Avifaunal Impact Assessment is included in Appendix D3.
Civil Aviation Assessment Sensitivity: Low	No	The Civil Aviation Authority has been consulted regarding the development of the project since the commencement of the BA Process. No specific negative impacts or issues have been raised to date by the CAA regarding the project. The project is also not located within an area considered to be of a high sensitivity. Refer to Appendix E for the Site Verification Report.
Defence Assessment Sensitivity: Low	No	The sensitivity is low and therefore no assessment has been included. Refer to Appendix E for the Site Verification Report.
Landscape / Visual Impact Assessment Sensitivity: Very High Feature(s): Mountain tops and high ridges	Yes	A Visual Impact Assessment is included in Appendix D3.
Palaeontological Impact Assessment Sensitivity: High	Yes	A Heritage Impact Assessment (including consideration of the palaeontology of the area) is included in Appendix D5.

Study identified in the DFFE Screening Tool and sensitivity	Study included?	Confirmation / motivation
Feature(s): Features with a Medium and High paleontological sensitivity.		This assessment is undertaken to comply with the requirements of the National Heritage Resources Act.
Plant species Assessment Sensitivity: Low	Yes	A Terrestrial Biodiversity Impact Assessment is included in Appendix D1, which also includes an assessment of the plant species present within the site. This assessment has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report.
RFI Assessment Sensitivity: Low	No	The South African Radio Astronomy Observatory (SARAO) has been consulted regarding the development of the project since the commencement of the EIA Process. No specific negative impacts or issues have been raised to date by the SARAO regarding the project. The project is also not located within an area considered to be of a high sensitivity. OpenServe has also been consulted regarding the development of the project since the commencement of the BA Process. Refer to Appendix E for the Site Verification Report.
Terrestrial Biodiversity Impact Assessment Sensitivity: Very High Feature(s): Ecological support area 1 and 2	Yes	A Terrestrial Biodiversity Impact Assessment is included in Appendix D1. This assessment has been undertaken in terms of the

Study identified in the DFFE Screening Tool and sensitivity	Study included?	Confirmation / motivation
		Protocols of GNR320 – refer to the content of the report.
Geotechnical Assessment Sensitivity: Not indicated	No	The assessment of geotechnical considerations of the site is considered to be a technical aspect and not an environmental aspect. Therefore, the Geotechnical Assessment will be undertaken by the Applicant as part of the micro-siting process and prior to the commencement of the construction phase.
Socio-Economic Assessment Sensitivity: Not indicated	Yes	A Social Impact Assessment is included in Appendix D6.

Please note that an Avifaunal Impact Assessment (Appendix D2) has been undertaken for the development to ensure that the Basic Assessment considers the impact of the development on avifauna as per the requirements of the BirdLife South Africa Best Practice Guidelines for the development of solar energy facilities.

1.6 STRUCTURE OF THE REPORT

This report is structured in accordance with the prescribed contents stipulated in Appendix 1 of Regulation No. 326. It consists of seven sections demonstrating compliance to the specifications of the regulations as illustrated in Table 1-5.

Table 1-5: Structure of the report

Requirements for the contents of a BAR as specified in the Regulations		Section in report
Appendix 1. (3) - A basic assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include-		
(a)	details of -	1
	(i) the EAP who prepared the report; and	
	ii) the expertise of the EAP, including a curriculum vitae.	
(b)	the location of the activity, including-	2

Requirements for the contents of a BAR as specified in the Regulations		Section in report
	(i) the 21-digit Surveyor General code of each cadastral land parcel;	
	(ii) where available, the physical address and farm name;	
	(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	
(c)	a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure 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;	
(d)	a description of the scope of the proposed activity, including-	
	(i) 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.	
(e)	a description of the policy and legislative context within which the development is proposed including:	3
	(i) An identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and	
	(ii) How the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks and instruments;	
(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;	4
(g)	A motivation for the preferred site, activity and technology alternative.	5
(h)	a full description of the process followed to reach the preferred alternative within the site including –	
	(i) details of all the alternatives considered;	

Requirements for the contents of a BAR as specified in the Regulations		Section in report
	(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	
	(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.	
	(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	
	(v) the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	6 & 7
	(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;	
	(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;	
	(viii) the possible mitigation measures that could be applied and level of residual risk;	
	(ix) the outcomes of the site selection matrix;	
	(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and	
	(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;	
(i)	a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including -	
	(i) a description of all environmental issues and risks that were identified during the EIA process; and	
	(ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.	

Requirements for the contents of a BAR as specified in the Regulations		Section in report
(j)	an assessment of each identified potentially significant impact and risk, including-	
	(i) cumulative impacts;	
	(ii) the nature, significance and consequences of the impact and risk;	
	(iii) the extent and duration of the impact and risk;	
	(iv) the probability of the impact and risk occurring;	
	(v) the degree to which the impact and risk can be reversed;	
	(vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and	
	(vii) the degree to which the impact and risk can be mitigated;	
(k)	where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;	6
(l)	an environmental impact statement which contains-	8
	(i) a summary of the key findings of the environmental impact assessment:	
	(ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and	
	(iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	
(m)	based on the assessment, and where applicable, impact management measures from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr;	
(n)	Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	Not applicable
(o)	a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	8

Requirements for the contents of a BAR as specified in the Regulations		Section in report
(p)	a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	
(q)	where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded, and the post construction monitoring requirements finalised;	Not applicable
(r)	an undertaking under oath or affirmation by the EAP in relation to-	Appendix A to the report
	(i) the correctness of the information provided in the report;	
	(ii) the inclusion of comments and inputs from stakeholders and interested and affected parties (I&APs);	
	(iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and	
	(iv) any information provided by the EAP to I&APs and any responses by the EAP to comments or inputs made by I&APs; and	
(s)	where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	Not applicable
(t)	any specific information that may be required by the CA; and	Not applicable
(u)	any other matters required in terms of section 24(4)(a) and (b) of the Act.	Not applicable

2 ACTIVITY DESCRIPTION

This section aims to address the following requirements of the regulations:

Appendix 1. (3) A BAR (...) must include-

(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;

(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;

(c) a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure 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;

(d) a description of the scope of the proposed activity, including-

(i) all listed and specified activities triggered and being applied for;

(ii) a description of the associated structures and infrastructure related to the development.

2.1 THE LOCATION OF THE ACTIVITY AND PROPERTY DESCRIPTION

The activity entails the development of a photovoltaic solar facility and associated infrastructure on the Farm Welgeluk No. 1622, Registration Division Boshof, Free State Province situated within the Tokologo Local Municipality and the greater Lejweleputswa District Municipality. The site is located approximately 13 km southwest of the centre of Dealesville in the Free State Province (refer to Figure A and Figure B for the respective locality and regional maps).

The project entails the generation of up to 100MW electrical power through the operation of photovoltaic (PV) panels. The total development footprint of the project will approximately be 195 hectares (including supporting and associated infrastructure on site) as assessed as part of the Basic Assessment process, which is located within the affected property – refer to Table 2-1 for general site information.

The property on which the facility is to be constructed will be leased by Notsi PV (Pty) Ltd from the property owner for the lifespan of the project (minimum of 20 years).

Table 2-1: General site information

General Site Information	
Description of affected farm portions	Farm Welgeluk No. 1622
Province	Free State Province
District Municipality	Lejweleputswa District Municipality
Local Municipality	Tokologo Local Municipality
Ward numbers	3
Closest towns	The centre of the town of Dealesville is located approximately 13 km northeast of the site
21 Digit Surveyor General codes	F00400000000162200000
Type of technology	Photovoltaic solar facility
Structure Height	PV Panels: up to 4.5m Battery Energy Storage System (BESS): ≤ 8m Buildings: up to 4m On-site Facility Substation: < 30m
Surface area to be covered (Development footprint)	Approximately 255 ha EIA footprint (area assessed for the placement of the development footprint) is 275ha.
Structure orientation	Tracking PV with mono- or bi-facial panels. Bi-facial panels with single axis tracking is preferred over fixed-axis or double axis tracking systems and mono-facial panels due to the potential to achieve higher annual energy yields whilst minimising the balance of system (BOS) costs and maximizing the efficiency of land use, resulting in the lowest levelized cost of energy (LCOE). The preference for single axis tracking is also based on the economic viability, water requirements, land requirements, efficiency and potential environmental impacts of the proposed solar panel mounting types. The development of the PV facility will take into consideration during the final design phase the use of either mono-facial or bi-facial PV panels as well as tracker vs fixed- tilt mounting structures. Both options are considered feasible for the site.

General Site Information	
Generation capacity	Up to 100MW

The site is located in a rural area and is bordered by farms. The site survey revealed that the affected properties currently consist of farming activities– refer to plates 1-8 for photographs of the site.

Dealesville is a mixed farming town in the Free State province of South Africa and is surrounded by numerous salt pans. There are many natural springs in the vicinity, most notably Florisbad some 35 km from the town of Dealesville.

2.2 ACTIVITY DESCRIPTION

The proposed development will trigger the following activity:

Table 2-2: Listed activities

Relevant notice:	Activity No (s)	Description of each listed activity as per project description:
GNR. 327 (as amended in 2017)	Activity 11(i)	• *"The development of facilities or infrastructure for the transmission and distribution of electricity (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."* • Activity 11(i) is triggered as the proposed photovoltaic solar facility will transmit and distribute electricity of 132 kilovolts outside an urban area. The infrastructure for the distribution of electricity will include an on-site facility substation (33kV/132kV) that will be located within the development footprint of the solar facility.
GNR. 327 (as amended in 2017)	Activity 14	• *"The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres."* • Activity 14 is triggered since the proposed BESS will contain electrolyte solutions considered to be dangerous goods. Although the BESS itself is not considered to be a facility for storage of dangerous goods, rather the function of BESS is to store energy. The total volume of electrolytes solution used in the BESS may exceed 80m^3 but will be less than 500m^3, which depending on the

Relevant notice:	Activity No (s)	Description of each listed activity as per project description:
		technology selected may be stored temporarily on-site during battery assembly. • The solar energy facility will only require the installation of a standard diesel storage tank, which will have a capacity of less than 30m^3.
GNR. 327 (as amended in 2017)	Activity 24(ii)	• *"The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters;"* • Activity 24(ii) is triggered as the internal roads will vary between 6 and 8 meters in width. Some sections of road may be slightly wider than 8 meters.
GNR. 327 (as amended in 2017)	Activity 28(ii)	• *"Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare."* • Activity 28(ii) is triggered as portions of the affected property have been used for grazing and crop production in the past and the property will be re-zoned to "special" use for the proposed development. The development footprint of Notsi PV 5 will be up to 195 hectares in extent.
GNR. 327 (as amended in 2017)	Activity 56 (ii)	• *"The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres…"* • Activity 56 (ii) is triggered as the existing access to the affected property will need to be widened by more than 6 metres. It is expected that only certain sections of the road will need to be upgraded, where relevant.
GNR. 325 (as amended in 2017)	Activity 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."*

Relevant notice:	Activity No (s)	Description of each listed activity as per project description:
		• Activity 1 is triggered since the proposed photovoltaic solar facility will generate up to 100 megawatts electricity through the use of a renewable resource.
GNR. 325 (as amended in 2017)	Activity 15	• *"The clearance of an area of 20 hectares or more of indigenous vegetation."* • In terms of vegetation type the site falls within the Western Free State Clay Grassland which is described by Mucina and Rutherford (2006) respectively as 'Least Concern'. Activity 15 is triggered since portions of the site have not been lawfully disturbed during the preceding ten years; therefore, more than 20 hectares of indigenous vegetation will be removed. The development footprint of the solar facility will be up to 195 hectares.

The potentially most significant impacts will occur during the construction phase of the development, which will include the following activities:

- Site clearing and preparation: Certain areas of the site will need to be cleared of vegetation and access to the site will need to be confirmed.
- Civil works to be conducted:
    - Terrain levelling if necessary– Levelling will be minimal as the potential site chosen is relatively flat.
    - Laying foundation- The structures will be connected to the ground through cement pillars, cement slabs or metal screws. The exact method will depend on the detailed geotechnical analysis.
    - Construction of access roads/paths – existing paths will be used, where reasonably possible. Access will be obtained via the S322 secondary road and various gravel farm roads within the area and affected property.
    - Trenching – all Direct Current (DC) and Alternating Current (AC) wiring within the PV plant will be buried underground. Trenches will have a river sand base, space for pipes, backfill of sifted soil and soft sand and concrete layering where vehicles will pass.

2.3 PHOTOVOLTAIC TECHNOLOGY

The term photovoltaic describes a solid-state electronic cell that produces direct current electrical energy from the radiant energy of the sun through a process known as the Photovoltaic Effect. This refers to light energy placing electrons into a higher state of energy to create electricity. Each PV cell is made of silicon (i.e., semiconductors), which is positively and negatively charged on

either side, with electrical conductors attached to both sides to form a circuit. This circuit captures the released electrons in the form of an electric current (direct current). The key components of the proposed project are described below:

- PV Panel Array - The proposed facility will require numerous linked rows of PV (single axis) modules placed behind a protective glass sheet to form a panel. Multiple panels will be required to form the solar PV arrays which will comprise the PV facility with associated support infrastructure (concrete footings, below ground electrical cables) to produce up to 100MW electricity.

  Battery Energy Storage System (BESS) – The battery energy storage system will make use of solid state or flow battery technology and will have a capacity of up to 400MWh. Both lithium-ion and Redox-flow technology are being considered for the project, depending on which is most feasible at the time of implementation. The extent of the system will be 3ha. The containers may be single stacked only to reduce the footprint. The containers will include cells, battery charge controllers, inverters, transformers, HVAC, fire, safety and control systems. The general purpose and utilisation of a Battery Energy Storage System (BESS) is to save and store excess electrical output as it is generated, allowing for a timed release when the capacity is required. BESS systems therefore provide flexibility in the efficient operation of the electric grid through decoupling of the energy supply and demand. Two technology types have been assessed in the Basic Assessment Lithium-Ion technology (e.g., Lithium Ferrophosphate (LFP), Nickel Manganese Cobalt Oxide (NMC) or similar technology and chemistries) and Redox-flow technology (e.g., vanadium flow battery, or similar technology and chemistries). Both technologies include batteries housed within containers which are fully enclosed and self-contained. It is important to note that both are expected to have similar impacts due to their design and functions being closely related. Therefore, the assessment proposes both technologies for authorisation (i.e., a BESS of either Lithium-Ion or Redox-flow type), to allow the proponent to determine the precise technology when the project is implemented. While there are various battery storage technologies available, Li-ion batteries have emerged as the leading technology in utility-scale energy storage applications because it offers the best mix of performance specifications, such as high charge and discharge efficiency, low self-discharge, high energy density, and long cycle life Compared to other battery options, Li-ion batteries are highly efficient and have a high energy density and are lightweight, At this stage, a solid-state technology type would be envisaged for implementation and a Solid-State Lithium-Ion battery is the currently preferred technology. However, given that both types of battery technology have been assessed and the impacts were found to be similar, and given the rapid evolution of battery technology, we request that the EA (if granted) authorize Lithium-Ion technology or redox-flow battery technology, in order to enable the applicant to utilize the most attractive battery type available on the market at the time of implementation.

- Inverters - Sections of the PV array will be wired to inverters. The inverter is a pulse width mode inverter that converts direct current (DC) electricity to alternating current (AC) electricity at grid frequency.

- Supporting Infrastructure – The following auxiliary buildings with basic services including water and electricity will be required:
    - On-site Facility Substation (up to 4ha);
    - Eskom Portion of the Substation (up to 4ha);
    - Temporary Laydown Areas; (~ 20000 m^2) and construction site camp/site office;
    - Site Administration Office (~500m^2);
    - Switch gear and relay room (~400m^2);
    - Staff lockers and changing room (~200m^2);
    - Security control (~60m^2);
    - Operations & Maintenance (O&M) building (~ 500 m^2); and
    - Warehouse.
- Roads – Access will be obtained via the S322 secondary road and various gravel farm roads within the area and affected property. An internal site road network will also be required to provide access to the solar field and associated infrastructure. Access roads will be up to 8m wide (6m wide road surface, with 1m drainage either side).
- Fencing - For health, safety and security reasons, the facilities will require perimeter fencing and internal security fencing. The fencing will be up to 2.4 m in height.

A separate environmental impact assessment process will be undertaken by the Applicant to obtain Environmental Authorisation for the grid connection solution that will need to be developed to evacuate the generated solar electricity from the Notsi PV Cluster to the national electricity grid.

2.4 LAYOUT DESCRIPTION

The layout plan proposed by the Applicant considers and adhere to the limitations of the site and aspects such as environmentally sensitive areas, roads, fencing and servitudes on site. The total surface area covered by the layout include the PV panel arrays (spaced to avoid shadowing), access and maintenance roads and associated infrastructure (buildings, power inverters, substation, BESS and perimeter fences). Limited environmental features of significance exist on site which have been avoided through the careful placement of the development footprint within the site under assessment. A final layout plan is included in Appendix H under Layout Plans in the report, as well as Figures H and I. Table 2-3 below provides detailed information regarding the layout for the proposed facility as per DFFE requirements.

Table 2-3: Technical details for the proposed facility

Technical Details for the proposed facility	
Component	**Description / dimensions**
Height of PV panels	Up to 4.5 meters

Technical Details for the proposed facility	
Component	**Description / dimensions**
Area of PV Array	Up to 255 ha
Area occupied by substations and BESS	On-site Facility Substation: Up to 4ha Eskom portion of the Substation: up to 4ha BESS: 3 ha
Capacity of the on-site substation	33kV / 132kV
Area occupied by both permanent and construction laydown areas	Up to 4 ha
Area occupied by buildings	Up to 3ha: • Administration Office (~500m²) • Switch gear and relay room (~400m²) • Staff lockers and changing room (~200m²) • Security control (~60m²)
Width of internal roads	Between 6 and 8 meters
Height of fencing	Approximately 2.4 meters

Table 2-4 provides the coordinate points for the proposed development footprint and associated infrastructure as is being applied for in this Basic Assessment Process.

Table 2-4: Coordinates

Coordinates			
Development Footprint (~195ha)	A	28°45'26.04"S	25°39'22.70"E
	B	28°46'19.67"S	25°38'39.62"E
	C	28°46'21.15"S	25°38'44.19"E
	D	28°46'19.32"S	25°38'52.36"E
	E	28°46'24.56"S	25°38'54.95"E
	F	28°46'34.26"S	25°39'24.06"E
	G	28°46'3.05"S	25°39'58.29"E
	H	28°45'35.26"S	25°39'51.31"E
	I	28°45'25.28"S	25°39'25.37"E
On-site Substation and Battery Energy Storage System	A	28°45'31.14"S	25°39'17.67"E
	B	28°45'29.10"S	25°39'14.99"E
	C	28°45'31.76"S	25°39'12.71"E
	D	28°45'33.83"S	25°39'15.48"E
Proposed Access Road (bend-points)	1	28°45'40.47"S	25°38'4.24"E
		28°45'41.98"S	25°38'12.73"E
		28°45'46.37"S	25°38'17.06"E
		28°45'45.54"S	25°38'24.14"E
		28°45'39.50"S	25°38'28.09"E
		28°45'29.32"S	25°39'6.75"E
		28°45'34.48"S	25°39'10.64"E
		28°45'33.03"S	25°39'11.61"E
		28°45'36.46"S	25°39'13.13"E

2.5 SERVICES PROVISION

The following sections provide information on services required on the site e.g., water, sewage, refuse removal, and electricity.

2.5.1 Water

Adequate provision of water will be a prerequisite for the development. Water for the proposed development will most likely be obtained from ground water resources or alternatively collected with water trucks from an authorized water service provider and stored on site. The Department of Water and Sanitation will be contacted by the project proponent to confirm the water resource availability in the relevant catchment management area in order to ensure sustainable water supply. A full assessment of the application for water use authorisation will only be undertaken in the event that the project proponent has obtained preferred bidder status by the Department of Mineral Resources and Energy or is developed as part of another power generation programme or opportunity.

The estimated maximum amount of water required during construction is a total of 6000 kl in (estimated max of 17 kl per day) during the 12 - 18 months of construction. The estimated maximum amount of water required during the facility's 20 years of production is 4000 kl per annum. The majority of this usage is for the cleaning of the solar panels. It is estimated that the panels may only need to be washed twice per annum. Other uses during operations include potable water for sewage and drinking water, as well as water for maintenance tasks and operations.

Drinking water supplied will comply with the SANS:241 quality requirements. Water quality from the borehole will be tested to confirm SANS:214 quality, if water quality is not sufficient for drinking, bottled water will be supplied to staff during construction and operational phases of the project.

Water saving devices and technologies such as the use of dual flush toilets and low-flow taps, the management of stormwater, the capture and use of rainwater from gutters and roofs will be considered by the developer. Furthermore, indigenous vegetation will be used during landscaping and the staff will be trained to implement good housekeeping techniques.

2.5.2 Storm water

To avoid soil erosion, it is recommended that the clearing of vegetation be limited. Stormwater management and mitigation measures are included in the Environmental Management Programme (EMPr) – refer to Appendix F.

2.5.3 Sanitation and waste removal

Portable chemical toilets will be utilised during the construction phase, that will be serviced privately or by the local municipality. Waste will be disposed of at a licensed landfill site. The construction- and hazardous waste will be removed and disposed of at licensed landfill sites accepting such kinds of wastes. During the operation phase household waste will be removed to a licensed landfill site by a private contractor or by the local municipality. The relevant Local

Municipality(s) will be contacted to formally confirm that it has the capacity to provide the proposed development with these services for the lifetime of the project (20 years).

2.5.4 Electricity

During the construction phase of the development electricity will either be generated on site through a small solar system or through the use of generators or the existing Eskom supply on the affected property will be utilised. This will depend on the Engineering, Procurement, and Construction (EPC) contractor appointed. During operation electricity use will be limited and will primarily be related to the lighting of the facility and domestic use. Design measures such as the use of energy saving light bulbs will be considered by the developer. During the day, electricity will be sourced from the photovoltaic plant, and from the electricity connection at night.

2.6 DECOMMISSIONING OF THE FACILITY

The operating period will be 20 years from the commencement date of the operation phase. Thereafter two rights of renewal periods of 40 years and 30 years will be relevant. It is anticipated that new PV technologies and equipment will be implemented, within the scope of the Environmental Authorisation, when influencing the profitability of the solar facility.

A likely extension of the plant's lifetime would involve putting new, more efficient, solar panels on the existing structures to improve the efficiency of the facility as the technology improves. The specifications of these new panels will be the same as the current panels under consideration, but the conversion efficiency of sunlight to energy will be greater (comparable to new computer chips, that are the same, but faster and more efficient). If, for whatever reason the plant halts operations, the Environmental Authorisation and contract with the landowner will be respected during the decommissioning phase.

<u>The decommissioning process will consist of the following steps:</u>

- The PV facility would be disconnected from the Eskom grid.
- The inverters and PV modules, and BESS, would be disconnected and disassembled.
- Concrete foundations (if used) would be removed, and the structures would be dismantled.
- Wastewater storage conservancy tanks would be responsibly removed, and the area would be rehabilitated.
- The underground cables would be unearthed and removed, and buildings would be demolished and removed.
- The fencing would be dismantled and removed.
- The roads can be retained should the landowner choose to retain them, alternatively the roads will be removed, and the compaction will be reversed.
- Most of the wires, steel and PV modules are recyclable and would be recycled to a reasonable extent. The Silicon and Aluminium in PV modules can be removed and reused in the production of new modules.
- Any rubble and non-recyclable materials will be disposed of at a registered landfill facility.

The rehabilitation of the site would form part of the decommissioning phase. The aim would be to restore the land to its original form (or as close as possible). The rehabilitation activities would include the following:

- Removal of all structures and rubble;
- Breaking up compaction where required, loosening of the soil and the redistribution of topsoil; and
- Restoration of the surface to the original contours and application of hydro seeding.

3 LEGISLATIVE AND POLICY CONTEXT

This section aims to address the following requirements of the regulations:

Appendix 1. (3) A BAR (...) must include-

(e) a description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context.

3.1 INTRODUCTION

Environmental decision making with regards to solar PV facilities and associated infrastructure is based on numerous policy and legislative documents. These documents inform decisions on project level environmental authorisations issued by the National Department of Forestry, Fisheries and the Environment (DFFE) as well as comments from local and district authorities. Moreover, it is significant to note that they also inform strategic decision making reflected in IDPs and SDFs. Therefore, to ensure streamlining of environmental authorisations it is imperative for the proposed activity to align with the principles and objectives of key national, provincial and local development policies and legislation. The following acts and policies and their applicability to the proposed development are briefly summarised:

- The Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996)
- National Environmental Management Act, 1998 (Act No. 107 of 1998) [NEMA]
- The National Energy Act, 2008 (Act 34 of 2008)
- Electricity Regulation Act (Act No. 4 of 2006) (as amended)
- National Water Act, 1998 (Act No. 36 of 1998)
- National Environmental Management: Biodiversity Act (10 of 2004) (NEMBA)
- National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
- National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)
- The National Heritage Resources Act, 1999 (Act No. 25 of 1999)
- Conservation of Agricultural Resources Act, 1983 (Act No. 85 of 1983)
- Subdivision of Agricultural Land Act (70 of 1970) (SALA)
- Spatial Planning and Land Use Management Act, 2013 (Act 16 of 2013) (SPLUMA)
- The National Forests Act, 1998 (Act 84 of 1998)
- The National Road Traffic Act (93 of 1996) (NRTA)
- The White Paper on the Energy Policy of the Republic of South Africa (1998)
- The White Paper on Renewable Energy (2003)

- Integrated Resource Plan (IRP) for South Africa (2010-2030)
- National Development Plan of 2030
- National Infrastructure Plan of South Africa (2012)
- New Growth Path Framework (2010)
- Climate Change Bill (2018)
- Climate Change Bill (2021) – for public comment
- Strategic Integrated Projects (SIPs) (2010 – 2030)
- Strategic Environmental Assessment (SEA) for wind and solar PV Energy in South Africa (2014)
- Free state Provincial Spatial Development Framework (PSDF) (2012)
- Lejweleputswa District Municipality Draft Integrated Development Plan (IDP) 2023/2024 (March 2023)
- Tokologo Local Municipality Draft Integrated Development Plan (IDP) 2023/2024
- Tokologo Local Municipality Draft Spatial Development Framework (SDF) 2022/2023 (March 2023)

The key principles and objectives of each of the legislative and policy documents are briefly summarised in Tables 3.-1 and 3-2 to provide a reference framework for the implications for the proposed activity.

3.2 LEGISLATIVE CONTEXT

Table 3-1: Legislative context for the construction of photovoltaic solar plants

LEGISLATION	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
The Constitution of South Africa **(Act No. 108 of 1996)**	National Government	1996	The Constitution is the supreme law of the Republic, and all law and conduct must be consistent with the Constitution. The Chapter on the Bill of Rights contains a number of provisions, which are relevant to securing the protection of the environment. Section 24 states that "everyone has the right to (a) an environment that is not harmful to their health or well-being and (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that – (i) prevent pollution and ecological degradation; (ii) promote conservation; and (iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development. The Constitution therefore, compels the government to give effect to the people's environmental rights and places the government under a legal duty to act as a responsible custodian of the country's environment. It compels the government to pass legislation and use other measures to protect the environment, to prevent pollution and ecological degradation, promote conservation and secure sustainable development. The development of Notsi PV 5 and the aspects related thereto considers the creation of an environment which is not harmful or degraded through the implementation of appropriate mitigation measures.
The National Environmental Management Act **(Act No. 107 of 1998)**	National Department of Environmental Affairs (now known as the Department of Forestry, Fisheries and the Environment) and	1998	NEMA provides for co-operative governance by establishing principles and procedures for decision-makers on matters affecting the environment. An important function of the Act is to serve as an enabling Act for the promulgation of legislation to effectively address integrated environmental management. Some of the principles in the Act are accountability; affordability; cradle to grave management; equity; integration; open information; polluter pays; subsidiary; waste avoidance and minimisation; co-operative governance; sustainable development; and environmental protection and justice.

LEGISLATION	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
	the Free State Province Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA)		The mandate for EIA lays with the National Environmental Management Act (107 of 1998) and the EIA Regulations No. 324, 325, 326, and 327 promulgated in terms of Section 24 of NEMA. The EIA Regulations determine that an Environmental Authorisation is required for certain listed activities, which might have a detrimental effect on the environment. The BA process undertaken for Notsi PV 5 is in-line with the requirements of NEMA for the Application for Environmental Authorisation.
The National Energy Act (Act No. 34 of 2008)	Department of Mineral Resources and Energy	2008	One of the objectives of the National Energy Act was to promote diversity of supply of energy and its sources. In this regard, the preamble makes direct reference to renewable resources, including solar: "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, taking into account environmental management requirements (…); to provide for (…) increased generation and consumption of renewable energies…" (Preamble). Considering that Notsi PV 5 is proposed to make use of PV technology and the solar resource for the generation of electricity, the proposed project is in-line with the Act.
Electricity Regulation Act (Act No. 4 of 2006) (as amended)	National Energy Regulator of South Africa (NERSA)	2006	The Act provides a national regulatory framework for the electricity supply industry. The Act requires registration and licensing of anyone wanting to generate, transmit, reticulate, distribute, trade, or import and export electricity. One of the requirements for the REIPPPP is for the Proponent to hold an environmental authorisation for the proposed project. The REIPPPP is guided by the National Energy Act, one of the purposes of which is to promote sustainable development of renewable energy infrastructure.

LEGISLATION	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
The National Water Act (Act No. 36 of 1998)	Department of Water Affairs (now known as Department of Water and Sanitation)	1998	Sustainability and equity are identified as central guiding principles in the protection, use, development, conservation, management and control of water resources. The intention of the Act is to promote the equitable access to water and the sustainable use of water, redress past racial and gender discrimination, and facilitate economic and social development. The Act provides the rights of access to basic water supply and sanitation, and environmentally, it provides for the protection of aquatic and associated ecosystems, the reduction and prevention of pollution and degradation of water resources. As this Act is founded on the principle that National Government has overall responsibility for and authority over water resource management, including the equitable allocation and beneficial use of water in the public interest, a person can only be entitled to use water if the use is permissible under the Act. Chapter 4 of the Act lays the basis for regulating water use. The National Water Act will be applicable in terms of obtaining the relevant license if any water uses triggered.
National Environmental Management: Biodiversity Act (10 of 2004) (NEMBA)	Department of Forestry, Fisheries and the Environment (DFFE)	2004	"The Act calls for the management of all biodiversity within South Africa. The 2007 Threatened or Protected Species Regulations (GN R150, as amended) provides protection through a permit system as well as through the identification of restricted activities. If required, the relevant permits will be applied for." The Act also provides for duty of care with regards to control of alien species.
National Environmental Management: Waste Act **(Act No. 59 of 2008)**	National Department Environmental Affairs (DEA) (now known as the Department of Forestry, Fisheries	2008	NEMWA has been developed as part of the law reform process enacted through the White Paper on Integrated Pollution and Waste Management and the National Waste Management Strategy (NWMS). The objectives of the Act relate to the provision of measures to protect health, well-being and the environment, to ensure that people are aware of the impact of waste on their health, well-being and the environment, to provide for compliance with the measures, and to

LEGISLATION	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
	and the Environment)		give effect to section 24 of the Constitution in order to secure an environment that is not harmful to health and well-being. Regulations No. R921 (of 2013) promulgated in terms of Section 19(1) of the National Environmental Management: Waste Act (59 of 2008) determines that no person may commence, undertake or conduct a waste management activity listed in this schedule unless a license is issued in respect of that activity. It is not envisaged that a waste permit will be required for the proposed development as no listed activities in terms of waste management are expected to be triggered.
National Environment Management: Air Quality Act **(Act No. 39 of 2004)**	National Department Environmental Affairs (DEA) (now known as the Department of Forestry, Fisheries and the Environment)	2004	The objective of this Act is to protect the environment by providing reasonable measures for the protection and enhancement of the quality of air in the Republic; the prevention of air pollution and ecological degradation; and securing ecologically sustainable development while promoting justifiable economic and social development. Regulations No. R248 (of 31 March 2010) promulgated in terms of Section 21(1)(a) of the National Environmental Management Act: Air Quality Act (39 of 2004) determine that an Atmospheric Emission License (AEL) is required for certain listed activities, which result in atmospheric emissions which have or may have a detrimental effect on the environment. The Regulation also sets out the minimum emission standards for the listed activities. It is not envisaged that an Atmospheric Emission License will be required for the proposed development.
The National Heritage Resources Act **(Act No. 25 of 1999)**	South African Heritage Resources Agency (SAHRA)	1999	The Act aims to introduce an integrated and interactive system for the management of heritage resources, to promote good governance at all levels, and empower civil society to nurture and conserve heritage resources so that they may be bequeathed to future generations and to lay down principles for governing heritage resources management throughout the Republic. It also aims to establish the South African Heritage Resources Agency together with its Council to co-ordinate and promote the management of heritage resources, to set norms and maintain essential national standards and to protect heritage resources, to provide for the protection and

LEGISLATION	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
			management of conservation-worthy places and areas by local authorities, and to provide for matters connected therewith. The Act protects and manages certain categories of heritage resources in South Africa. For the purposes of the Heritage Resources Act, a "heritage resource" includes any place or object of cultural significance. In this regard the Act makes provision for a person undertaking an activity listed in Section 28 of the Act to notify the resources authority. The resources authority may request that a heritage impact assessment be conducted if there is reason to believe that heritage resources will be affected. A case file has been opened on the SAHRIS (CaseID: 19688) for the Notsi PV Cluster and all relevant documents have been submitted. The Heritage Impact Assessment undertaken for the development is included as Appendix D5 to this final BAR.
Conservation of Agricultural Resources Act (Act No. 85 of 1983)	National and Provincial Government	1983	The objective of the Act is to provide control over the utilisation of the natural agricultural resources of the Republic in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants; and for matters connected therewith. Consent will be required from the Department of Rural Development and Land Reform in order to confirm that the proposed development is not located on high potential agricultural land and to approve the long -term lease agreement. A Soil and Agricultural Compliance Statement has been undertaken for Notsi PV 5 and is included as Appendix D4 of this final BAR.
Subdivision of Agricultural Land Act (70 of 1970) (SALA)	Department of Agriculture, Land Reform and Rural	1970	The purpose of this Act is to control the subdivision of agricultural land and, in connection therewith, the use of agricultural land. Applications are lodged with the Department of Agriculture, Land Reform and Rural Development (DALRRD) to allow for the subdivision of agricultural land, as well as other prohibited actions in terms of the Act. In order to limit the potential threat that solar energy development could pose to agricultural production and to the

LEGISLATION	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
	Development (DALRRD)		agricultural economy, DALRRD created the 10% rule to inform the decision of whether a solar energy development on agricultural land should be approved or not. This rule states that a solar energy facility may not utilise more than 10% of the surface area of a farm. Its aim was to ensure that each farm unit remained predominantly agricultural rather than certain farms abandoning agricultural production in favour of renewable energy generation.
Spatial Planning and Land Use Management Act, 2013 (Act 16 of 2013) (SPLUMA);	Provincial Authority	2013	This suite of legislation provides the framework for spatial planning and regulates the use and development of land.
The National Forests Act, 1998 (Act 84 of 1998)	Department of Environmental Affairs (now known as the Department of Forestry, Fisheries and the Environment)	1998	The purposes of this Act are to: (a) promote the sustainable management and development of forests for the benefit of all; (b) create the conditions necessary to restructure forestry in State forests; (c) provide special measures for the protection of certain forests and trees: (d) promote the sustainable use of forests for environmental, economic, educational, recreational, cultural, health and spiritual purposes. (e) promote community forestry; (f) promote greater participation in all aspects of forestry and the forest products industry by persons disadvantaged by unfair discrimination. Section 12(1) read with s15(1) of the NFA stated that the Minister may declare a particular tree, group of trees, woodland; or trees belonging to a particular species, to be a protected tree, group of trees, woodland or species. A list of protected tree species was gazetted in GN 635 of 6 December 2019. The effect of the declaration is that no person may (a) cut, disturb, damage

LEGISLATION	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
			or destroy; or (b) possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, or any forest product derived from a protected tree, except under a license granted by the Minister; or in terms of an exemption published by the Minister in the Gazette. A Terrestrial Biodiversity Impact Assessment has been undertaken for the Notsi PV 5 and the relevant report is included in Appendix D1 of the current report.
National Road Traffic Act (93 of 1996) (NRTA)	Department Roads and Public Works	1996	Certain vehicles and loads cannot be moved on public roads without exceeding the limitations in terms of the dimensions and/or mass as prescribed in the Regulations of the NRTA. Due to the large size of some of the facility's components, they will need to be transported via "abnormal loads". Access to the site is readily available via the existing S322 secondary road and various gravel farm roads within the area and affected property. Some internal roads have been identified for upgrade to ensure that the heavy vehicles can reach the site.
Free State Nature Conservation Ordinance, 1969 (Act 8 of 1969)	Free State Province Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA)	1969	The Act provides for the conservation of fauna and flora and the hunting of animals causing damage and for matters incidental thereto. This includes wild animals, fish, indigenous plants, as well as nature reserves. The Act also provides for the permitting of the disturbance of such species. A Terrestrial Biodiversity Impact Assessment has been undertaken for Notsi PV 5 and the relevant report is included in Appendix D1 of this final BAR.

3.3 POLICY CONTEXT

Table 3-2: Policy context for the construction of solar PV plants

POLICY	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
The White Paper on the Energy Policy of the Republic of South Africa	Department of Mineral Resources and Energy	1998	The White Paper on the Energy Policy of the Republic of South Africa establishes the international and national policy context for the energy sector, and identifies the following energy policy objectives: • Increasing access to affordable energy services • Improving energy governance • Stimulating economic development • Managing energy-related environmental and health impacts • Securing supply through diversity • Energy policy priorities The White Paper sets out the advantages of renewable energy and states that the Government believes that renewables can in many cases provide the least cost energy service, particularly when social and environmental costs are included. The White Paper acknowledges that South Africa has neglected the development and implementation of renewable energy applications, despite the fact that the country's renewable energy resource base is extensive, and many appropriate applications exist. The White Paper notes that renewable energy applications have specific characteristics that need to be considered. Advantages include: • Minimal environmental impacts in operation in comparison with traditional supply technologies; and • Generally lower running costs, and high labour intensities. Disadvantages include:

POLICY	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
			• 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. Notsi PV 5 is in line with this policy as it proposes the generation of renewable energy from the solar resource.
The White Paper on Renewable Energy	Department of Mineral Resources and Energy	2003	This White Paper on Renewable Energy supplements the *White Paper on Energy Policy*, which recognises that the medium and long-term potential of renewable energy is significant. This Paper sets out Government's vision, policy principles, strategic goals and objectives for promoting and implementing renewable energy in South Africa. The White Paper notes that while South Africa is well-endowed with renewable energy resources that have the potential to become sustainable alternatives to fossil fuels, these have thus far remained largely untapped. Government's long-term goal is the establishment of a renewable energy industry producing modern energy carriers that will offer in future years a sustainable, fully non-subsidised alternative to fossil fuels. The medium-term (10-year) target set in the White Paper is: *10 000 GWh (0.8 Mtoe) renewable energy contribution to final energy consumption by 2013, to be produced mainly from biomass, wind, solar and small-scale hydro. The renewable energy is to be utilised for power generation and non-electric technologies such as solar water heating and bio-fuels. This is approximately 4% (1667 MW) of the projected electricity demand for 2013 (41539 MW)* (Executive Summary, ix). Notsi PV 5 is in line with this policy as it proposes the generation of renewable energy from the solar resource.
Integrated Resource Plan	Department of Mineral	2010-2030	The Integrated Resource Plan for Electricity for South Africa of 2010–2030 (further referred to as the IRP) is a "living plan" which is expected to be revised and updated continuously as necessary due to changing circumstances. According to the Summary of the plan the current IRP for South Africa, which was originally

POLICY	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
(IRP) for South Africa	Resources and Energy		initiated by the Department of Energy (DoE) in June 2010 (the Department is now known as Department of Mineral Resources and Energy), led to the Revised Balanced Scenarios (RBS) for the period 2010–2030. "*This scenario was derived based on the cost-optimal solution for new build options (considering the direct costs of new build power plants), which was then "balanced" in accordance with qualitative measures such as local job creation".* In addition to all existing and committed power plants, the RBS included 11,4 GW of renewables, which relates to the proposed Notsi PV 5 project. In 2010 several changes were made to the IRP model. The main changes in the IRP were the disaggregation of renewable energy technologies to explicitly display solar photovoltaic (PV), concentrated solar power (CSP), and wind options (RSA, 2011a). The summary of the IRP further explains that traditional cost-optimal scenarios were developed based on the previously mentioned changes in the IRP. This resulted in the Policy-Adjusted IRP, which stated that: "*The installation of renewables (solar PV, CSP and wind) have been brought forward in order to accelerate a local industry*; *To account for the uncertainties associated with the costs of renewables and fuels, a nuclear fleet of 9,6 GW is included in the IRP; The emission constraint of the RBS (275 million tons of carbon dioxide per year after 2024) is maintained; and Energy efficiency demand-side management (EEDSM) measures are maintained at the level of the RBS*" (RSA, 2011a:6). *"The Policy-Adjusted IRP includes the same amount of coal and nuclear new builds as the RBS, while reflecting recent developments with respect to prices for renewables. In addition to all existing and committed power plants (including 10 GW committed coal), the plan includes 9,6 GW of nuclear; 6,3 GW of coal; 17,8 GW of renewables; and 8,9 GW of other generation sources"* (RSA, 2011a:6). The IRP highlights the commitments before the next IRP. The commitments pertaining to the purpose of the proposed project in renewable energy is: "*Solar PV programme 2012-2015: In order to facilitate the connection of the first solar PV units to the grid in 2012 a firm commitment to this capacity is necessary. Furthermore, to provide the security of investment to ramp up a sustainable local industry cluster, the first four years from 2012 to 2015 require firm commitment.*"

POLICY	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
			"*Solar PV 2016 to 2019: As with wind, grid upgrades might become necessary for the second round of solar PV installations from 2016 to 2019, depending on their location. To trigger the associated tasks in a timely manner, a firm commitment to these capacities is necessary in the next round of the IRP at the latest. By then, the assumed cost decreases for solar PV will be confirmed*" (IRP, 2011a:17). In conclusion the IRP recommends that an accelerated roll-out in renewable energy options should be allowed with regards to the benefits of the localization in renewable energy technologies (RSA, 2011a). It is however important to take note that since the release of the IRP in 2011 there has been a number of developments in the energy sector of South Africa. Therefore, the IRP has been updated and were open for comments until March of 2017. The new IRP of 2019 was formally published in October 2019. The draft IRP of 2018 was open for comments until the end of October 2018. For the revision scenario analysis were conducted and the results thereof are included in the draft IRP of 2018. The results revealed that for the period ending 2030 that: *"The committed Renewable Energy Independent Power Producers Programme, including the 27 signed projects and Eskom capacity rollout ending with the last unit of Kusile in 2022, will provide more than sufficient capacity to cover the projected demand and decommissioning of plants up to approximately 2025"; "Imposing annual build limits on renewable energy will not affect the total cumulative capacity and the energy mix for the period up to 2030*"; and *"the scenario without renewable energy annual build limits provides the least-cost option by 2030*" (RSA, 2018:34). Lastly, the draft IRP of 2018 also included the scenario analysis for the period post 2030. Here it was observed that: "*Imposing annual build limits on renewable energy will restrict the cumulative renewable installed capacity and the energy mix for this period; adopting no annual build limits on renewables or imposing a more stringent strategy to reduce greenhouse gas emissions implies that no new coal power plants will be built in the future unless affordable cleaner forms of coal-to-power are available; and the scenario without renewable energy annual build limits provides the least-cost option by 2050*" (RSA, 2018:34–35). In the final IRP of 2019 key considerations were taken into consideration together with required actions to be taken for the IRP of 2019 to be credible. In terms of renewable energy technologies like solar and wind, the IRP stated that *"The application of renewable build limits 'smoothes out' the capacity allocations for*

POLICY	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
			wind and solar PV which provides a constant pipeline of projects to investment; this addresses investor confidence". The decision stated against this key consideration is to *"retain the current annual build limits on renewables (wind and PV) pending the finalization of a just transition plan"* (RSA, 2019:46). Hereby the IRP also recognises renewable technologies' potential to diversify the electricity mix, create new industries and job opportunities and localize across the value chain (RSA, 2019:13). Notsi PV 5 is in line with this plan as it proposes the generation of renewable energy from the solar resource and will contribute to the energy mix of the country as set out in this plan.
National Development Plan of 2030	The Presidency: National Planning Commission	-	The National Development Plan aims to "eliminate poverty and reduce inequality by 2030" (RSA, undated). In order to eliminate or reduce inequality, the economy of South Africa needs to grow faster in order to benefit all South Africans. In May 2010 a draft national development plan was drafted, which highlighted the nine (9) key challenges for South Africa. The highest priority areas according to the plan are considered to be the creation of employment opportunities and to improve the quality of national education. In this regard, the plan sets out three (3) priority areas, namely to raise employment by a faster growing economy, improve the quality of education, and to build the capability of the state in order to play a more developmental and transformative role. One of the key challenges identified was that the economy is unsustainably resource intensive and the acceleration and expansion of renewable energy was identified as a key intervention strategy to address this challenge. The development of Notsi PV 5 will contribute to the intervention strategy as identified within the plan.
National Infrastructure Plan of South Africa	Presidential Infrastructure Coordinating Commission	2012	In the year 2012 the South African Government adopted a National Infrastructure Plan (hereafter referred to as the Plan). The aim of this Plan is to transform the economic landscape, while strengthening the delivery of basic services and creating new employment opportunities. This Plan also supports the integration of African communities, and also sets out the challenges and enablers that our country needs in order to respond to the planning and development of infrastructure with regards to fostering economic growth (RSA, 2012). The Plan has developed eighteen (18) strategic integrated projects (further referred to as SIPs). These SIPs stretches over all nine (9) provinces, covering social and economic infrastructure, and projects that enhances development and growth. Of the eighteen (18), five (5) are geographically focused,

POLICY	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
			three (3) spatial, three (3) energy, three (3) social infrastructure, two (2) knowledge, one (1) regional integration, and one (1) water and sanitation focussed. The three (3) SIPs according to the Plan, which are energy focused and correlate to the proposed project are as follow: - SIP 8: Green energy in support of the South African economy; - SIP 9: Electricity generation to support socio-economic development; and - SIP 10: Electricity transmission and distribution for all. SIP 8 according to the Plan "*support sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the IRP 2010 and support bio-fuel production facilities*". The purpose of SIP 9 according to the Plan is to "*accelerate the construction of new electricity generation capacity in accordance with the IRP 2010 to meet the needs of the economy and address historical imbalances*". SIP 9 should also monitor the implementation of major projects such as new power stations like Medupi, Kusile and Ingula. Lastly, SIP 10 aims to "*expand the transmission and distribution network to address historical imbalances, provide access to electricity for all and support economic development*" (RSA, 2012:20). The development of Notsi PV 5 is in line with SIP 8 and SIP 9 as it will provide "Green" energy in support of the South African Economy and will generate electricity which supports socio-economic development.
New Growth Path Framework	Department of Economic Development	-	The New Growth Path was developed after 16 years of South Africa's democracy, to respond to emerging opportunities and risks while building on policies. This framework provides a dynamic vision on how to collectively achieve a more developed, equitable and democratic society and economy. This framework mainly reflects the commitment of the South African Government to create employment opportunities for its people in all economic policies (RSA, 2011b). This framework sets out the markers for job creation and growth and also identifies where there are viable changes in the character and structure of production, in order to create a more inclusive, greener economy

POLICY	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
			in the long-term. It is stated in the framework that in order for this framework to reach its objectives, the Government is committed to: - Identify the possible areas of employment creation; and - Develop a policy to facilitate employment creation especially with regards to social equity, sustainable employment and growth in the creation of employment activities (RSA, 2011b). This framework also identifies investments in five key areas, one of which is energy. This framework also states that the green economy is a priority area, which includes the construction of and investment in renewable energy technologies like solar (RSA, 2011b). In this regard it will also assist creating employment opportunities over the medium- and long-term. Considering that the construction of and investment in renewable energy is a key area identified within the framework, Notsi PV 5 is considered to be in-line with the framework.
Climate Change Bill	National Department of Environmental Affairs (now known as the Department of Forestry, Fisheries and the Environment)	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. The following objectives are set within the Bill: • Provide for the coordinated and integrated response to climate change and its impacts by all spheres of government in accordance with the principles of cooperative governance; • Provide for the effective management of inevitable climate change impacts through enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, with a view to building social, economic, and environmental resilience and an adequate national adaptation response in the context of the global climate change response; • Make a fair contribution to the global effort to stabilise greenhouse gas concentrations in the atmosphere at a level that avoids dangerous anthropogenic interference with the climate system

POLICY	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
			within a timeframe and in a manner that enables economic, employment, social and environmental development to proceed in a sustainable manner. Notsi PV 5 comprises the development of a renewable energy generation facility and would not result in the generation or release of emissions during its operation.
Climate Change Bill	National Department of Forestry, Fisheries and the Environment	2021	The Department of Forestry, Fisheries and the Environment has published a new Climate Change Bill for public comment. The bill notes that climate change represents an urgent threat to human societies and the planet, and requires an effective, progressive and incremental response from both government and citizens. It recognises that South Africa has a global responsibility to reduce greenhouse gases and that the anticipated impacts arising as a result of climate change have the potential to undermine achieving of the country's developmental goals. The main objective of the bill is to enable the development of an effective climate change response and the long-term, just transition to a climate-resilient and lower-carbon economy and society, and to provide for matters connected therewith. Notsi PV 5 comprises the development of a renewable energy generation facility and would not result in the generation or release of emissions during its operation.
Strategic Environmental Assessment (SEA) for wind and solar PV Energy in South Africa	National Department of Forestry, Fisheries and the Environment (DFFE)	2014	The then Department of Environmental Affairs (DEA) has committed to contribute to the implementation of the National Development Plan and National Infrastructure Plan by undertaking Strategic Environmental Assessments (SEAs) to identify adaptive processes that integrate the regulatory environmental requirements for Strategic Integrated Projects (SIPs) while safeguarding the environment. The wind and solar photovoltaic (PV) SEA were accordingly commissioned by DEA in support of SIP 8, which aims to facilitate the implementation of sustainable green energy initiatives. This SEA identifies areas where large scale wind and solar PV energy facilities can be developed in terms of SIP 8 and in a manner that limits significant negative impacts on the environment, while yielding the highest

POLICY	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
			possible socio-economic benefits to the country. These areas are referred to as Renewable Energy Development Zones (REDZs). The REDZs also provide priority areas for investment into the electricity grid. Currently one of the greatest challenges to renewable energy development in South Africa is the saturation of existing grid infrastructure and the difficulties in expanding the grid. Proactive investment in grid infrastructure is likely to be the most important factor determining the success of REDZs. Although it is intended for the SEA to facilitate proactive grid investment in REDZs, such investment should not be limited to these areas. Suitable wind and solar PV development should still be promoted across the country and any proposed development must be evaluated on its own merit. The proposed site falls within the Kimberley REDZ (refer to Figure D).
Free State Provincial Spatial Development Framework (PSDF)	Free State Provincial Government	2012	The Free State PSDF is a policy document that promotes a 'developmental state' in accordance with national and provincial legislation and directives. It aligns with the Free State Provincial Growth and Development Strategy which has committed the Free State to 'building a prosperous, sustainable and growing provincial economy which reduces poverty and improves social development'. The PSDF includes comprehensive plans and strategies that collectively indicate which type of land-use should be promoted in the Province, where such land-use should take place, and how it should be implemented and managed. In broad terms, the PSDF: • Indicates the spatial implications of the core development objectives of the Free State Provincial Growth and Development Strategy. • Serves as a spatial plan that facilitates local economic development. • Lays down strategies, proposals and guidelines as it relates to sustainable development. • Facilitates cross-boundary co-operation between municipalities, adjoining provinces, and bordering countries.

POLICY	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
			• Serves as a manual for integration and standardisation of the planning frameworks of all spheres of government in the Province. The Free State Provincial Growth and Development Strategy states that sustainable economic development is the only effective means by which the most significant challenge of the Free State, namely poverty, can be addressed. The PSDF gives practical effect to sustainable development, which is defined as development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. The PSDF is prepared in accordance with bioregional planning principles that were adapted to suit the site-specific requirements of the Free State. It incorporates and complies with the relevant protocols, conventions, agreements, legislation and policy at all applicable levels of planning, ranging from international to the local level. The PSDF builds upon achievements and learns from mistakes of the past, reacts to the challenges, incorporates the traditional knowledge of the people of the Free State, and builds upon international best-practice and technology. The development of Notsi PV 5 is in-line with the framework based on the contributions and opportunities presented by a development of this nature.
Lejweleputswa District Municipality Draft Integrated Development Plan (IDP) 2023/2024	**Lejweleputswa District Municipality**	**2023**	The long-term vision of the Lejweleputswa DM is to be: "A leader in sustainable development and service delivery to all". The above stated vision defines what Lejweleputswa District Municipality would like to attain over medium to long-term, and for that achievement to effectively materialize, their mission is: "Providing sound financial management. Providing excellent, vibrant public participation and high quality local municipal support programmes by maintaining good working relations in the spirit of co-operative governance, and enhancing high staff morale, productivity and motivation". The IDP identified specific objectives, strategies and projects for the district as per the District Rural Development Plan and the District Rural Development Implementation Plan. Key Performance Area 3

POLICY	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
			relates to Local Economic Development and lists that the development of a solar plant as one of the Municipal Focus Areas with the objective to revive the regional economy of the District Municipality with the intention of creating sustainable economies. The development of Notsi PV 5 is in line with the plan, considering the relevant Key Performance Area stated in the IDP.
Tokologo Local Municipality Draft Integrated Development Plan (IDP) 2023/2024	**Tokologo Local Municipality**	**2023**	The Integrated Development Plan (IDP) of the Local Municipality identifies municipal key performance areas which included basic service, Local Economic Development, institutional capacity building, financial management and good governance. The development of Notsi PV 5 will increase the supply of electricity available in the national electricity grid and will therefore contribute to the performance areas of the municipality, albeit to a limited extent.
Tokologo Local Municipality Draft Spatial Development Framework (SDF) 2022/2023	**Tokologo Local Municipality**	**2023**	The SDF indicates that electricity backlogs have been experienced by the by the local municipalities in the Lejweleputswa district for 2011 and 2015. The number of households without access to electricity has slightly reduced from 1372 households in 2011 to 1197 households in 2015. The SDF further indicates that the Tokologo Local Municipality needs to develop an Electricity Master Plan which provides an assessment of the current status of the electricity distribution networks, backlogs and recommendations. Therefore, the municipality needs to implement alternative electricity infrastructure such as promoting and facilitating solar heating, solar street lighting and other energy saving strategies. It should be noted that there is no data available to reflect the current status of the energy sources in the Tokologo Local Municipality. The Tokologo Local Municipality has favorable conditions in relation to solar because the amount of sunlight experienced in the municipality is very high. Solar energy is less expensive, has a lesser carbon footprint and minimal effect on the environment. The Lejweleputswa SDF (2022) has identified a solar hub in Dealesville and Boshof. A number of solar plants have been established on the farms situated in the Tokologo Local Municipality.

POLICY	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
			The development of Notsi PV 5 will increase the supply of electricity available in the national electricity grid and will therefore contribute to the goals of the municipality, albeit to a limited extent.

3.4 OTHER LEGISLATION

Other legislation mainly refers to the following:

- Planning legislation governing the rezoning process and approval of the layout plan.
- Design standards and legislation for services provision such as water, sewerage, electricity, etc.
- Municipal bylaws related to building plans, building regulations, etc.

3.5 RELEVANT GUIDANCE

The following guidance was considered in conducting the BA:

- The Equator principles III (2013)
- World Bank Group Environmental, Health and Safety General Guidelines (EHS Guidelines) (2007)
- Environmental, Health, and Safety Guidelines for Electric Power Transmission and Distribution (2007)
- International Finance Corporation's Policy on Environmental and Social Sustainability (2012)
- DEA. (2013). Draft National Renewable Energy Guideline. Department of Environmental Affairs, Pretoria, South Africa
- DEA, (2012), Guideline 5 – Final companion to the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations of 2010
- DEA, (2012), Guideline 7 – Public participation in the Environmental Impact Assessment process
- DEA, (2012), Guideline 9 – Need and desirability
- DEAT, (2006), Guideline 3 – General guide to the Environmental Impact Assessment Regulations
- DEAT, (2006), Guideline 4 – Public participation in support of the Environmental Impact Assessment Regulations
- DEAT, (2006), Guideline 5 – Assessment of alternatives and impacts in support of the Environmental Impact Assessment Regulations
- BirdLife, (2017). Best Practise Guidelines Birds & Solar Energy: Guidelines for assessing and monitoring the impact of solar power generating facilities on bird in southern Africa.

3.6 CONCLUSION

The Basic Assessment was undertaken in accordance and consideration with the EIA Regulations (2017) published in GNR 326, in terms of Section 24(5) and 44 of the NEMA as amended as well as all relevant National legislation, policy documents, national guidelines, the World Bank EHS Guidelines, the IFC Performance Standards, and the Equator Principles.

The legislative and policy context plays an important role in identifying and assessing the potential social impacts associated with the proposed development. For this reason, the proposed development project will be assessed and has been considered in terms of its fit with the key legislative, policy and planning documents discussed above.

The main findings of the review of the policy documents on all spheres of Government indicated that strong support was given towards renewable energy, specifically PV solar energy and therefore it is concluded that there is support for the development of Notsi PV 5. The White Paper on the Energy Policy of the Republic of South Africa of 1998 stated that due to the fact that renewable energy resources operate from an unlimited resource base, i.e., the sun, renewable energy can increasingly contribute towards a long-term sustainable energy supply for future generations. This policy further highlights that due to the unlimited resource base of renewable energy in South Africa, renewable energy applications like PV solar energy and associated infrastructure are more sustainable in terms of social and environmental costs.

The Integrated Resource Planning for Electricity for South Africa of 2010–2030, the National Infrastructure Plan of South Africa and the New Growth Path Framework all support the development of the renewable energy sector. In particular, the IRP also indicated that 43% of the energy generation in South Africa is allocated to renewable energy applications.

On a District and Local level limited attention is given explicitly to renewable sources like PV solar energy. At Provincial, District and Local level the policy documents indirectly support the applications of renewables as it will contribute to the surety of electricity supply and improving the lives of the community.

The review of the relevant policies and documents related to the energy sector therefore indicate that renewables, like solar energy and the establishment of solar energy facilities and associated infrastructure, are supported on all spheres of Government. Notsi PV 5 is therefore supported by the related policy and planning documents reviewed in this section of the report.

4 THE NEED AND DESIRABILITY

This section aims to address the following requirements of the regulations:

> **Appendix 1.** (3) A BAR (...) must include-
>
> (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;

4.1 THE NEED FOR THE PROPOSED ACTIVITY

The proposed activity is a direct result of the growing demand for electricity and the need for renewable energy in South Africa. According to Eskom, the demand for electricity in South Africa has been growing at approximately 3% per annum. This growing demand, fueled by increasing economic growth and social development, is placing increasing pressure on South Africa's existing power generation capacity. Coupled with this, is the growing awareness of environmentally responsible development, the impacts of climate change and the need for sustainable development.

Over 90% of South Africa's electricity generation is coal based, the Word bank estimates that this results in an annual, per capita carbon emission of ~8.9 tons per person. Based on 2008 fossil-fuel CO_2 emissions statistics released by the Carbon Dioxide Information Analysis Centre, South Africa is the 13th largest carbon dioxide emitting country in the world and the largest emitter in Africa (Boden, et al. 2011). In August 2021 an article confirmed that South Africa is the 12th highest greenhouse gas emitter in the world (source: https://www.news24.com/fin24/economy/eskom-will-only-able-to-meet-global-air-quality-standards-by-2050-owing-to-financial-woes-20210818).

The proposed project is intended to form part of the Department of Mineral Resources and Energy's (DMREs) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme or any other appropriate energy generation programmes / opportunities. The REIPPP Programme aims to secure 14 725 Megawatts (MW) of new generation capacity from renewable energy sources, while simultaneously diversifying South Africa's electricity mix. According to the 2021 State of the Nation Address, Government will soon be initiating the procurement of an additional 11 800 MW of power from renewable energy, natural gas, battery storage and coal in line with the Integrated Resource Plan 2019 and fulfilling their commitments under the United Nations Framework Convention on Climate Change and its Paris Agreement which include the reduction of greenhouse gas emissions. Eskom, the largest greenhouse gas emitter of South Africa, has committed in principle to net zero emission by 2050 and to increase its renewable capacity. During the 2022 State of the Nation Address it was indicated that the government had taken "firm steps" to bring additional generation capacity online as quickly as possible to close the shortfall in terms of electricity. As a result, it was confirmed that several new generation projects will be coming online over the next few years.

Besides capacity additions, several assumptions have changed since the promulgation of the IRP 2010–2030. Key assumptions that changed include the electricity demand projection, Eskom's existing plant performance, as well as new technology costs. These changes necessitated the review and update of the IRP which resulted in the draft IRP 2018 as per table 4-1:

Table 4-1: Published Draft IRP 2018 (Approved by Cabinet for Consultation)

	Coal	Nuclear	Hydro	Storage (Pumped Storage)	PV	Wind	CSP	Gas / Diesel	Other (CoGen, Biomass, Landfill)	Embedded Generation
2018	39 126	1 860	2 196	2 912	1 474	1 980	300	3 830	499	Unknown
2019	2 155					244	300			200
2020	1 433				114	300				200
2021	1 433				300	818				200
2022	711				400					200
2023	500									200
2024	500									200
2025					670	200				200
2026					1 000	1 500		2 250		200
2027					1 000	1 600		1 200		200
2028					1 000	1 600		1 800		200
2029					1 000	1 600		2 850		200
2030			2 500		1 000	1 600				200
TOTAL INSTALLED	33 847	1 860	4 696	2 912	7 958	11 442	600	11 930	499	2600
Installed Capacity Mix (%)	44.6	2.5	6.2	3.8	10.5	15.1	0.9	15.7	0.7	

Installed Capacity
Committed / Already Contracted Capacity
New Additional Capacity (IRP Update)

According to the South African Energy Sector Overview (2021), there is currently 1 723MW of installed PV capacity, while an additional 2 600MW from wind and solar has been rewarded as part of Bid Window 5.

In December of 2022, five solar energy preferred bidders were announced by the Department of Mineral Resources and Energy under Bid Window 6, with a total capacity amounting to 860MW.

4.2 THE DESIRABILITY OF THE PROPOSED ACTIVITY

The facility's contribution towards sustainable development and the associated benefits to society in general is discussed below:

- Lesser dependence on fossil fuel generated power - The deployment of the facility will have a positive macro-economic impact by reducing South Africa's dependence on fossil fuel generated power and assisting the country in meeting its growing electricity demand.
- Increased surety of supply - By diversifying the sources of power in the country, the surety of supply will increase. The power demands of South Africa are ever increasing and by adding solar power this demand can be met, even exceeded without increasing pollution in relation to the use of fossil fuels. The project has the potential of "securing" economic activity by assisting in removing supply constraints if Eskom generation activities result in a supply shortfall. When supply is constrained, it represents a limitation to economic growth. When a supply reserve is available, it represents an opportunity for economic growth.
- Local economic growth - The proposed project will contribute to local economic growth by supporting industry development in line with provincial and regional goals and ensuring advanced skills are drawn to the Free State Province. The project will likely encounter widespread support from government, civil society and businesses, all of whom see potential opportunities for revenues, employment and business

opportunities locally. The development of the photovoltaic solar facility will in turn lead to growth in tax revenues for local municipalities and sales of carbon credits, resulting in increased foreign direct investment.

- Lower costs of alternative energy - An increase in the number of solar facilities commissioned will eventually reduce the cost of the power generated through solar facilities. This will contribute to the country's objective of utilising more renewable energy and less fossil fuel-based power sources. It will assist in achieving the goal to generate 14 725 MW of electricity from renewable energy as per the Renewable Energy Independent Power Producer Procurement (REIPPP) Programme of the Department of Mineral Resources and Energy.
- Reduction in greenhouse gas emissions - The additional power supplied through solar energy will reduce the reliance on the combustion of fossil fuels to produce power. The South African electricity grid is predominantly coal-fired and therefore Greenhouse Gas (GHG) emissions intensive (coal accounts for more than 92% of the fuel used in South Africa's electricity generation). The reduction of GHG emissions as a result of the project implementation will be achieved due to reduction of CO_2 emissions from combustion of fossil fuels at the existing grid-connected power plants and plants which would likely be built in the absence of the project activity.
- CDM Project - A solar energy facility also qualifies as a Clean Development Mechanism (CDM) project (i.e., a financial mechanism developed to encourage the development of renewable technologies).
- Climate change mitigation - On a global scale, the project makes a contribution to greenhouse gas emission reduction and therefore contributes toward climate change mitigation.
- Reduced environmental impacts - The reduction in electricity consumed from the grid will not only result in a reduction in greenhouse gas emissions, but also the prevention of negative impacts associated with coal mining. For example, coal power requires high volumes of water, in areas of South Africa where water supply is already over-stretched and water availability is highly variable. Photovoltaic solar energy technology also does not produce the sulphur emissions, ash or coal mining concerns associated with conventional coal fired electricity generation technologies resulting in a relatively low level of environmental impacts. It is a clean technology which contributes toward a better-quality environment for employees and nearby communities.
- Social benefits - The project activity is likely to have significant long-term, indirect positive social impacts that may extend to a regional and even national scale. The larger scale impacts are to be derived in the utilisation of solar power and the experience gained through the construction and operation of the solar development. In future, this experience can be employed at other similar solar installations in South Africa.
- Provision of job opportunities - The main benefit of the proposed development operating in the area is that local companies or contractors will be hired for the duration of the construction period. The operational phase will provide permanent job opportunities to the local communities from the surrounding area since security guards and general labourers will be required on a full-time basis. Approximately 300

employment opportunities will be created during the construction and ~25 during the operational phase.

- Indirect socio-economic benefits - The increase in the demand for services such as accommodation, transportation, security, general maintenance and catering will generate additional indirect socio-economic benefits for the local community members.
- Effective use of resources –The applicant has obtained consent from the landowner for use of the farm area for the development. The proposed development in this specific area will generate alternative land use income through rental for the energy facility, which will have a positive impact on agriculture and enable the landowner to explore and implement other agricultural activities which will have a positive impact not only for the landowner but also the surrounding communities with additional agricultural employment opportunities becoming available. It will provide the farming enterprise with increased cash flow and rural livelihood, and thereby improve the financial sustainability of agricultural activities by the landowner.
- Location of the activity within a REDZ - The Renewable Energy Development Zones (REDZ) have a key role to play in South Africa's just energy transition. The REDZ create priority areas for investment in the electricity grid. Since the site is located within a REDZ it contributes to the desirability of the project.
- Cumulative impacts of low to medium significance – No cumulative impacts with an unacceptable residual risk have been identified. In terms of the desirability of the development of sources of renewable energy, it may be preferable to incur a higher cumulative loss in such a region as this one, which is characterised by a landscape that has been transformed by agriculture, than to lose land with a higher environmental value elsewhere in the country.

5 DESCRIPTION OF ENVIRONMENTAL ISSUES

This section aims to address the following requirements of the regulations:

Appendix 1. (3) A BAR (...) must include-

(g) A motivation for the preferred site, activity and technology alternative;

(h) a full description of the process followed to reach the proposed preferred alternative, within the site, including –

(i) details of all the alternatives considered;

(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;

(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;

(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;

(viii) 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;

(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and

(xi) a concluding statement indicating the preferred alternative development location within the approved site.

5.1 CONSIDERATION OF ALTERNATIVES

The DEAT 2006 guidelines on 'assessment of alternatives and impacts' proposes the consideration of four types of alternatives namely, the no-go, location, activity, and design alternatives. It is, however, important to note that the regulation and guidelines specifically state that only 'feasible' and 'reasonable' alternatives should be explored. It also recognizes that the consideration of alternatives is an iterative process of feedback between the developer and EAP, which in some instances culminates in a single preferred project proposal.

An initial site assessment was conducted by the developer of the affected property and the farm portion was found favourable due to the availability of the land for development, proximity to grid connections, solar radiation, ecology and relatively flat terrain. Furthermore, the developer has considered the results of specialist fieldwork and the environmental sensitive areas and features identified within the affected property has been avoided prior to the lodging of the Application for Environmental Authorisation. This approach ensures that all environmental sensitivities are avoided from the commencement of the process and thereby ensuring that the mitigation hierarchy is applied as much as possible.

The following alternatives have been considered in relation to the proposed activity:

5.1.1 No-go alternative

This alternative considers the option of 'do nothing' and maintaining the status quo. The description provided in section 5.3 of this report could be considered the baseline conditions (*status quo*) to persist should the no-go alternative be preferred. The site is currently zoned for agricultural land uses. Should the proposed activity not proceed, the site will remain unchanged and will continue to be used for agricultural purposes (refer to the photographs of the site included in the plates).

The Soils and Agricultural Compliance Statement (Appendix D4) has confirmed that an area is present within the development footprint that was historically used as cropland. This area is more sandy with red Hutton soil that is limited by shallow depths due to underlying rock. The very shallow depths to underlying rock in are evident where erosion has removed the topsoil.

The potential opportunity costs in terms of adding solar energy generation to the current land use, which is not a highly intensive land use, would be lost if the status quo persist, and therefore all positive socio-economic opportunities and associated growth will also be lost.

The implementation of the no-go alternative is therefore not preferred.

5.1.2 Location alternatives

This alternative asks the question, if there is not, from an environmental perspective, a more suitable location for the project. No alternative properties have at this stage been secured by Notsi PV (Pty) Ltd in the Dealesville area to potentially establish the solar energy facility.

When considering that the proposed development forms part of a larger cluster of solar energy facilities, the location of the entire cluster as a whole has been considered by the developer as well as the opportunities presented by the area under assessment that will be able to house such a cluster. This includes both technical and environmental aspects. Therefore, the location of Notsi PV 5 has been identified within the larger cluster by the developer considering the various technical and environmental aspects.

From a local and site perspective, the Farm Welgeluk No. 1622, are preferred due to its suitable climatic conditions and solar resource, topography (i.e., in terms of gradient), environmental conditions (i.e. ecological and avifaunal sensitivity), proximity to a feasible grid connection point (i.e. for the purpose of electricity evacuation), as well as site access (i.e. to facilitate the movement of machinery, equipment, infrastructure and people during the construction phase).

The proposed development falls within an area used for agricultural activities, mainly grazing. The site has low agricultural and cropping potential because of a combination of climate and soil constraints (Appendix D4). As a result of the constraints, the site is unsuitable for crop production, and agricultural production is limited to grazing.

Within the affected property an area of 195 hectares has been identified and assessed which is considered to be the preferred development footprint for the placement of the infrastructure.

No alternative areas for the development footprint within the affected property have been considered or identified for the proposed use of Notsi PV 5, based on feedback from the

landowner and the results of the upfront specialist fieldwork. Therefore, there is a single preferred location alternative that will be assessed – refer to Figure 5-1 below.

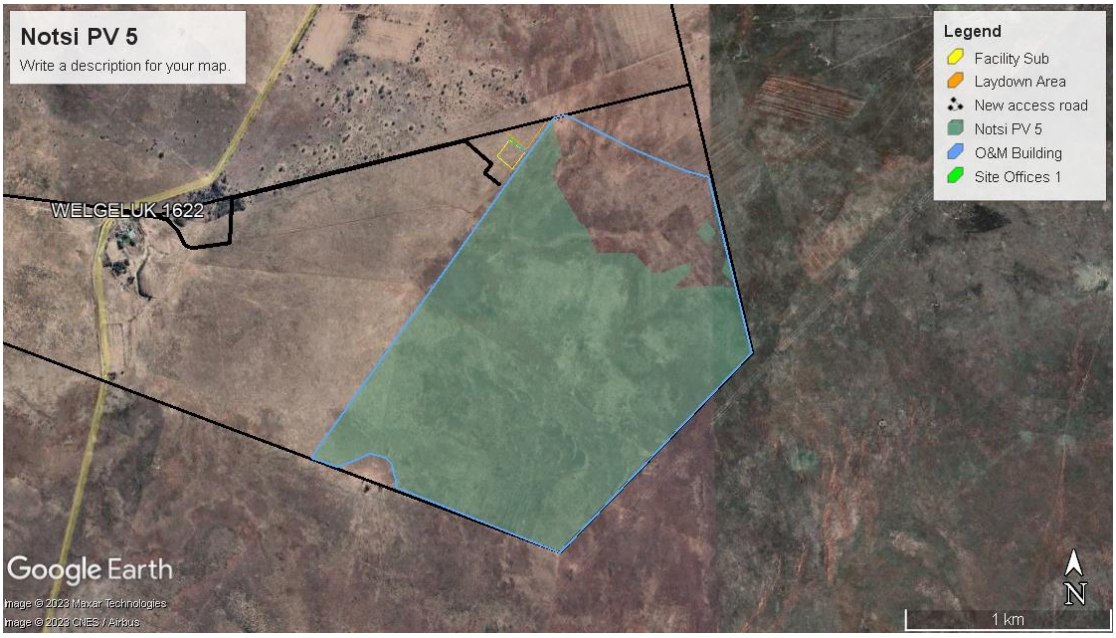


Figure 5-1: Location of the preferred alternative for Notsi PV 5

5.1.3 Activity alternatives

The BA process also needs to consider if the development of a solar facility would be the most appropriate land use for the particular site.

- **Photovoltaic (PV) solar facility** – Notsi PV (Pty) Ltd is part of a portfolio of solar PV projects throughout South Africa. Notsi PV (Pty) Ltd is of the opinion that solar PV technology is appropriately suited to the site, given the high irradiation values for the area – refer to Figure 5-2. The technology furthermore entails low visual impacts, have relatively low water requirements, is a simple and reliable type of technology and all the components can be recycled.

- **Wind energy facility** - Due to the local climatic conditions, a wind energy facility is not considered suitable as the area does not have the required wind resource. Furthermore, the applicant has opted for the generation of electricity via solar power rather than the use of wind turbines. This alternative is therefore regarded as not feasible and will not be evaluated further in this report.

- **Concentrated solar power (CSP) technology** - CSP technology requires large volumes of water which is a major constraint for this type of technology. While the irradiation values are high enough to generate sufficient solar power, the water constraints render this alternative not feasible. The development of CSP is also no longer listed as part of the energy mix indicated in the IRP. The cost of CSP is also significantly higher than the highly competitive costs for Solar PV. Therefore, this alternative will not be considered further in this report.

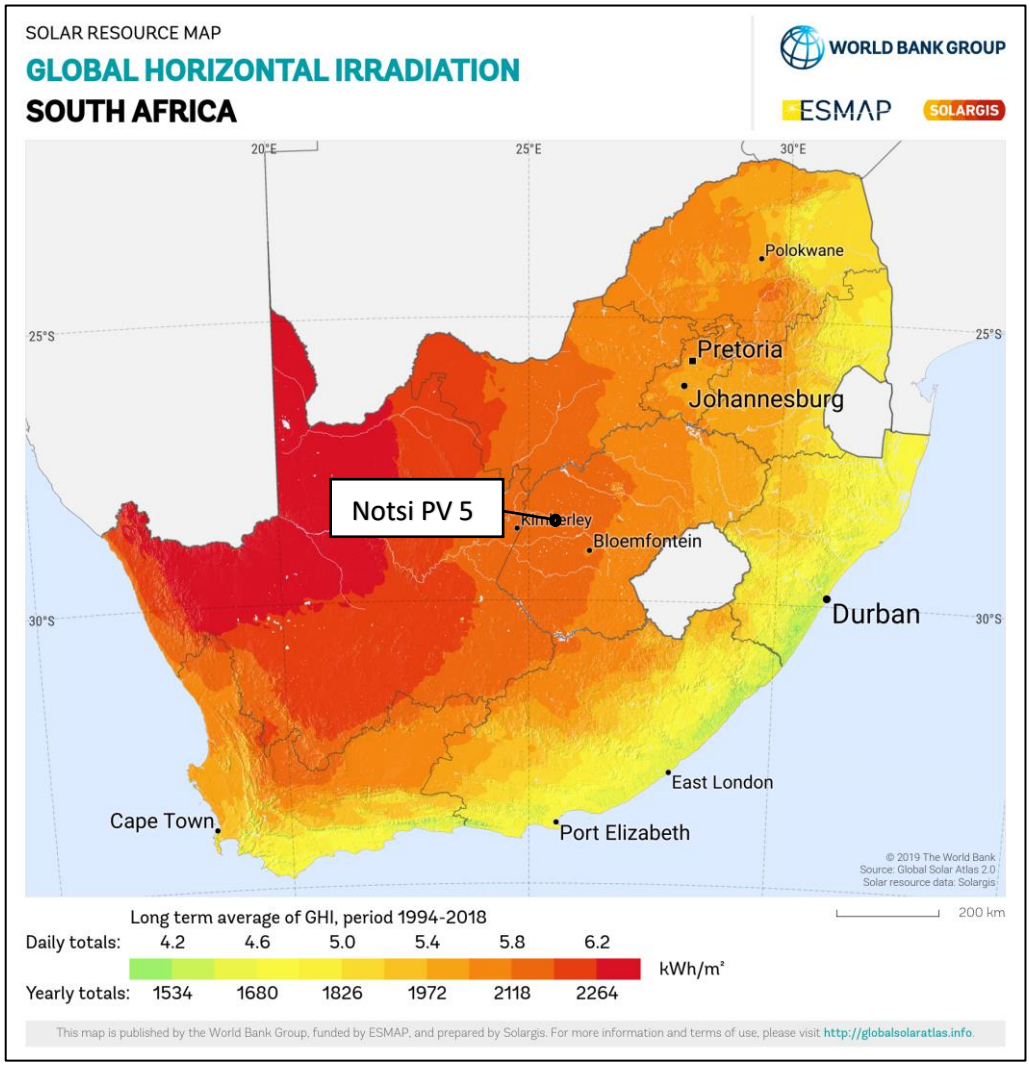


Figure 5-2: Global horizontal irradiation values for South Africa (SolarGIS, 2021) and the location of Notsi PV 5

5.1.4 Technical alternatives

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

Battery Energy Storage Facility (BESS)

Three types of battery technologies were considered for the proposed project: Lithium-ion (Lithium-Phosphate), Sodium-sulphur or Vanadium Redox flow battery. While there are various battery storage technologies available, Li-ion batteries have emerged as the leading technology in utility-scale energy storage applications because it offers the best mix of performance specifications, such as high charge and discharge efficiency, low self-discharge, high energy density, and long cycle life (Divya KC et al., 2009). Both lithium-ion and Redox-flow technology are being considered for the project, depending on which is most feasible at the time of implementation.

The battery energy storage system will make use of solid state or flow battery technology and will have a capacity of up to 400MWh. Both lithium-ion and Redox-flow technology are being considered for the project, depending on which is most feasible at the time of implementation.

The extent of the system will be 3ha. The containers may be single stacked only to reduce the footprint. The containers will include cells, battery charge controllers, inverters, transformers, HVAC, fire, safety and control systems.

The general purpose and utilisation of a Battery Energy Storage System (BESS) is to save and store excess electrical output as it is generated, allowing for a timed release when the capacity is required. BESS systems therefore provide flexibility in the efficient operation of the electric grid through decoupling of the energy supply and demand. Two technology types have been assessed in the Basic Assessment Lithium-Ion technology (e.g., Lithium Ferrophosphate (LFP), Nickel Manganese Cobalt Oxide (NMC) or similar technology and chemistries) and Redox-flow technology (e.g., vanadium flow battery, or similar technology and chemistries). Both technologies include batteries housed within containers which are fully enclosed and self-contained. It is important to note that both are expected to have similar impacts due to their design and functions being closely related. Therefore, the assessment proposes both technologies for authorisation (i.e., a BESS of either Lithium-Ion or Redox-flow type), to allow the proponent to determine the precise technology when the project is implemented.

While there are various battery storage technologies available, Li-ion batteries have emerged as the leading technology in utility-scale energy storage applications because it offers the best mix of performance specifications, such as high charge and discharge efficiency, low self-discharge, high energy density, and long cycle life Compared to other battery options, Li-ion batteries are highly efficient and have a high energy density and are lightweight, At this stage, a solid-state technology type would be envisaged for implementation and a Solid-State Lithium-Ion battery is the currently preferred technology. However, given that both types of battery technology have been assessed and the impacts were found to be similar, and given the rapid evolution of battery technology, we request that the EA (if granted) authorize Lithium-Ion technology or redox-flow battery technology, in order to enable the applicant to utilize the most attractive battery type available on the market at the time of implementation.

5.1.5 Design and layout alternatives

Design alternatives were considered throughout the planning and design phase (i.e., what would be the best design option for the development?). In this regard discussions on the design were held between the EAP and the developer specifically considering the results of the fieldwork undertaken by the independent specialists prior to the lodging of the Application for Environmental Authorisation. This approach resulted in implementing the mitigation hierarchy which is to firstly avoid impacts and areas of sensitivity as much as possible through careful placement and design of the development footprint. The sensitivities identified within the property are mainly related to ecological, wetland/riparian, avifauna and heritage characteristics.

The placement of the development footprint for Notsi PV 5 has therefore been carefully carved out by the developer to ensure avoidance is obtained as much as possible and to ensure that the layout of the facility will be environmentally appropriate and acceptable.

The layout therefore follows the limitations of the site and aspects such as environmental sensitive areas (supported by specialist input), roads, areas considered as valuable by the landowner, fencing and servitudes are considered. The total surface area proposed for the

layout include the PV panel arrays spaced to avoid shadowing, access and maintenance roads and associated infrastructure (buildings, power inverters, substations, BESS and perimeter fences).

With regards to the PV structures/panels to be installed, bi-facial panels with single axis tracking are preferred over fixed-axis or double axis tracking systems and mono-facial panels due to the potential to achieve higher annual energy yields whilst minimising the balance of system (BOS) costs and maximizing the efficiency of land use, resulting in the lowest levelized cost of energy (LCOE). The preference for single axis tracking is also based on the economic viability, water requirements, land requirements, efficiency and potential environmental impacts of the proposed solar panel mounting types.

The development of the PV facility will take into consideration during the final design phase the use of either mono-facial or bi-facial PV panels as well as tracker vs fixed- tilt mounting structures. Both options are considered feasible for the site.

The layout plan is included in Appendix H and Figures H and I.

5.1.6 Technology alternatives

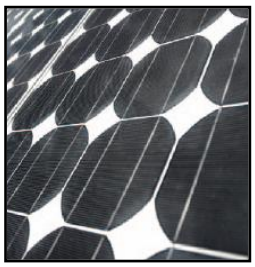
Technology alternatives for the development of a solar facility needs to be considered during the BA process.

5.1.6.1 Photovoltaic solar panels

There are several types of semiconductor technologies currently available and in use for PV solar panels. Two, however, have become the most widely adopted, namely crystalline silicon, and thin film or bifacial PV panels. These technologies are discussed in more detail below:

- **Crystalline (high efficiency technology at higher cost)**

  Crystalline silicon panels are constructed by first putting a single slice of silicon through a series of processing steps, creating one solar cell. These cells are then assembled together in multiples to make a solar panel. Crystalline silicon, also called wafer silicon, is the oldest and the most widely used material in commercial solar panels. Crystalline silicon modules represent 85-90% of the global annual market today. There are two main types of crystalline silicon panels that can be considered for the solar facility:



- ***Mono-crystalline Silicon*** - mono-crystalline (also called single crystal) panels use solar cells that are cut from a piece of silicon grown from a single, uniform crystal. Mono-crystalline panels are among the most efficient yet most expensive on the market. They require the highest purity silicon and have the most involved manufacturing process.

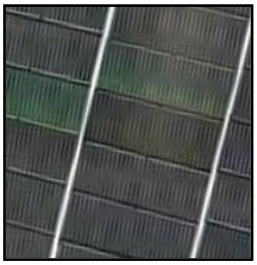
- ***Poly-crystalline Silicon*** – poly-crystalline panels use solar cells that are cut from multifaceted silicon crystals. They are less uniform in appearance than mono-crystalline cells, resembling pieces of shattered glass. These are the most common solar panels on the market, being less expensive than mono-crystalline silicon. They are also less efficient, though the performance gap has begun to close in recent years (First Solar, 2011).

- **Thin film (low-cost technology with lower efficiency)**

  Thin film solar panels are made by placing thin layers of semiconductor material onto various surfaces, usually on glass. The term *thin film* refers to the amount of semiconductor material used. It is applied in a thin film to a surface structure, such as a sheet of glass. Contrary to popular belief, most thin film panels are not flexible. Overall, thin film solar panels offer the lowest manufacturing costs, and are becoming more prevalent in the industry. Thin films currently account for 10-15% of global PV module sales. There are three main types of thin film used:

- ***Cadmium Telluride (CdTe)*** - CdTe is a semiconductor compound formed from cadmium and tellurium. CdTe solar panels are manufactured on glass. They are the most common type of thin film solar panel on the market and the most cost-effective to manufacture. CdTe panels perform significantly better in high temperatures and in low-light conditions.

- ***Amorphous Silicon*** - Amorphous silicon is the non-crystalline form of silicon and was the first thin film material to yield a commercial product, first used in consumer items such as calculators. It can be deposited in thin layers onto a variety of surfaces and offers lower costs than traditional crystalline silicon, though it is less efficient at converting sunlight into electricity.



- ***Copper, Indium, Gallium, Selenide (CIGS)*** - CIGS is a compound semiconductor that can be deposited onto many different materials. CIGS has only recently become available for small commercial applications and is considered a developing PV technology (First Solar, 2011).

- **Bifacial panels:**

As the name suggests, bifacial solar panels have two faces, or rather, they can absorb light from both sides of the panel. A lot of potential energy transfer is lost in traditional solar cells when the light hits the back of a solar panel. Most bifacial solar panels use monocrystalline cells, whereas traditional cells use polycrystalline materials. The monocrystalline materials, alongside the clear light pathway on both sides of the panel, enable the light to be absorbed from either side of the cell, and it is thought that the overall efficiency of these cells can be up to 30% greater in commercial applications. Although, the exact amount is variable depending on the surface that they are installed on. The front side of the solar panel still absorbs most of the solar light, but the back side of the solar panel can absorb between 5-90% of the light absorbed by the front of the solar panel.

Traditional solar panels use an opaque back sheet. By comparison, bifacial solar panels either have a clear/reflective back sheet or have dual panes of glass. Most of these solar panels are frameless so any issues with potential-induced degradation (PID) are reduced. To efficiently convert light into electricity from both sides, bifacial solar cells have selective-area metallization schemes that enable light to pass between the metallized areas, rather than the conventional thick metal collectors as seen with monofacial solar panels.

The technology that (at this stage) proves more feasible and reasonable with respect to the proposed solar facility is crystalline silicon panels, due to it being non-reflective, more efficient, and with a higher durability.

However, due to the rapid technological advances being made in the field of solar technology the exact type of technology to be used, will only be confirmed at the onset of the project.

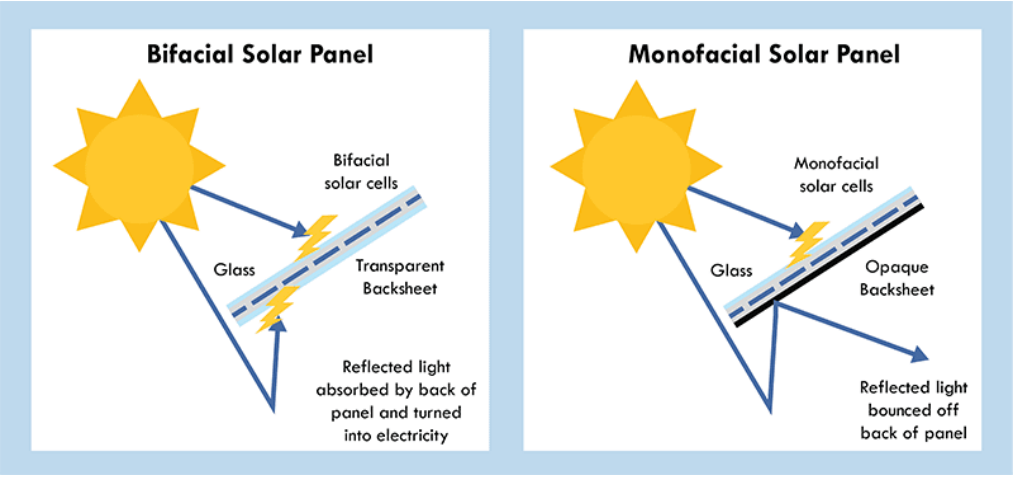


Figure 5-3: Bifacial vs Monofacial Solar Panel absorption

Bi-facial panels with single axis tracking is preferred over fixed-axis or double axis tracking systems and mono-facial panels due to the potential to achieve higher annual energy yields whilst minimising the balance of system (BOS) costs and maximizing the efficiency of land use, resulting in the lowest levelized cost of energy (LCOE).

5.2 PUBLIC PARTICIPATION PROCESS

The following sections provide detailed information on the public participation process conducted in terms of Regulations 39 to 44.

5.2.1 General

The public participation process was conducted strictly in accordance with Regulations 39 to 44. The following three categories of variables were taken into account when deciding the required level of public participation:

- The scale of anticipated impacts
- The sensitivity of the affected environment and the degree of controversy of the project
- The characteristics of the potentially affected parties

Since the scale of the anticipated impacts is low, based on the generally low environmental sensitivity of the site and development footprint and the fact that no conflict was foreseen between potentially affected parties, no additional public participation mechanisms were considered at this stage of the process. The following actions have already been taken:

- Newspaper advertisement

  Since the proposed development is unlikely to result in any impacts that extend beyond the municipal area where it is located, it was deemed sufficient to advertise in a local newspaper. An advertisement was placed in English in the local newspaper (Noordkaap Bulletin and Bloemnuus) on the 29 September 2022 and July 2023 respectively (see Appendix C1) notifying the public of the BA process and requesting Interested and Affected Parties (I&APs) to register with and submit their comments to Solis-Environmental Consultants. I&APs were given the opportunity to raise comments within 30-days from the placement of the advertisement.

- Site notices

  Site notices were placed on site in English and Afrikaans on 14 September 2022 to inform surrounding communities and immediately adjacent landowners of the proposed development. Photographic evidence of the site notices is included in Appendix C2.

- Direct notification of identified I&APs

  Identified and registered I&APs, including key stakeholders representing various sectors, were directly informed of the Basic Assessment process via telephone calls, WhatsApps and emails (as appropriate). See Appendix C3 to this report. A Background Information Document and Locality Map was also distributed to the I&APs. Distribution of the notification was on 28 September 2022.

- Direct notification of surrounding landowners and occupiers

  Written notices were provided via WhatsApp or email to all surrounding landowners and occupiers – refer to Figure -5-4. The surrounding landowners were given the opportunity to raise comments within 30 days. A Background Information Document and Locality Map

was also distributed to the I&APs. Distribution of the notification was on 28 September 2022. For a list of surrounding landowners see Appendix C3.

- Circulation of Draft Basic Assessment Report

  The registered I&APs have been notified of the availability of the draft BAR at the commencement of the 30-day review and comment period. This included the details of where the report can be accessed. They have been requested to provide their comments on the report within 30 days (14 July 2023 – 15 August 2023). All issues that are identified, raised, and recorded were documented and compiled into a Comments and Responses Report (Appendix C6) and included as part of the current report (Final Basic Assessment Report).

- Circulation of Final Basic Assessment Report

  The final BAR was submitted to the Competent Authority on the 1st of September 2023. All issues that are identified, raised and recorded to date was be documented and compiled into a Comments and Responses Report (Appendix C6). Any additional comments will be forwarded to the Relevant Environmental Department for decision making purposes.

- Circulation of decision and submission of appeals:

  Notice will be given to all identified and registered I&APs of the decision taken by the DFFE. The attention of all registered I&APs will also be drawn to the fact that an appeal may be lodged against the decision in terms of the National Appeals Regulations. In accordance with the provisions of Regulation 4(1) of Government Notice No. 993, an appellant must submit the appeal to the appeal administrator, and a copy of the appeal to the applicant, any registered I&APs and any organ of state with interest in the matter within 20 days from the date that the notification of the decision was sent to the applicant by the competent authority.

5.2.2 Registered I&APs

I&APs include all stakeholders who deem themselves affected by the proposed activity. According to Regulation 43(1) "*A registered interested and affected party 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*."

This report is the final Basic Assessment Report which has been made available to all potential and/or registered I&APs and State Departments. They have been provided with a copy of the Final BAR and have been requested to provide written comments on the report within 30 days. All issues identified during the initial Public Participation Process was documented and compiled into a Comments and Response Report (Appendix C5 and C6) in order to provide I&APs an opportunity to confirm that their comments raised during the initial public participation phase have been included and considered. Any further comments received will

be responded to, and a copy thereof will be provided to the relevant Environmental Department for decision making purposes.

5.2.3 Issues raised by I&APs and consultation bodies

Comments received to date, are captured and responded to in the Comments and Response Report included in Appendix C5 and C6. Any further comments received will be responded to, and a copy thereof will be provided to the relevant Environmental Department for decision making purposes.

5.2.4 Consultation process

Regulation 41 requires that the landowner, surrounding landowners, municipality, relevant ward councillor, any organ of state having jurisdiction in respect of any aspect of the activity and any other party as required by the competent authority should be given written notice of the activity. A complete list of all the consultees who received written notice as well as proof of correspondence is attached as Appendix C.

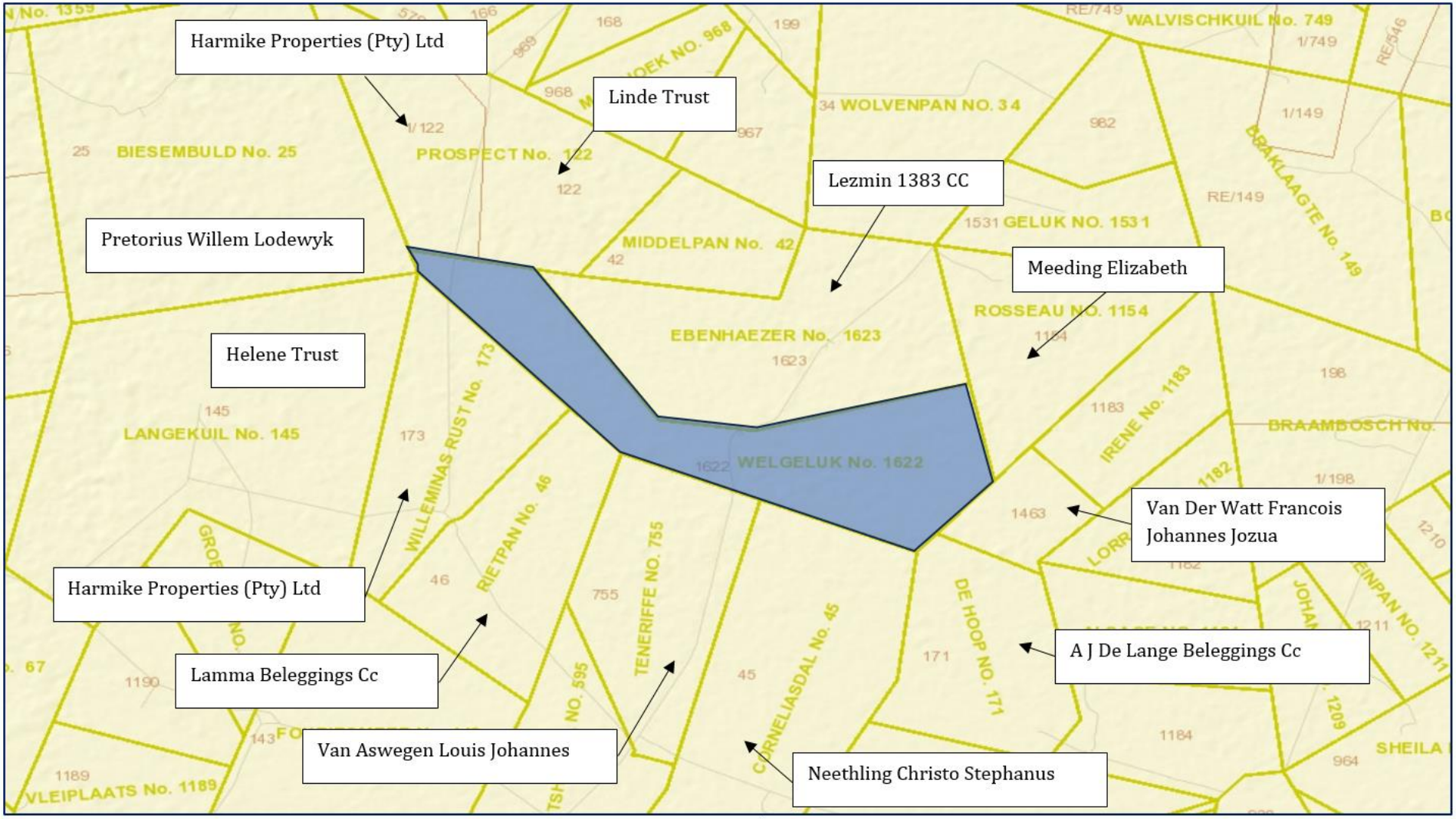


Figure 5.4: Surrounding Landowners (blue polygon represents the Farm Welgeluk No. 1622)

5.3 THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE PREFERRED ALTERNATIVE

The following sections provide general information on the biophysical and socio-economic attributed associated with the preferred location alternative.

5.3.1 Biophysical environment

The biophysical environment is described with specific reference to geology, soils, agricultural potential and land capability, vegetation and landscape features, climate, biodiversity, heritage features (in terms of archaeology and palaeontology), the visual landscape and the social environment to be affected. A number of specialists were consulted to assist with the compilation of this chapter of the report – refer to the Table 1-2.

However, due to the fact that the area proposed for development (i.e., the development footprint) exclusively consists of land used for agricultural activities and the developer has already avoided areas of sensitivity as far as possible, no sensitive environmental areas or features are expected to be affected. The details of the environmental features and characteristics present within the site are discussed in detail below.

5.3.1.1 Geology, soils, agriculture and terrain

According to the Soil and Agriculture Compliance Statement (attached in Appendix D4) the site is located on flat land with low slope gradients. The dominant soils are high clay content soils of limited depth of the Valsrivier, Swartland, and Coega soil forms. Better soils of the Hutton soil form also occur in places, but they are still limited in depth by underlying rock.

According to the land type database (Land Type Survey Staff, 1972 - 2006), the site is characterised by the Db 3 land type. This land type consists of prismacutanic and/or pedocutanic diagnostic horizons with the addition of one or more of the following. Additionally, vertic, melanic and red structured diagnostic horizons occur frequently within this land type. Figures 5-5 to 5-8 provides photographs of the site and the current baseline conditions present.

Figure 5-5: Typical site conditions where shallow, high clay content soils are dominant

Figure 5-6: Rock occurs close to the surface across most of the site

Figure 5-7: More sandy, red Hutton soils which have been cultivated in the past but are limited by shallow depths to underlying rock

Figure 5-8: The very shallow depths to underlying rock are evident where erosion has removed the topsoil

The site has low agricultural and cropping potential because of a combination of climate and soil constraints. As a result of the constraints, the site is unsuitable for crop production, and agricultural production is limited to grazing.

In terms of the agricultural sensitivity of the site, the DFFE Screening Tool Report (Appendix B) classifies parts of the area as high agricultural sensitivity (red in Figure 5-9) is because those parts are classified as cropland in the dataset used by the screening tool. However, the specialist has indicated that the dataset is outdated. All land across the site and surrounds is no longer viable for and/or used as cropland. No land across the site should still be classified as viable cropland and allocated high sensitivity because of it.

The fact that previously cropped lands are no longer viable for cropping is not because the soil has changed but because the suitability for cropping changes with a changing agricultural economy. Poorer soils or marginal climates that may have been cropped with economic viability in the past, are abandoned as cropland because they become too marginal for viable crop production in a more challenging agricultural economy with higher input costs. Climate change and changes in rainfall patterns have also led to the increasing marginality of agricultural lands.

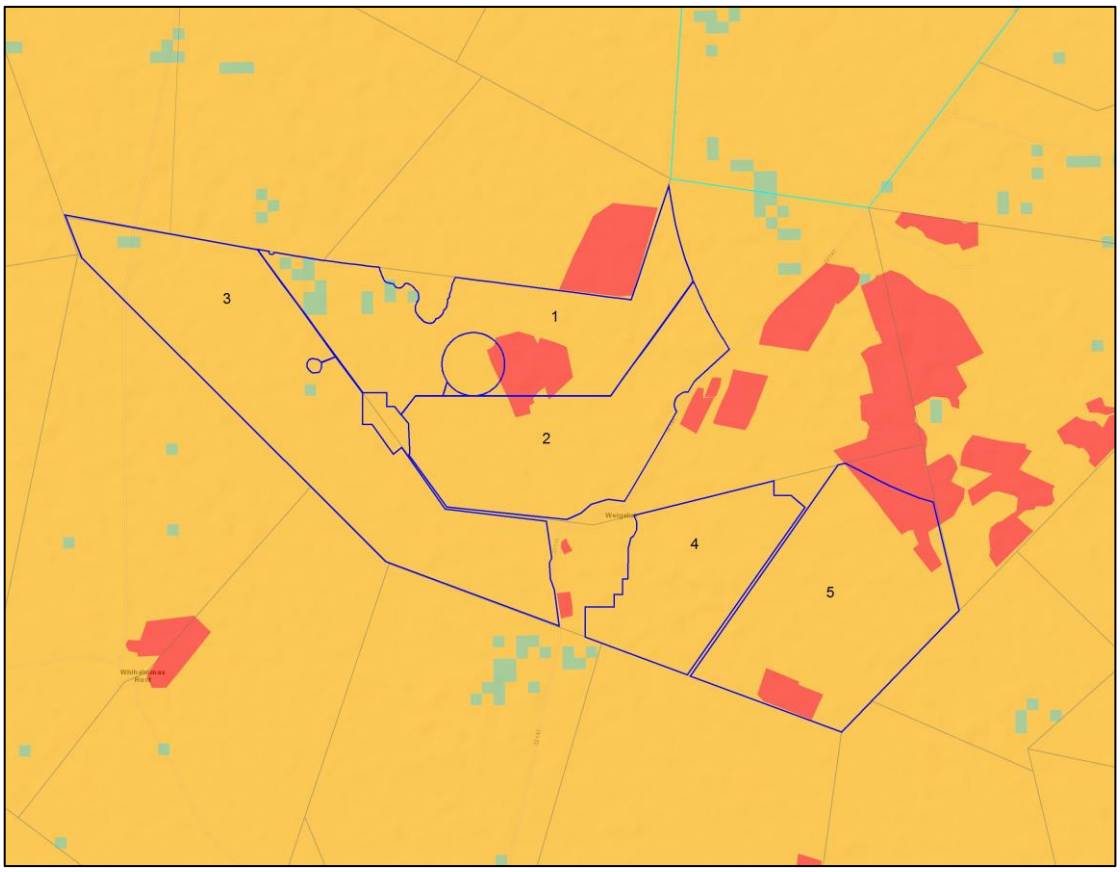


Figure 5-9: Agricultural sensitivity as identified by the DFFE Screening Tool

The classified land capability of Notsi PV 5 varies from 5 to 7, but is predominantly 7, which translates to a medium agricultural sensitivity. The medium agricultural sensitivity of the site, as identified by the screening tool, is confirmed by this assessment but the high sensitivity areas, as discussed above, is disputed. The motivation for confirming the medium sensitivity is predominantly that the climate data (low rainfall of approximately 410 mm per annum and high evaporation of approximately 1,570 mm per annum) proves the area to be arid and therefore of limited land capability. Moisture availability is too marginal for viable rainfed crop production. In addition, the land type data and the field investigation undertaken as part of the Soils and Agricultural Compliance Statement showed the dominant soils to have depth limitations due to underlying rock, hardpan carbonate or dense clay. A medium agricultural sensitivity is entirely appropriate for all the land across the site, which is too marginal for crop production. This site sensitivity verification verifies the entire site as being of medium agricultural sensitivity.

The Heritage Impact Assessment (Appendix D5) indicates that according to the extract from the CGS Map for Kimberley 2824, the sediments underlying the site include Jurassic Dolerite which has no palaeontological sensitivity, Quaternary Sands of the Gordonia Formation and sediments of the Tierberg Formation of the Ecca Group. The geology of this area is characterised by deposits of sandstone, shale, and mudstone (Volksrust Formation, Ecca Group) and is found in flat areas with some undulating plains. No rivers or streams drain these plains therefore all water drains into the salt pans. Dry, clayey, duplex soils are typically found within this geology (Mucina and Rutherford, 2006).

5.3.1.2 Vegetation and landscape features

The site is situated within the Grassland Biome. The Grassland Biome in South Africa occurs mainly on the Highveld, the inland areas of the eastern seaboard, the mountainous areas of KwaZulu-Natal and the central parts of the Eastern Cape. The topography is mainly flat to rolling, but also includes mountainous regions and the Escarpment (Refer to Figure 5-10).

Grasslands characteristically contain herbaceous vegetation of a relatively short and simple structure that is dominated by graminoids, usually of the family Poaceae. Woody plants are rare (usually made up of low or medium-sized shrubs), absent, or confined to specific habitats such as smaller escarpments or koppies. Core grassland areas usually have deep, fertile soils although a wide spectrum of soil types does occur (Mucina & Rutherford, 2006).

The Grassland Biome is comprised of 4 parent bioregions and a total of 72 different vegetation types. The site is situated within the Western Free State Clay Grassland of the Dry Highveld Grassland Bioregion.

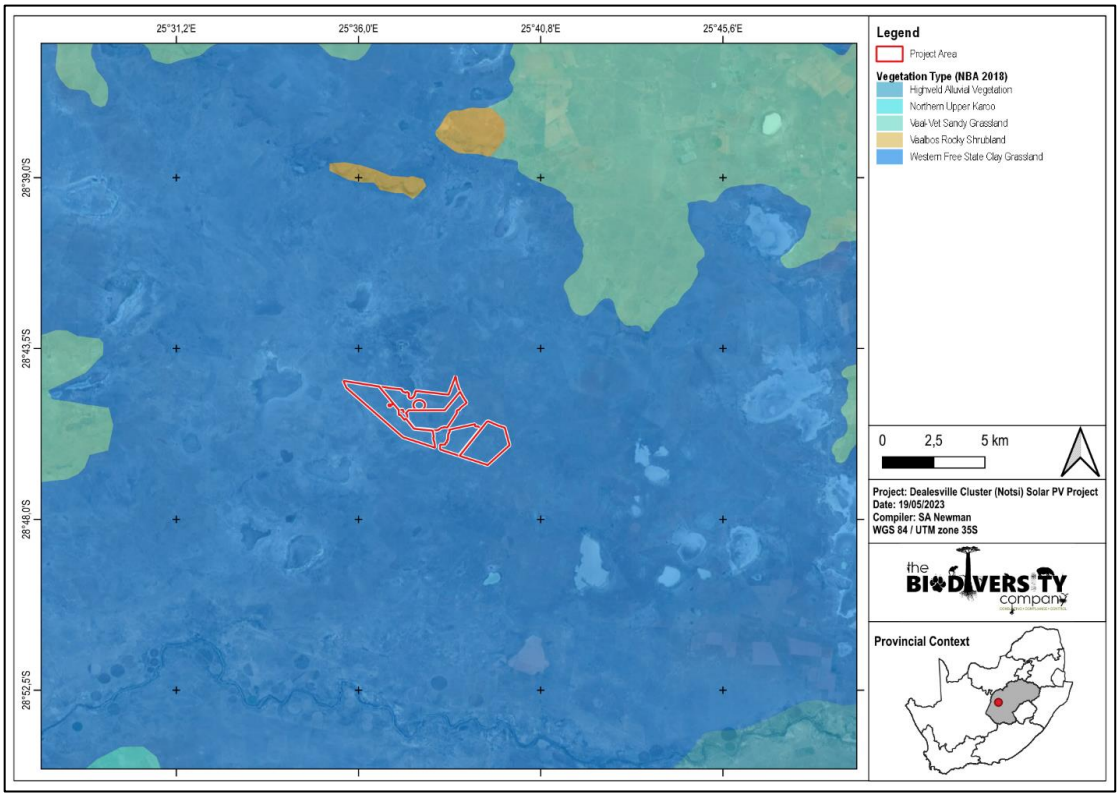


Figure 5-10: Vegetation type associated with the Notsi PV Cluster, including Notsi PV 5.

Western Free State Clay Grassland occurs within the Free State, covering part of the western Bloemfontein District (south), Boshof (southwest), Hertzogville (west), Wesselsbron (north) and Brandfort (east) and consisting of three main areas, of which the southern and middle sections are separated by a slightly elevated area (dolerite hills) between Hertzogville, Boshof and Soutpan. The Vet River Valley separates the middle and northern sections, and all three sections are separated from one another by belts of Vaal-Vet Sandy Grassland (Mucina & Rutherford, 2006).

According to Mucina and Rutherford (2006) this vegetation type is classified as 'Least Concern', with the national target for conservation protection being 24%. No portion of the vegetation

type is statutorily conserved, and only 20% has been transformed mainly for maize and wheat cultivation (Mucina and Rutherford, 2006). The following species are considered important in the vegetation type (d = dominant):

- Graminoids: *Aristida adscensionis (d), A. bipartita (d), Cynodon dactylon (d), Eragrostis chloromelas (d), E. lehmanniana (d), Panicum coloratum (d), Themeda triandra (d), Aristida congesta, Cymbopogon pospischilii, Digitaria eriantha, Eragrostis bicolor, E. curvula, E. micrantha, E. obtusa, E. plana, E. superba, E. trichophora, Heteropogon contortus, Setaria nigrirostris, Tragus berteronianus, T. koelerioides, T. racemosus.*
- Herbs: *Berkheya onopordifolia var. onopordifolia, Chamaesyce inaequilatera, Gnaphalium declinatum, Indigofera alternans, Kohautia cynanchica, Nidorella microcephala, Platycarpha parvifolia, Salvia stenophylla, Selago paniculata, Stachys spathulata.*
- Geophytic Herbs: *Bulbine narcissifolia, Oxalis depressa*.
- Succulent Herb: *Tripteris aghillana var. integrifolia*.
- Low Shrubs: *Lycium cinereum (d), Pentzia globosa (d), Amphiglossa triflora, Aptosimum elongatum, Berkheya annectens, Felicia filifolia subsp. filifolia, F. muricata, Gnidia polycephala, Helichrysum dregeanum, Melolobium candicans, Nenax microphylla, Rosenia humilis, Selago saxatilis*.
- Succulent Shrub: *Hertia pallens*.

Habitat Types:

The main habitat types identified across the Notsi PV Cluster (Five Projects) were initially delineated largely based on aerial imagery, and these main habitat types were then refined based on the field coverage and data collected during the survey. Five (5) habitats were delineated in total, and these are mapped over the entire cluster site.

When considering the development footprint under assessment for Notsi PV 5, only two habitat types are present, namely Modified Grassland and Rocky Ridge.

According to the 2018 NBA spatial dataset the Project Area overlaps with a 'Least Concern' and 'Poorly Protected' ecosystem. A 'Least Concern' ecosystem type is one which has experienced little or no loss of natural habitat or deterioration in condition, and 'Poorly Protected' ecosystems are those where the extent protected is only between 5% and 49% (Refer to Figure 5-11 and Table 5-2).

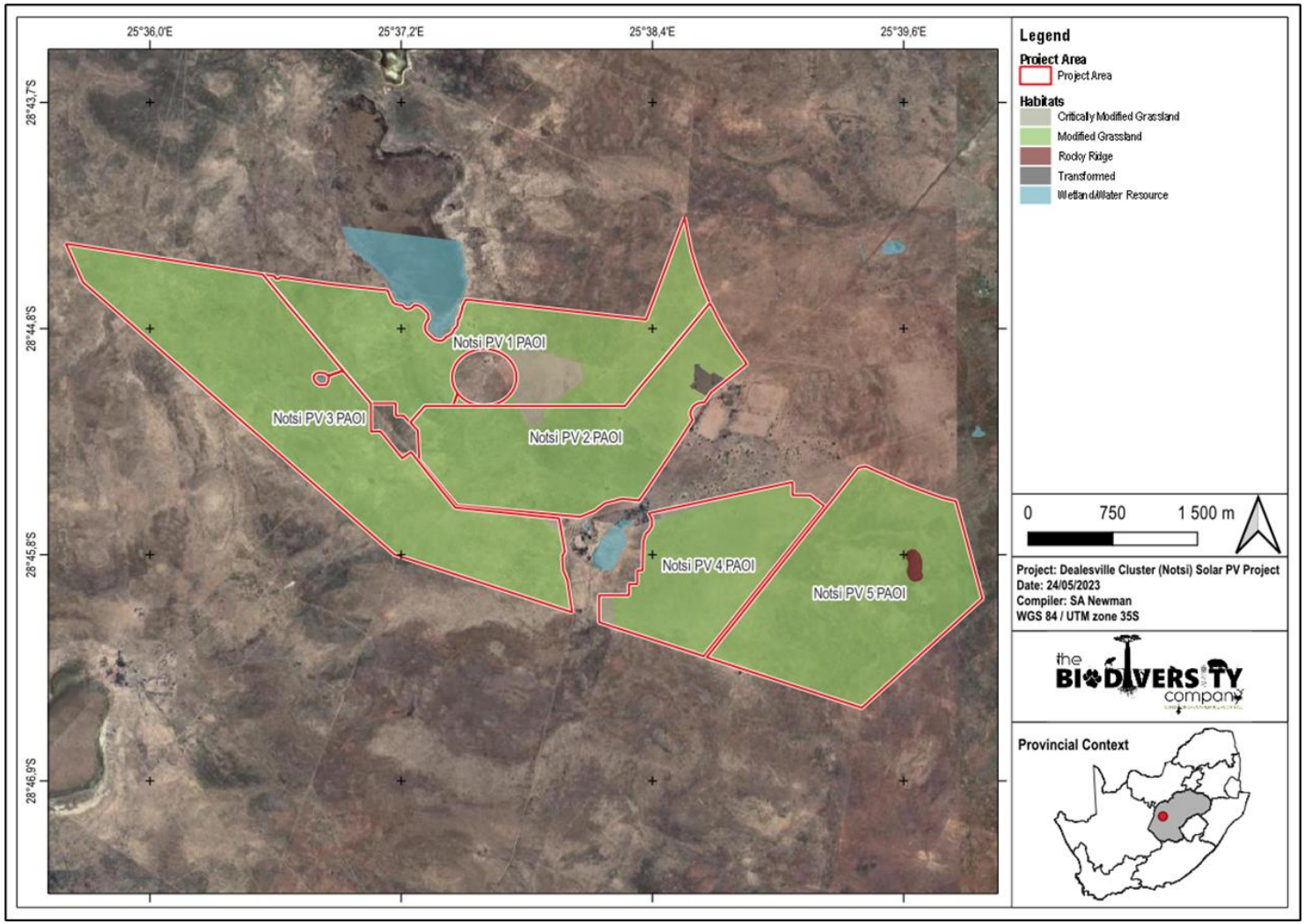


Figure 5-11: Habitats present within the Notsi PV Cluster, including Notsi PV 5, which is primarily Modified Grassland and a small area of Critically Modified Grassland

Table 5-1: Summary of the habitat units present at Notsi PV 5

Habitat Unit	Description	Botanical Analysis and Characteristics	Photograph
Modified Grassland	• Gently undulating open savannah habitat with a good functionality and a higher diversity and density of flora species than the Critically Modified Grassland areas. • The majority of the site was found to be representative of Modified Grassland habitat, which encompasses open grassland areas with a higher diversity of herbaceous indigenous species and a greater density of climax grasses and shrublets. This habitat unit has a higher level of functionality than the Critically Modified Grassland and local SCC fauna species may occasionally forage in these areas. • This habitat provides important ecological services to the surrounding region, including runoff and erosion control enabling rainwater percolation, nutrient cycling within the topsoil layers supporting the healthy functioning of indigenous flora and re-seeding processes, carbon sequestration, and foraging and nesting resources for livestock and local indigenous fauna species (including occasional SCC). The Modified Grassland is also considered an important movement corridor for all types of fauna. • Medium Habitat Sensitivity.	• Diversity of grasses, including some climax grasses such as *Themeda triandra*. Diversity of herbs and shrubs such as *Chrysocoma ciliata*, *Pentzia globosa*, and *Felicia filifolia*.	

Habitat Unit	Description	Botanical Analysis and Characteristics	Photograph
Rocky Outcrops	• Isolated linear section of rocky outcrops that serve as important micro-habitat. • Likely to support reptile and small mammal species native to the area. • The feature is also likely to be supportive of habitat specialist flora which may not be observable in the drier season, such as geophytes and micro succulents. • High Habitat Sensitivity.	• A diversity of grass species and low shrubs and small herbs such as *Pentzia incana* and *Lycium cinereum*.	

Protected Areas, Critical Biodiversity Areas (CBA) and Ecological Support Areas (ESA)

Officially protected areas, either Provincially or Nationally that occur close to a project site could have consequences as far as impacts on these areas are concerned.

The National Protected Area Expansion Strategy (NPAES) sets targets for protected area expansion, provides maps of the most important areas for protected area expansion, and makes recommendations on mechanisms for protected area expansion. The site is not located within a priority focus area of the National Protected Area Expansion Strategy (NPAES). The closest NPAES priority focus area is over 6 km away. In terms of protected areas considering NEMPAA, the Nielsview Nature Reserve, is located 7 km southeast of the site.

The Free State Biodiversity Conservation Plan has been considered for the identification of the relevant Critical Biodiversity Areas associated with the proposed development. Critical Biodiversity Areas (CBA) are areas required to meet biodiversity targets for ecosystems, species, and ecological processes, as identified in a systematic biodiversity plan. Ecological Support Areas (ESA) are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of Critical Biodiversity Areas and/or in delivering ecosystem services. Critical Biodiversity Areas and Ecological Support Areas may be terrestrial or aquatic. The primary purpose of a map of Critical Biodiversity Areas (CBA) and Ecological Support Areas (ESA) is to guide decision-making about where best to locate a development. It should inform land-use planning, environmental assessment and authorisations, and natural resource management, by a range of sectors whose policies and decisions impact on biodiversity. It is the biodiversity sector's input into multi-sectoral planning and decision-making processes.

The site is located within areas classified as 'Other'. These are areas of natural habitat not required to meet biodiversity targets for ecosystem types, species, or ecological processes, i.e., natural areas not selected as CBA or ESA. A very small portion of the site along the south-western boundary is classified as degraded (Refer to Figure 5-12).

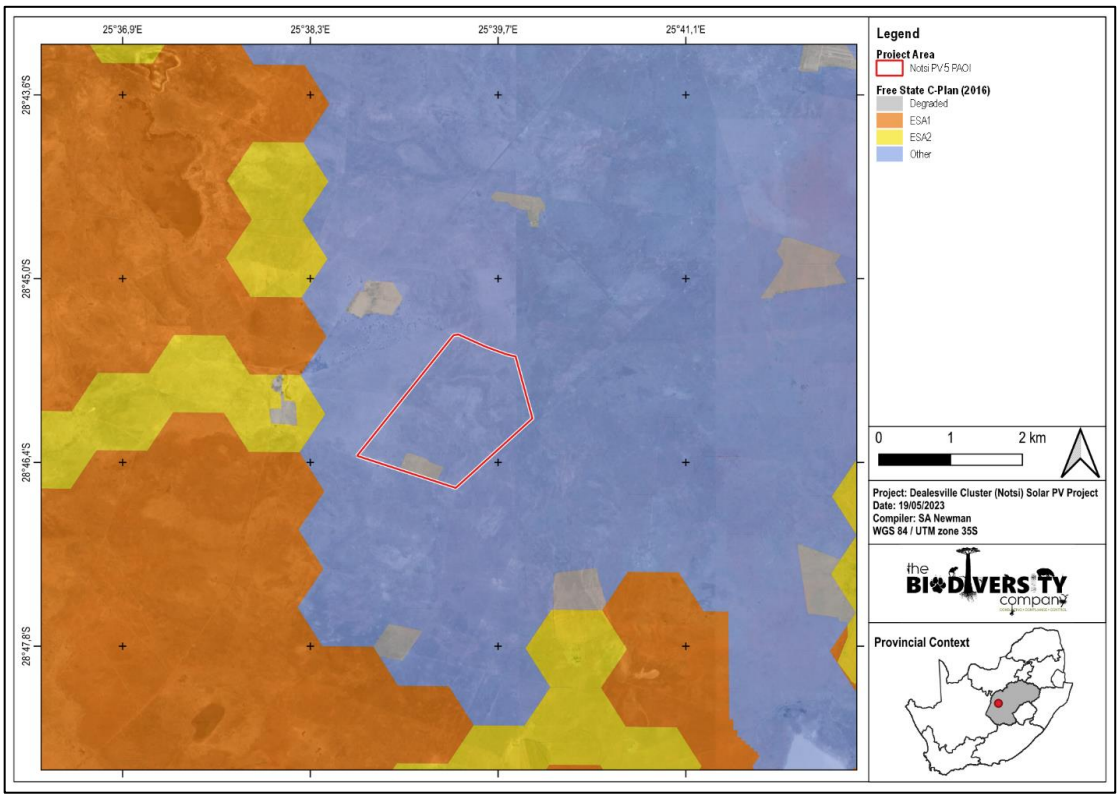


Figure 5-12: Critical Biodiversity Map for Notsi PV 5

Protected Plants and Trees

According to the Plants of South Africa (POSA) database two of the expected plant species present are classified as Species of Conservation Concern (SCC), however, it is noted that both of the species native ranges are restricted to the Western Cape - and as such they are unlikely to be found naturally occurring within or nearby to the site. The species are listed on the SANBI Red-List and are both classified as Endangered:

- Family: Iridaceae; Species: *Moraea debilis*
- Family: Aizoaceae; Species: *Trichodiadema pygmaeum*

As part of the Terrestrial Biodiversity Impact Assessment (Appendix D1), the general vegetation landscape is well defined by the historical classification assigned by Mucina & Rutherford (2006), this being short open grassland with scattered low shrubs in varying densities. The most dominant grasses included *Eragrostis chloromelas*, *E. lehmanniana*, *Aristida congesta*, and *Themeda triandra*. Prominent shrubs recorded include *Chrysocoma ciliata, Felicia filifolia, F. muricata, Lycium cinereum* and *Pentzia globosa*. Overall, forty-five (45) species of flora were recorded – including thirty-nine (39) indigenous species and six (6) exotics.

No SCC were recorded, however, two (2) individual provincially protected plants were observed. The plants are protected as per Schedule 6 of the Free State Nature Conservation Ordinance 8 of 1969. Note: All species of *Helichrysum* are protected in the Free State. These species were observed outside of the Notsi PV 5 development footprint (See Figures 5-13, 5-14 and 5-15.)

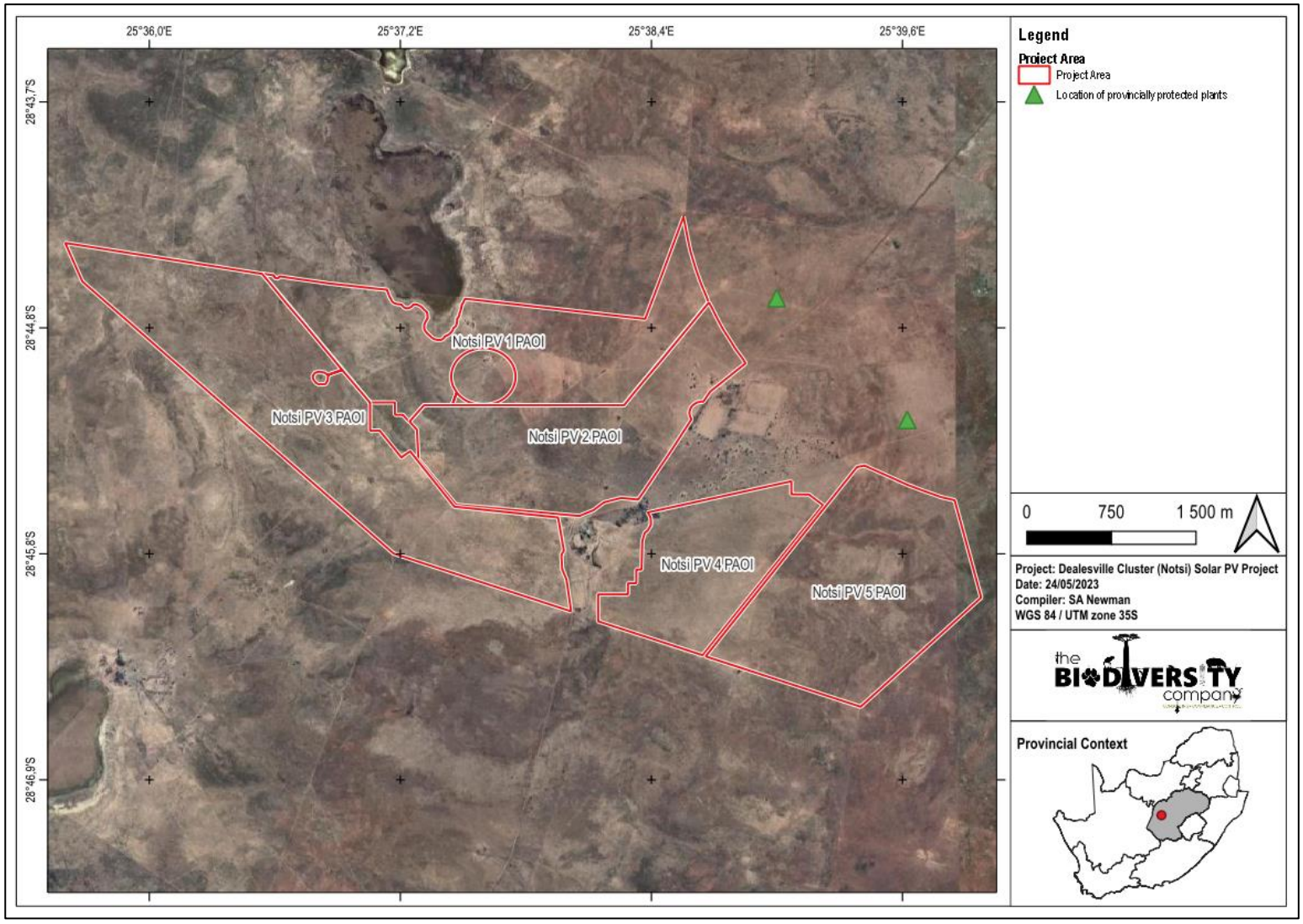


Figure 5-13: Locations of the recorded provincially protected plants (x2 individuals)

Figure 5-14: Photographs illustrating some of the indigenous flora species recorded – A*) Helichrysum sp*. (protected); B) *Helichrysum argyrosphaerum* (protected); C) *Chrysocoma ciliata*; and D) *Lasiosiphon polycephalus*

Figure 5-15: Photographs illustrating some of the indigenous flora species recorded – A) *Moraea pallida*; B) *Felicia muricata*; C) *Albuca virens*; and D) *Moraea stricta*

Declared Invasive Alien Species

The National Environmental Management: Biodiversity Act, Act No. 10 of 2004, (NEM:BA) is the national legislation that incorporates the mandatory regulation of Invasive Alien Plant (IAP) species, and in September 2020 the most current lists of IAP Species were published in terms of NEM:BA (in Government Gazette No. 43726 of 18 September 2020). The Alien and Invasive Species Regulations serve to define and regulate the various categories of Alien and Invasive Species and were recently updated and published in terms of NEM:BA in the Government Gazette No. 43735 of 25 September 2020. The 2020 Alien and Invasive Species Regulations and Lists were recently extended as published in the Government Gazette No. 44182, 24th of February 2021.

The legislation calls for the removal and/or control of IAP species (Category 1 species). In addition, unless authorised thereto in terms of the National Water Act, no land user shall allow Category 2 plants to occur within 30 meters of the 1:50 year flood line of a river, stream, spring, natural channel in which water flows regularly or intermittently, lake, dam or wetland. Category 3 plants are also prohibited from occurring within proximity to a watercourse. Below is a brief explanation of the three categories in terms of the NEM:BA:

- **Category 1a**: Invasive species requiring compulsory eradication. Remove and destroy. Any specimens of Category 1a listed species need, by law, to be eradicated from the environment. No permits will be issued.
- **Category 1b**: Invasive species requiring compulsory control as part of an invasive species control programme. Remove and destroy. These plants are deemed to have such a high invasive potential that infestations can qualify to be placed under a government sponsored invasive species management programme. No permits will be issued.
- **Category 2**: Invasive species regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy or accept as a gift any plants listed as Category 2 plants. No permits will be issued for Category 2 plants to exist in riparian zones. Species existing outside of a regulated area shall be classified as category 1b.
- **Category 3**: Invasive species regulated by activity. An individual plant permit is required to undertake any of the following restricted activities: import, possess, grow, breed, move, sell, buy or accept as a gift - involving a Category 3 species. No permits will be issued for Category 3 plants to exist in riparian zones as these will be classified as category 1b species.

Four (4) species were recorded during the field survey, namely Agave americana, *Eucalyptus camaldulensis*, *Opuntia ficus-indica*, and *Prosopis velutina*. The last two species are Category 1b species which must be controlled through the implementation of an IAP Management Programme. The common weeds *Tagetes minuta* and *Bidens pilosa* were also observed invading certain sections (Refer to Figure 5-16 for photographs of the observed invasive species.)

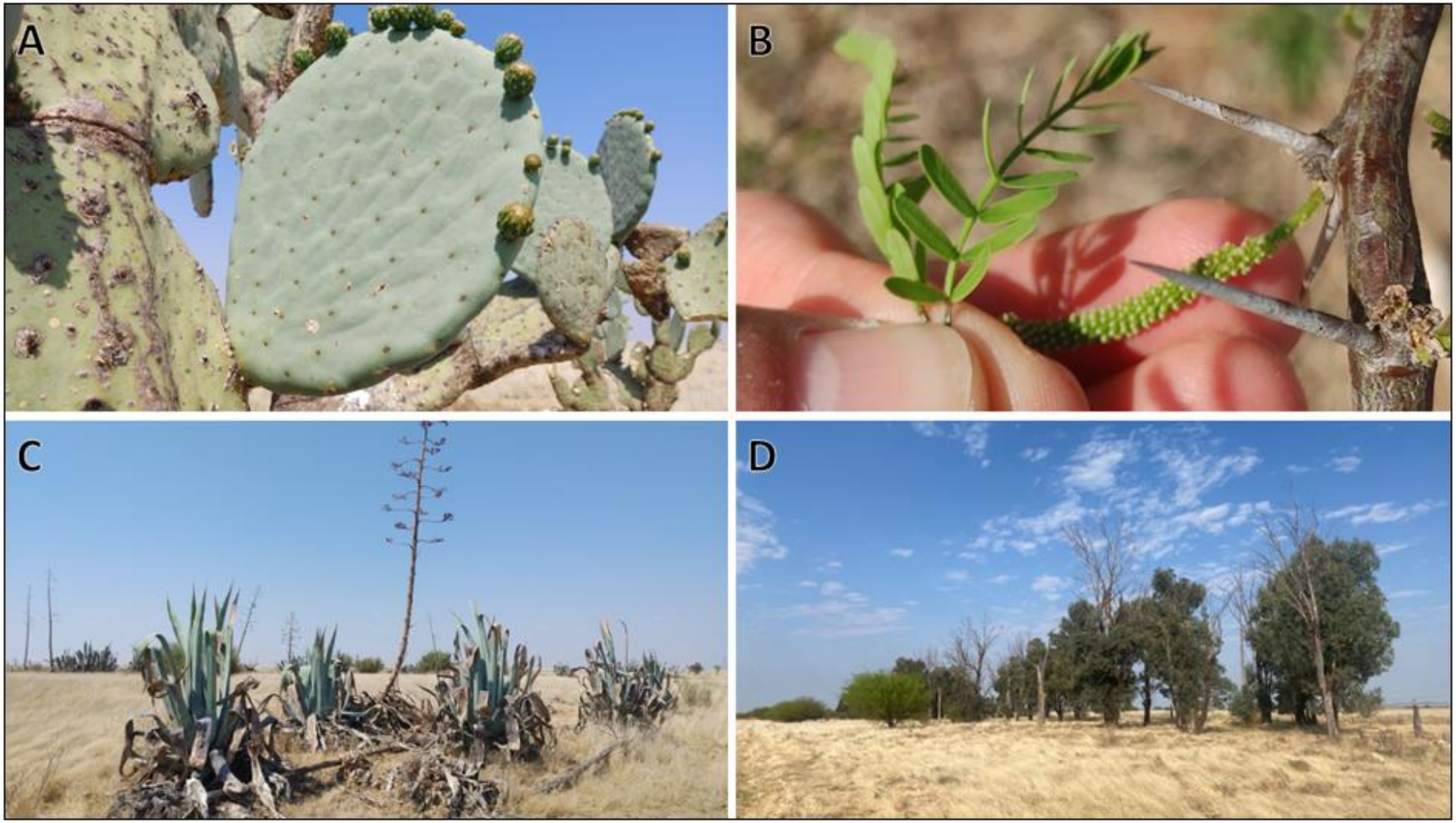


Figure 5-16: Photographs illustrating the listed IAP flora species recorded – A) *Opuntia ficus-indica*; B) *Prosopis velutina*; C) *Agave americana*; and D) *Eucalyptus camaldulensis*

5.3.1.3 Surface Water Resources

The Wetland Impact Assessment (Appendix D7) provides feedback of the surface water features present within the regulated area of the Notsi PV Cluster. The feedback is as follows:

- South African Inventory of Inland Aquatic Ecosystems (SAIIAE) - Two wetlands of the same type were identified by means of this data set. The wetlands as classified as being depression wetlands. The conditions of these wetlands are classified as being A/B (Natural/Good). Refer to Figure 5.17.
- National Freshwater Ecosystem Priority Areas (NFEPAs) - "Freshwater ecosystems" refer to all inland water bodies whether fresh or saline, including rivers, lakes, wetlands, sub-surface waters and estuaries. Consistent with global trends, high levels of threat have been reported for freshwater ecosystems. According to the National Biodiversity Assessment 2018 nearly 80% of inland wetland ecosystem types in South Africa are threatened and approximately 75% of inland wetland ecosystem types are both threatened and under-protected. Five wetland types have been identified within the 500 m regulated area of the proposed PV Facility, namely depression wetlands, a wetland flat, a hillslope seep, unchannelled valley bottom and a valley head seep wetland. Refer to Figure 5.17.
- Topographical Inland Water and River Lines - The topographical inland and river line data for "2825" quarter degree was used to identify potential wetland areas within the PAOI. This data set indicates multiple inland water areas of which were classified as being dams, marsh vlei and non-perennial pans as well as a single non-perennial river line located within the regulated area of the Notsi PV Cluster (Refer to Figure 5.18).

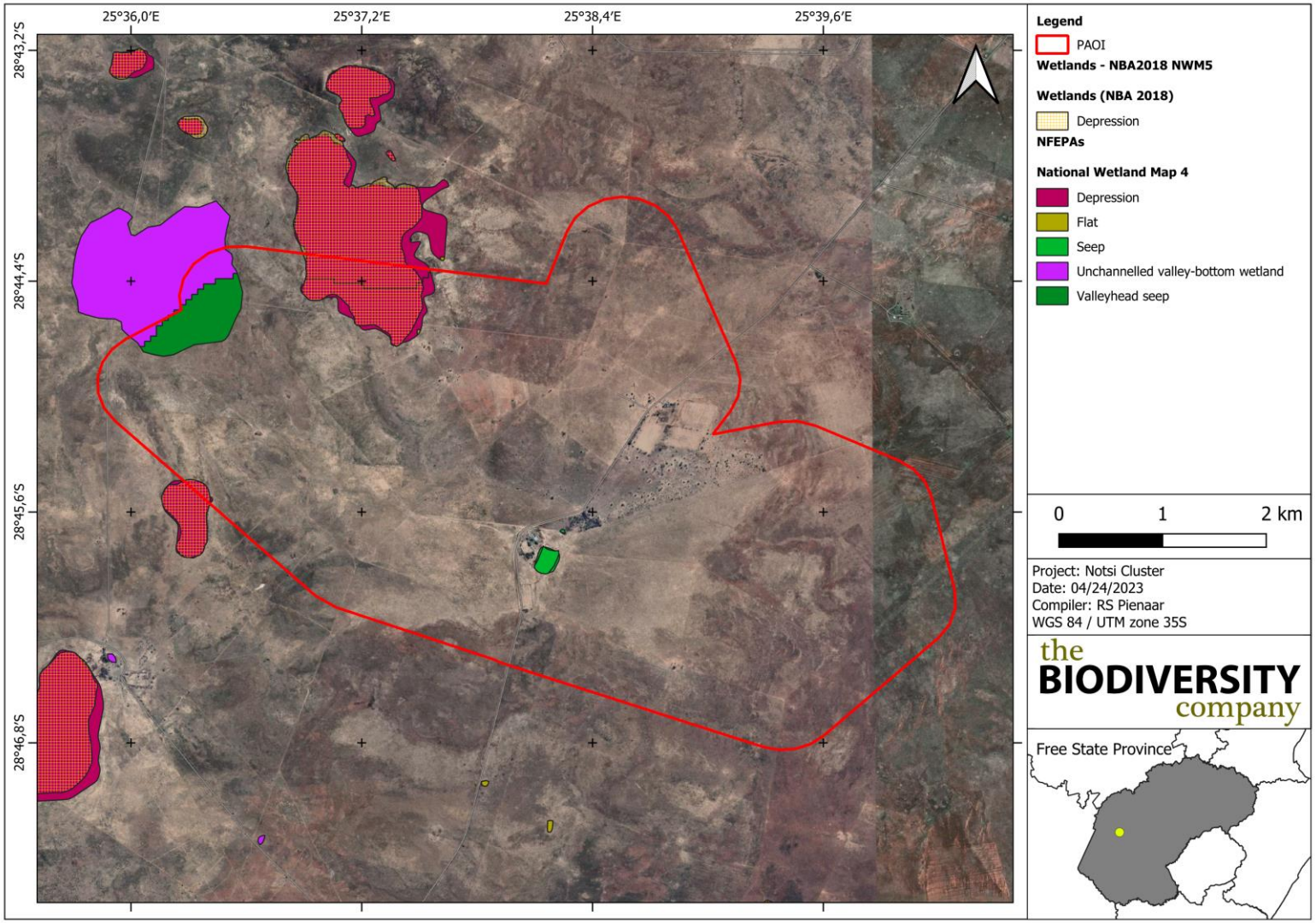


Figure 5-17: SAIIAE and NFEPA wetlands located within the regulated area of the Notsi PV Cluster

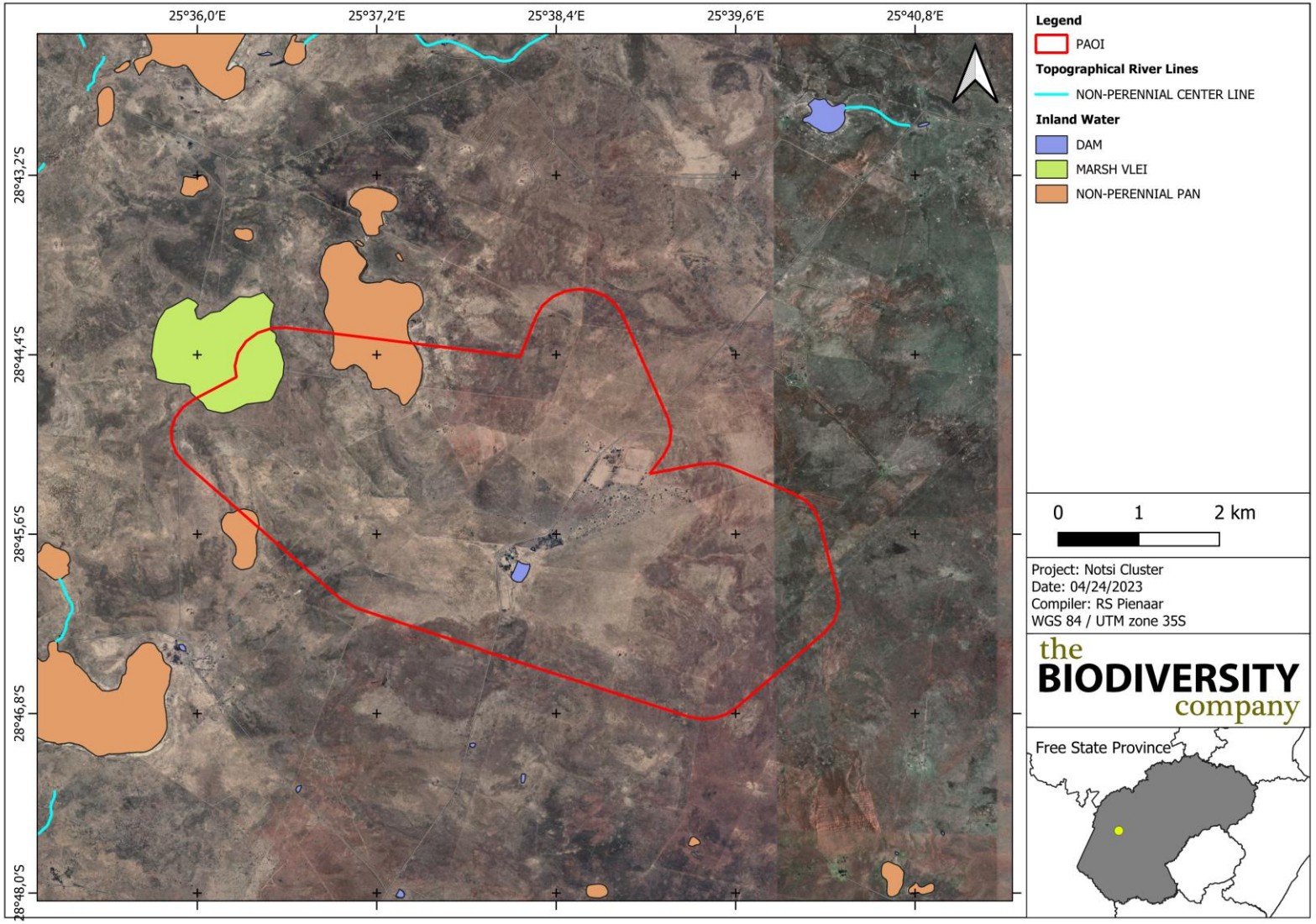


Figure 5-18: Topographical River line and inland water areas located within the regulated area of the Notsi PV Cluster

When considering the development footprint of Notsi PV 5 the Wetland Impact Assessment (Appendix D7) has indicated that during the fieldwork two hydrogeomorphic (HGM) units were identified but none are located on the Notsi PV 5 site. The wetland areas were delineated in accordance with the DWAF (2005) guidelines. HGM units have been classified as two depression wetlands. Multiple artificial wetlands, namely dams were identified within the regulated area of the Notsi PV Cluster.

According to Ollis et al (2013) a dam is classified as 'an artificial body of water formed by the unnatural accumulation of water behind an artificial barrier that has been constructed across a river channel or an unchannelled valley bottom wetland'. Although these systems do not classify as a natural wetland system it is important to note where the dams are for any planned development in the area. The delineation of the wetland systems and functional assessment have been completed for the unchanneled valley bottom wetlands in which the dams are located. The location of the delineated wetlands/HGM Units in relation to the Notsi PV 5 development footprint is indicated in Figure 5.19. Both of these features are located outside of the Notsi PV 5 development footprint. In addition, the development footprint also avoids the associated buffers as identified by the Wetland Specialist.

In terms of the Ecological Functional Assessment, HGM 1, is a salt pan located along the norther boundary of Notsi PV 1 and scored the lowest ecosystem services of all the identified wetlands. The wetland plays a role in sediment trapping and the assimilation of phosphates, nitrates and toxicant. This is due to the fact that during rainy season the water will runoff into the pan and stay there for long periods of time where the assimilation can take place. Water will also be stored inside the wetland during rainy season and can then be used by humans as well as animals. This helps with biodiversity maintenance of the wetlands. The wetland scored lower ecosystem services due to the fact that the wetland had little to no hydrophyte vegetation present which plays a major role in ecosystem services scores.

HGM 2, located on the PV 3 site, scored moderately high. The main factors contributing to the lower scores is the location of the wetlands. The wetlands are located on private land where human interaction is limited. The wetlands thus have very limited tourist attraction as well little to no cultural function. The wetlands also only provide natural resources to a limited amount of people which also lowers the associated benefits.

These wetlands however have high vegetation cover which will play an important role in biodiversity maintenance providing habitat for a wide variety of fauna. The vegetation will also help with streamflow regulation and flood attenuation during the rainy season. Vegetation also plays a vital role in the assimilation of toxicants.

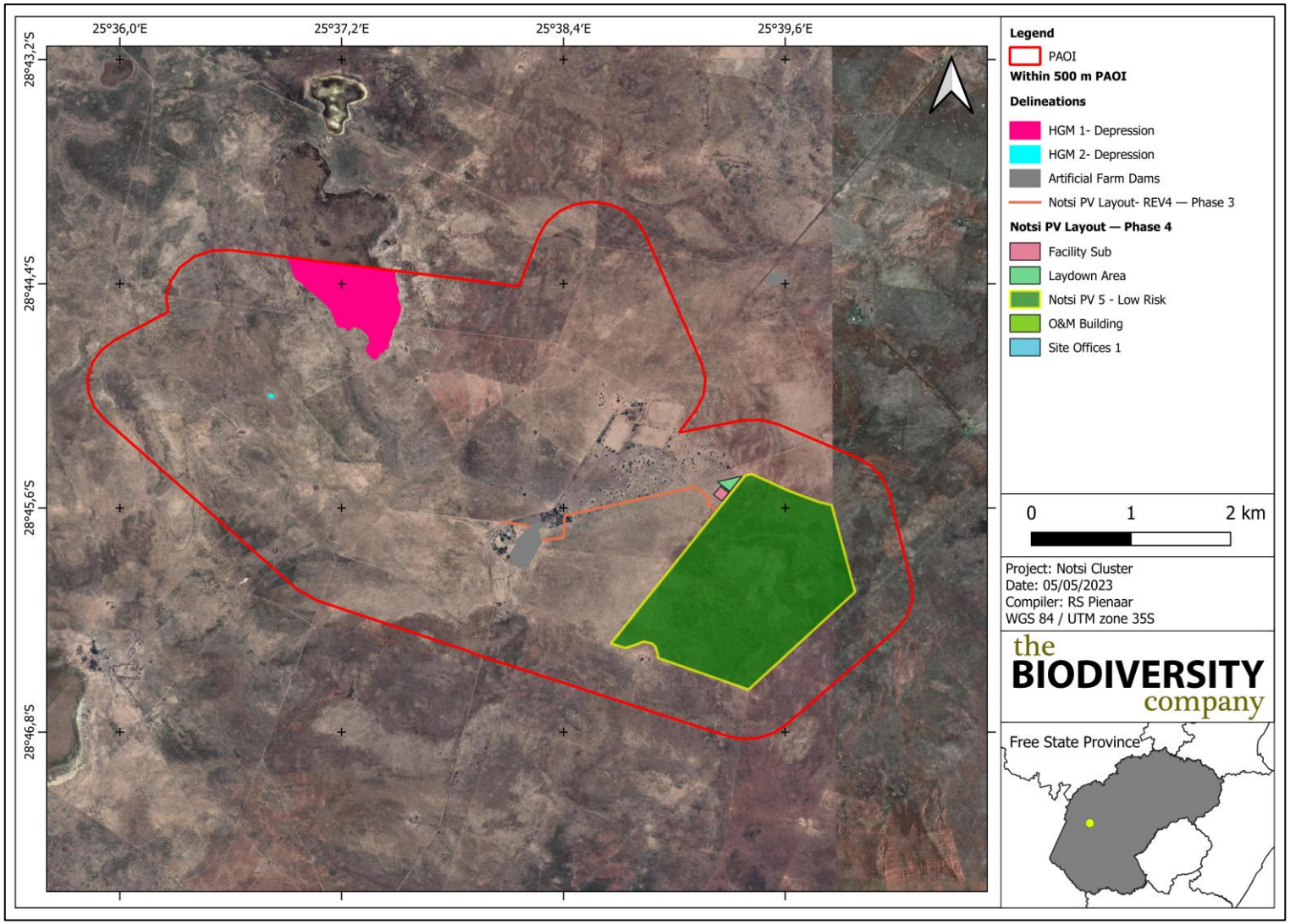


Figure 5-19: Delineated wetlands and risks associated with Notsi PV 5

5.3.1.4 Climate

The landscape is characterised by seasonal rainfall occurring mostly between November and March with a mean annual precipitation (MAP) of 450 mm (see Figure 3 1). The landscape is also situated in a cool temperate regime with a mean annual temperature between 16 and 17 °C with frost occurring frequently during winter months.

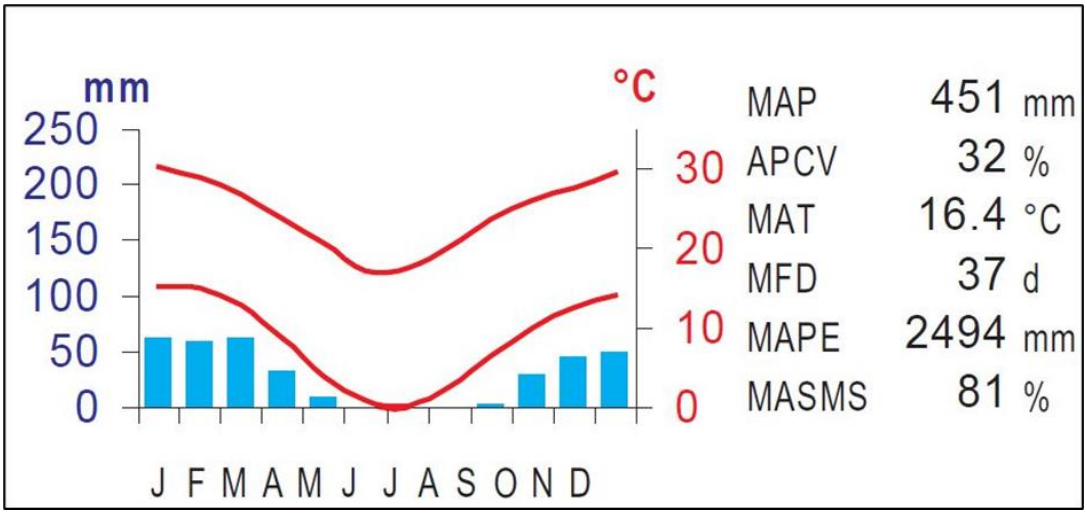


Figure 5-20: Climate

5.3.1.5 Biodiversity

The primary cause of loss of biological diversity is habitat degradation and loss (IUCN, 2004; Primack, 2006). In the case of this study special attention was given to the identification of sensitive species or animal life and birds on site. The following section will discuss the state of biodiversity on the site in more detail.

Avifaunal

A baseline description of the avifaunal community has been provided in the Avifaunal Impact Assessment (Appendix D2). Sampling was conducted over two seasons [autumn (3-5 May 2022) and winter (28-30 July 2022)] over several days each, in good weather conditions, in addition to an initial site inspection in a third season (summer November 2021).

During walked transects, 55 avian species were recorded, with 33 species recorded during the early May survey, and 42 avian species recorded during the late July survey. The highest number of individuals and species were recorded on walked transect 2 with an Index of Kilometric Abundance (IKA) (average number of birds recorded per km) of 46.9 and 30 species recorded. Overall, the number of individual birds present is relatively moderate compared to other area's data collected in winter in South Africa in which solar PV developments are proposed, in the specialist's experience.

A total of seven target species were recorded during driven transects, including three sightings of Endangered Secretarybird (4 birds) and three sightings of Critically Endangered White-backed Vulture (4 birds). A total distance of 66.6 km was sampled, with a total of 42 sightings of 47 target birds, resulting in an IKA of 1.4 target birds per km. The IKA for SCC was 0.12 birds per km.

Twelve species were recorded incidentally throughout the two surveys, with a total of 44 records of 272 birds. Pale Chanting Goshawk, Greater Kestrel and Northern Black Korhaan were the most frequently recorded species, and these are likely to include repeat records of the same individuals or pairs, as these are territorial resident species. A flock of approximately 200 Greater Flamingo was observed in a wetland located outside of Notsi PV 5. Refer to Figure 5.22.

The South African Bird Atlas Project 2 (SABAP2) has recorded 143 species (as of March 2023), which potentially occur in the greater study area, including 9 Species of Conservation Concern (SCC). An additional fifteen species were recorded during the site inspection and seasonal surveys, including the red listed species Greater Flamingo (Near-threatened). Two further red listed species were flagged as potentially present by the Screening Tool (Tawny Eagle and Burchell's Courser). The species richness of the area was 74 species recorded during the three site surveys. This includes five SCCs and ten near-endemic species. Of the SCC recorded one is listed as Critically Endangered (White-backed Vulture), one is listed as Endangered (Secretarybird) and three are listed as Near-threatened (Blue Crane, Greater Flamingo and Kori Bustard).

Table 5.2 provides a list of the species of conservation concern, endemic and near-endemic bird species predicted and recorded during the surveys.

Table 5-2: Species of Conservation Concern, endemic and near-endemic bird species predicted and recorded during the pre-application monitoring surveys

Common Name	Scientific Name	Red Data Status	Endemism	SABAP2 Reporting Rate (%)	Surveys
Abdim's Stork	*Ciconia abdimii*	NT		5	
Black Harrier	*Circus maurus*	EN	NE	60	
Black Stork	*Ciconia nigra*	VU		5	
Black-eared Sparrow-Lark	*Eremopterix australis*		NE	0	x
Blue Crane	***Grus paradisea***	**NT**		**5**	**x**
Blue Korhaan	*Eupodotis caerulescens*		SLS	25	x
Burchell's Courser		VU		-	
Cape Weaver	*Ploceus capensis*		NE	-	x
Cape White-eye	*Zosterops virens*		NE	-	x
Cloud Cisticola	*Cisticola textrix*		NE	65	x
Fiscal Flycatcher	*Melaeornis silens*		NE	35	x
Greater Flamingo	***Phoenicopterus roseus***	**NT**		**-**	**x**
Karoo Thrush	*Turdus smithi*		NE	5	x
Kori Bustard	***Ardeotis kori***	**NT**		**10**	**x**
Large-billed Lark	*Galerida magnirostris*		NE	10	
Ludwig's Bustard	*Neotis ludwigii*	EN		15	
Melodious Lark	*Mirafra cheniana*		NE	30	x
Secretarybird	***Sagittarius serpentarius***	**EN**		**20**	**x**
Sickle-winged Chat	*Emarginata sinuata*		NE	25	x
South African Cliff Swallow	*Petrochelidon spilodera*		BSLS	35	x

Common Name	Scientific Name	Red Data Status	Endemism	SABAP2 Reporting Rate (%)	Surveys
Tawny Eagle	*Aquila rapax*	EN		0	0
White-backed Vulture	***Gyps africanus***	**CR**		**5**	**x**

As part of the sampling surveys undertaken, specific avifaunal habits have been identified for the larger Notsi PV Cluster, including Notsi PV 5 (Figure 5.23). These habitats include:

- Grassland Habitat: This type of habitat is favoured by the recorded SCC Secretarybird (Endangered), as well as recorded terrestrial species such as Blue Crane (Near-threatened), Kori Bustard (Near-threatened), Blue Korhaan and Northern Black Korhaan. Ludwig's Bustard (Endangered) and Black Harrier (Endangered) may also occur here. It is utilised for foraging by small raptors, such as the recorded Greater Kestrel and Amur Falcon, as well as a variety of passerines and terrestrial species such as coursers, spurfowl, quails and guineafowl. Due to the large extent of grassland habitat in the area the density of avian species is typically low. A Secretarybird breeding site was located within the habitat. The sensitivity of this habitat in terms of avifauna is overall considered to be medium, while an area of 1 km surrounding the Secretarybird breeding site of very high sensitivity (No Go), the area of 1 - 2 km surrounding the breeding site of high sensitivity, and the area of 2 - 3 km of medium sensitivity.

  It is however confirmed that Notsi PV 5 falls outside of these medium sensitivity, high sensitivity and no-go areas, and is therefore not relevant for the placement of the development footprint.

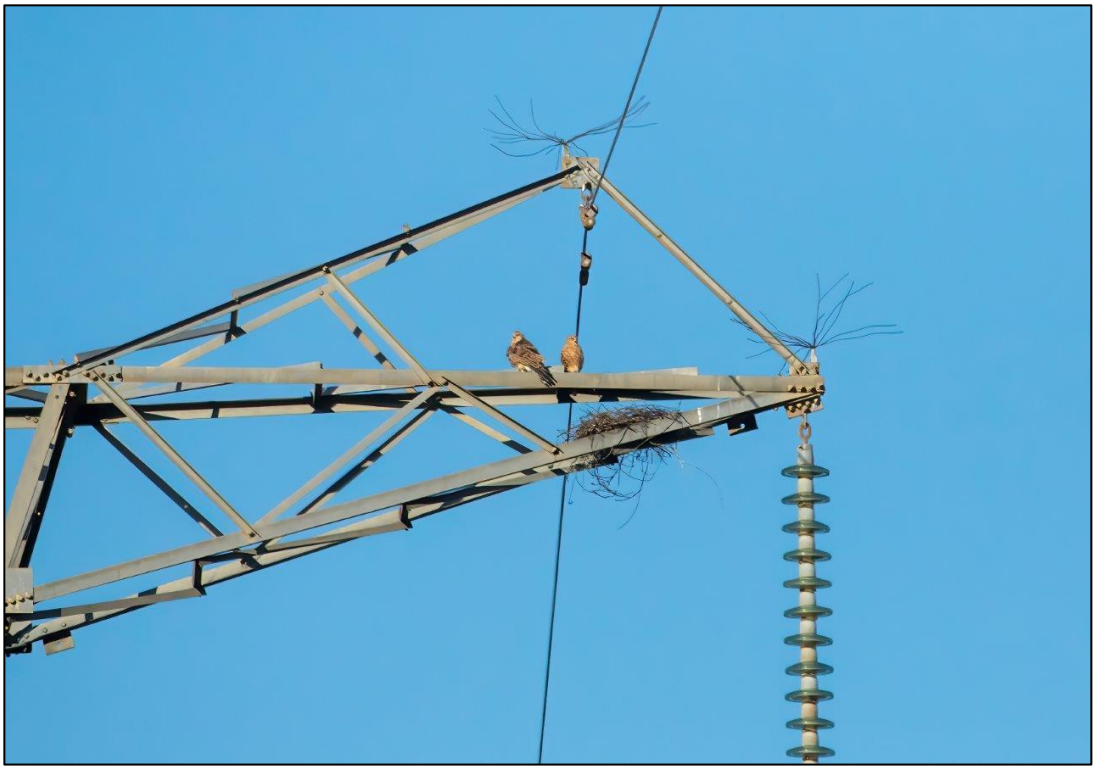
- Reservoirs, water troughs and dams: The area contains some open water troughs, small dams and reservoirs. Open water attracts all avifauna and dams may attract the recorded SCC Secretarybird (Endangered) and Blue Crane (Near-threatened) who prefer to nest and roost in the vicinity of open water, as well as a variety of raptors including the recorded White-backed Vulture (Critically Endangered), Pale Chanting Goshawk, Greater Kestrel and Amur Falcon. Abdim's Stork, Black Stork (Vulnerable), Booted Eagle, Black-chested Snake-Eagle and Black winged Kite may also occur here, but the habitat is most frequently utilised by weavers, doves, sparrows, and bishops. Therefore, an area of 100 m of artificial open water bodies is considered to be of high avifaunal sensitivity. The existing open water areas are however not considered to be irreplaceable, and any man-made open water structures could be removed or covered, which would lower the sensitivity.

- Wetlands, Pans and Vleis: Wetlands, pans and vleis (wet and dry) within the grassland biome attract a variety of water-associated as well as terrestrial species such as the recorded SCC Greater Flamingo (Near-threatened), Blue Crane (Near-threatened), Secretarybird (Endangered) and Kori Bustard (Near-threatened), as well as a variety of waterfowl, waders and passerines. This habitat type and an area of 200 m surrounding delineated wetlands and pans are considered of high avifaunal sensitivity.

- Power lines and electricity pylons: Four high voltage transmission lines run through the length of the proposed Notsi PV Cluster from the Main Transmission substation (MTS) located in the north-east. Large power lines and their supporting pylons are an important roosting and nesting substrate for a variety of raptors. White-backed Vulture (Critically Endangered) were recorded perched on these lines during pre-application monitoring. A

pair of Greater Kestrel was recorded as nesting on one of the electricity pylons, within the Notsi PV 1 footprint (Figure 5.21). Other raptors and corvids are also likely to utilise the pylons for nesting or perching. Areas around raptor nests on electricity pylons are of high sensitivity, and the size of this area is species dependant. For Greater Kestrel an area of 250 m was determined as of high sensitivity.

Figure 5-21: **Greater Kestrel Breeding Pair at Nest (July 2022)**



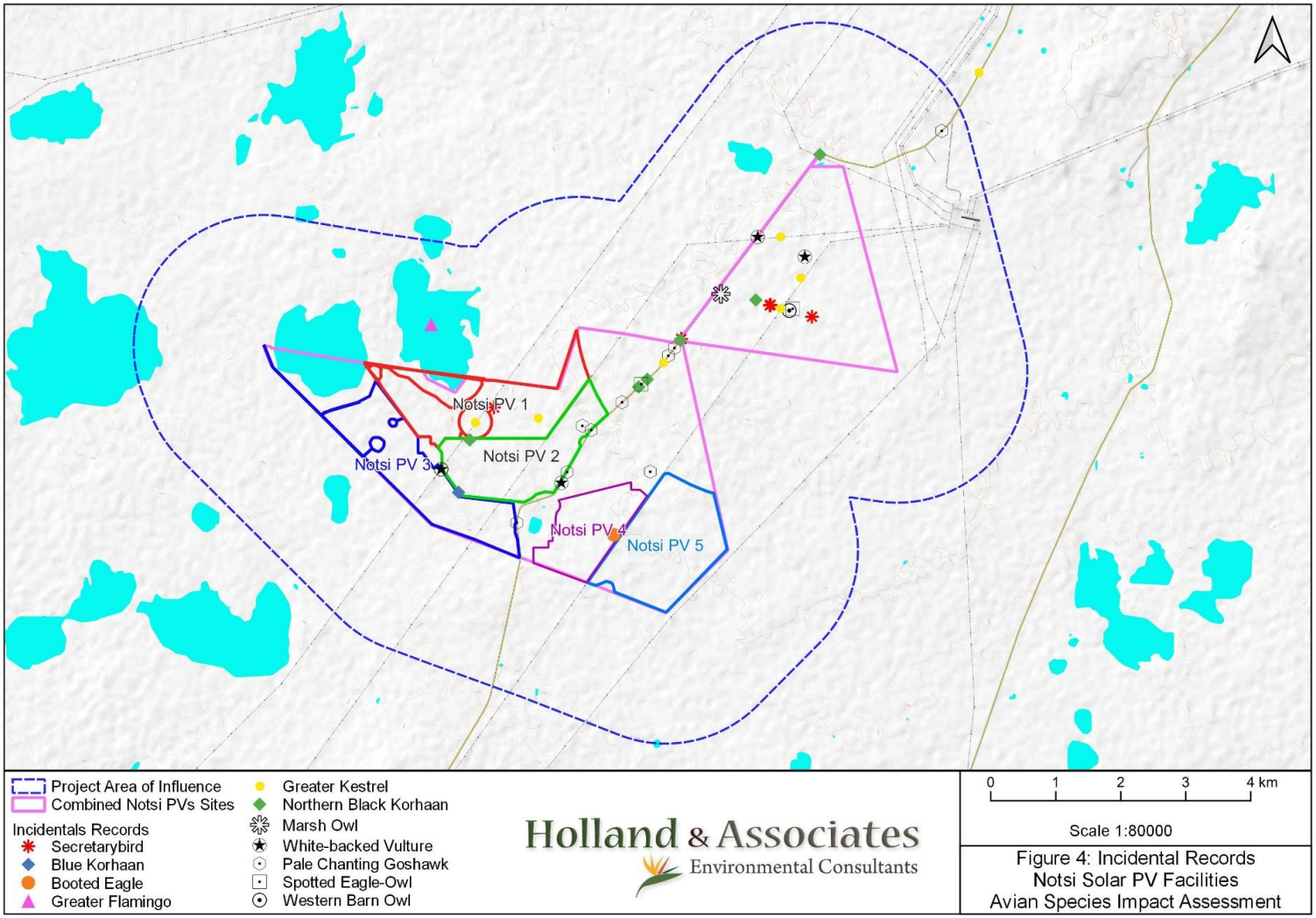


Figure 5-22: Incidental records

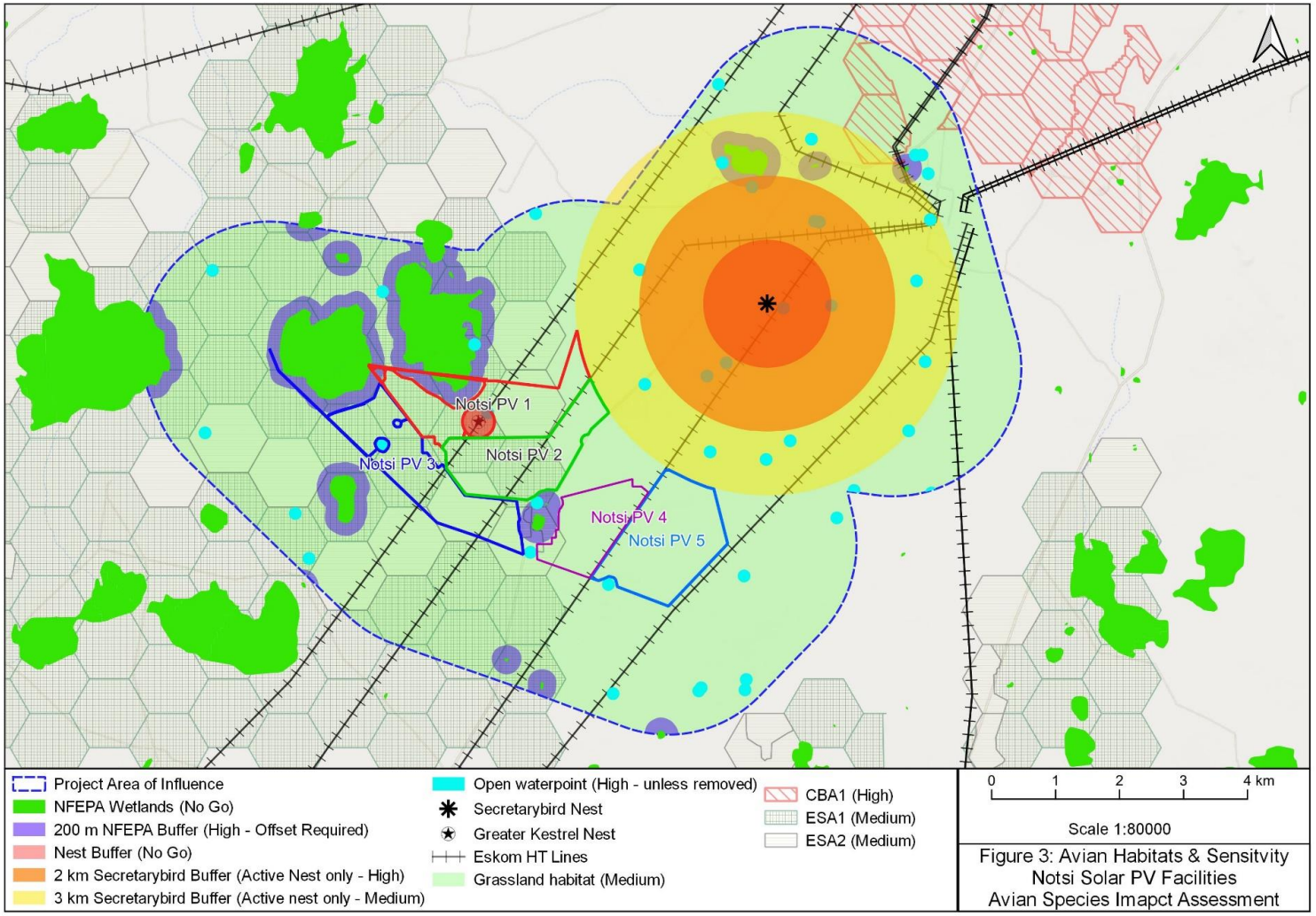


Figure 5-23: **Avian Habitats present**

Fauna

The Terrestrial Biodiversity Impact Assessment (Appendix D1) reports on the expected fauna species that may occur, which includes mammals, reptiles and amphibians. The IUCN Red List spatial database, in addition to the MammalMap database, lists over 90 mammal species that could be expected to occur within and around the area. Seventeen (17) of these expected species are regarded as SCC, and of these SCC six (6) have a moderate-high likelihood of occurrence based on the presence of suitable habitat and food sources in the area (Refer to Table 5.3 below).

Table 5-3: Species of Conservation Concern mammal species that may occur

Species	Common Name	Conservation Status		Likelihood of Occurrence
		SANBI (2022)	IUCN (2021)	
Aonyx capensis	Cape Clawless Otter	NT	NT	Low
Atelerix frontalis	South Africa Hedgehog	NT	LC	Moderate
Damaliscus lunatus	Tsessebe	VU	LC	Low
Damaliscus pygargus pygargus	Bontebok	VU	VU	Low
Equus zebra hartmannae	Hartmann's Mountain Zebra	VU	VU	Low
Felis nigripes	Black-footed Cat	VU	VU	Moderate
Hippotragus equinus	Roan Antelope	EN	LC	Low
Hippotragus niger	Sable Antelope	VU	LC	Low
Hydrictis maculicollis	Spotted-necked Otter	VU	NT	Low
Leptailurus serval	Serval	NT	LC	Moderate
Mystromys albicaudatus	White-tailed Rat	VU	VU	Moderate
Panthera pardus	Leopard	VU	VU	Low
Parahyaena brunnea	Brown Hyaena	NT	NT	High
Pelea capreolus	Grey Rhebok	NT	NT	Low
Poecilogale albinucha	African Striped Weasel	NT	LC	Moderate
Rhinolophus denti	Dent's Horseshoe Bat	NT	LC	Low
Smutsia temminckii	Temminck's Ground Pangolin	VU	VU	Low

Based on the IUCN Red List spatial database and the ReptileMap database, over 40 reptile species may be expected to occur within and nearby to the area. One (1) of these species is regarded as an SCC but it is assigned only a low likelihood of occurrence. This species is the Cape Sand Snake (*Psammophis leightoni*).

Based on the IUCN Red List spatial database and FrogMap, over 15 amphibian species may be expected to occur within and nearby to the area. One (1) of these is regarded as an SCC and it is assigned a moderate likelihood of occurrence due to the presence of suitable wetland habitat. This species is the *Pyxicephalus adspersus* (Giant Bullfrog) which is listed as 'Near Threatened' (NT) on a regional scale. It is a species that inhabits drier savannahs where it is fossorial for most of the year, remaining buried in cocoons. They emerge at the start of the rain season and breed in shallow, temporary waters in pools, pans and ditches (IUCN, 2017).

The presence of some suitable aquatic habitat within the area means that this species has a moderate likelihood of occurrence.

Fauna surveys

Mammal activity during the survey was good, as would be expected from a large area with no major signs of long-term historical disturbance. Fifteen (15) mammal species were recorded, and two (2) herpetofauna species (one (1) reptile and one (1) amphibian) were observed during the survey.

No fauna SCC were recorded, however, a larger number of mammal and herpetofauna species are expected to occur in the area, and longer-term multi-season surveys would be required in order to ensure extensive sampling. However, sampling was considered sufficient for the purposes of this assessment. Several provincially protected fauna (as per the Free State Nature Conservation Ordinance 8 of 1969) were observed, as noted in Tables 5.4 and 5.5. Schedule 1 protected species shall not be hunted by any person, except under authority of a permit which may be issued by the Administrator.

Table 5-4: Mammal species recorded during the field survey

Species	Common Name	Conservation Status		Notes
		SANBI (2022)	IUCN (2021)	
Antidorcas marsupialis	Springbok	LC	LC	Provincially Protected (Schedule 2)
Canis mesomelas	Black-backed Jackal	LC	LC	
Cryptomys hottentotus	Common Mole-rat	LC	LC	
Cynictis penicillata	Yellow Mongoose	LC	LC	
Herpestes pulverulentus	Cape Grey Mongoose	LC	LC	
Herpestes sanguineus	Slender Mongoose	LC	LC	
Hystrix africaeaustralis	Cape Porcupine	LC	LC	
Ictonyx striatus	Striped Polecat	LC	LC	
Lepus capensis	Cape Hare	LC	LC	Provincially Protected (Schedule 2)
Orycteropus afer	Aardvark	LC	LC	Provincially Protected (Schedule 1)
Otocyon megalotis	Bat-eared Fox	LC	LC	Provincially Protected (Schedule 1)
Phacochoerus africanus	Common Warthog	LC	LC	
Raphicerus campestris	Steenbok	LC	LC	Provincially Protected (Schedule 2)
Suricata suricatta	Suricate	LC	LC	
Xerus inauris	Cape Ground Squirrel	LC	LC	

Table 5-5: Herpetofauna species recorded during the field survey

Species	Common Name	Conservation Status		Notes
		SANBI (2022)	IUCN (2021)	
Sclerophrys gutturalis	Guttural Toad	LC	LC	
Stigmochelys pardalis	Leopard Tortoise	LC	LC	Provincially Protected (Schedule 1)

5.3.1.6 Visual landscape

The Visual Impact Assessment (Appendix D3) considers the landscape character within which the solar facility is proposed to be developed. When considering the landscape within which the solar facility is proposed to be developed it is confirmed the site is located in an area with relatively low significance in elevation, meaning that the site is not located on a mountain, at the foot of a mountain or in an area with a significant difference in elevation. The site is located at an above mean sea level (amsl) of approximately 1262m at the highest elevation and at an amsl of 1244m at the lowest elevation. The site drains towards the west.

The landform and drainage described above is unlikely to limit visibility except to the north-east and north at a distance of approximately 7km and 9km respectively, where small isolated ridges and plateaus are present. The highest amsl point in a 10km radius around Notsi PV 5 is 1320m, approximately 10km towards the north on top of the isolated plateau ridge. This is a difference of approximately 58m in an extreme case from the site. The rest of the area is rather level with much lower difference in amsl. Areas within 5km from the proposed development might have a clear view without taking existing screening into account.

Different types of development occur within the surrounding area of the proposed solar facility which contributes to the landscape. These include:

- **Industrial Development;** No significant industrial development is present in the area except for, what looks like, an abandoned salt mine east of Dealesville, outside the study area.
- **Urban Development**; Small scale urban development, outside the study radius, only including the town of Dealesville and one associated suburb, called Tswaraganang.
- **Sports and Recreational Development;** It seems no real recreational development is present within the study area. Sports development is more associated with the three schools found in Dealesville.
- **Agricultural Development;** This is one of the main development types in the area consisting mostly out of cattle, sheep, dryland cultivation and irrigation farming. The latter being located approximately 16km south from the proposed development.
- **Service Development;** Facilities and infrastructure associated with development. This includes roads, power infrastructure, water infrastructure etc. Most services are linked to electricity distribution with a dense power line network and two major substations called Perseus and Beta.
- **Tourism Development;** Dealesville and surrounds are not known to be an attractive tourist destination. Tourism development, in this case more accommodation, is very limited with only a few lodging facilities located in the area.

Furthermore, the Visual Impact Assessment has identified sensitive visual receptors that may be impacted by the proposed development. Visual Receptors can be defined as: “Individuals, groups or communities who are subject to the visual influence of a particular project”. This

highlights possible sensitive visual receptors, within a 10km radius from the proposed development, which due to use could be sensitive to landscape change. They include:

- **Area Receptors** which include:
  - None relevant.
- **Linear Receptors** which include:
  - S322 secondary road.
  - S401 secondary road.
  - One unnamed secondary road leading to Petrusburg. For the sake of this report, it will be referred to as the "Petrusburg secondary road".
- **Point Receptors** which include:
  - Homesteads on farms.
  - Lodging facilities.

Zone of Theoretical Visibility Model

A Zone of Theoretical Visibility (ZTV) is a Geographic Information System (GIS)-generated tool to identify the likely (or theoretical) extent of visibility of a development. The tool used in this model does not take existing screening into account but only the above mean sea level of the landscape.

Table 5.6 reflects the visibility rating in terms of proximity on sensitive receptors from the solar facility within a 10km radius.

Table 5-6: ZTV Visibility Rating in terms of proximity to Notsi PV 5

Radius	Visual Receptors	Visibility rating in terms of proximity
0-1km	- None **Visibility Coverage: 79.39%**	Very High
1-3km	- Three homesteads on a farms - S322 secondary road **Visibility Coverage: 27,39%**	High
3-5km	- S322 secondary road **Visibility Coverage: 15.26%**	Medium
5-10km	- Eight homesteads on farms - One lodging facility - S322 secondary road - Petrusburg secondary road **Visibility Coverage: 16%**	Low

The ZTV maps will give a clearer understanding of areas susceptible to line of sight from the solar facility (Refer to Figure 5.24).

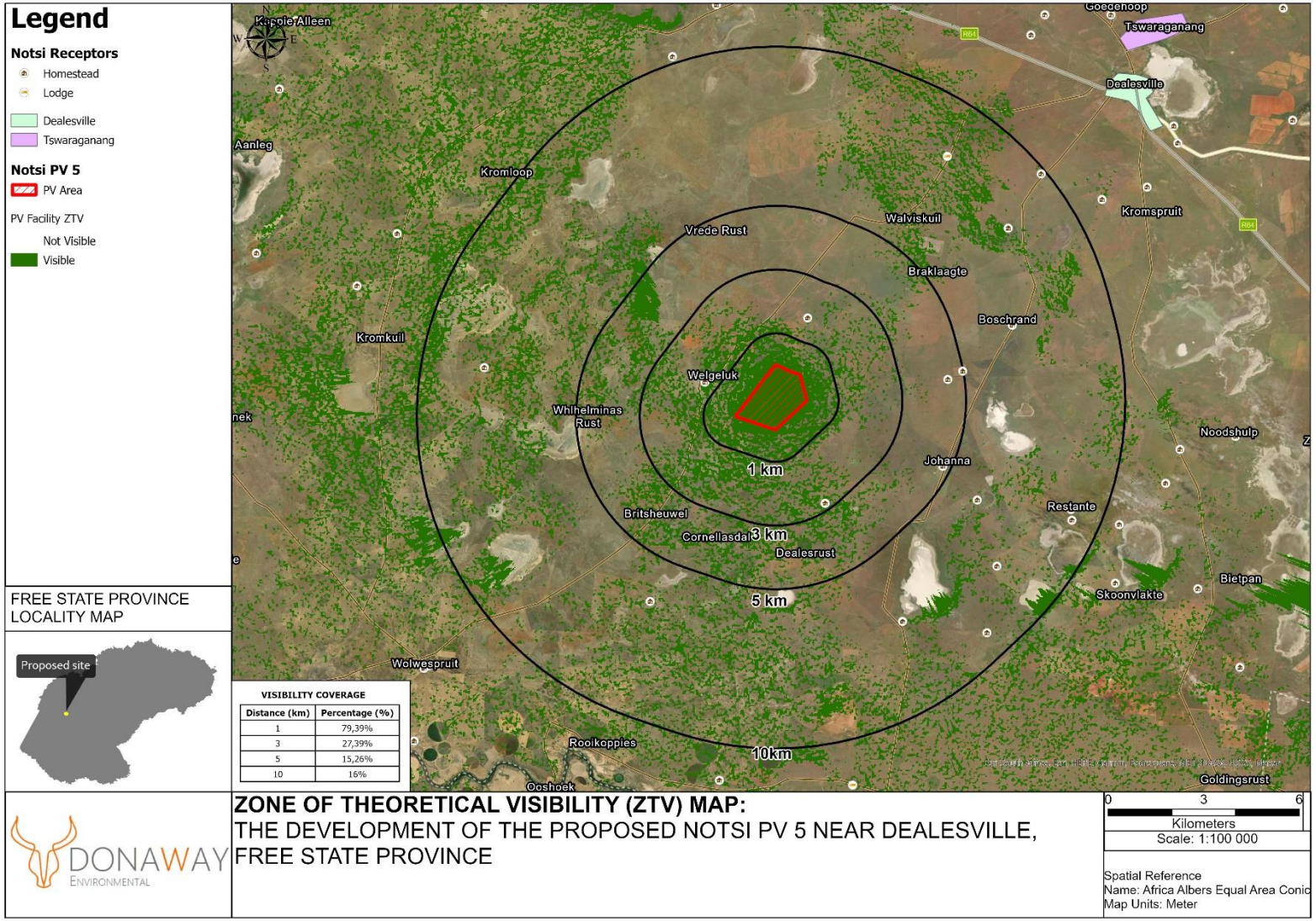


Figure 5-24: Zone of Theoretical Visibility (ZTV) for Notsi PV 5

5.3.1.7 Traffic Considerations

The Transport Impact Assessment (Appendix D8) confirms that Notsi PV 5 can be accessed via an existing access from the R64, which is located to the north-east of the proposed site. Suitable access points were assessed in line with access spacing requirements, sight lines and road safety considerations. Sight distances in both directions from the S322 onto the R64 are acceptable.

According to the road classification of the surrounding road network as per the Road Infrastructure Strategic Framework for South Africa (RISFSA), the R64, from which the development trips will take access, can be classified as follows:

Rural Class 3 route is major arterial roads that typically carry inter-district traffic between:

- Small towns, villages, and larger rural settlements,
- Smaller commercial areas and transport nodes of local importance that generate relatively high volumes of freight;
- Other traffic in the district (public transport and freight terminals, railway sidings, small seaports, and landing strips);
- Very small or minor border posts; Tourist destinations;
- Other Class 1, 2 and 3 routes; and Smaller centres than the above when travel distances are relatively long (longer than 50 to 100 km).

It is envisaged that the components will be imported to South Africa via the Port of Durban or the Port of Ngqura as the closest ports to the site.

5.3.2 Description of the socio-economic environment

The socio-economic environment is described with specific reference to social, economic, heritage and cultural aspects.

5.3.2.1 Socio-economic conditions

According to the Social Impact Assessment (Appendix D6) the Free State Province is located in the central part of South Africa and bordered by six of the nine provinces, with Gauteng, Mpumalanga and North West bordering to the north, Northern Cape to the west, KwaZulu-Natal to the east, and Eastern Cape to the south. The remaining border section of the province is shared with the independent state of Lesotho, providing an important transportation route for Lesotho.

The Free State Province is the third largest province in South Africa covering an area of 129 825km^2, while only accommodating the second lowest population and density with 2 834 714 people at a population density of only 5.1%. The judicial capital of the country Bloemfontein is situated in the heart of the province, with other major towns including Welkom, Kroonstad, Sasolburg and Bethlehem.

Topographically the province is situated on a plateau rising to elevation of 1 800m above mean sea level in the east, sloping down to west to the Orange River around 1 200m above mean sea level. The Orange River and Vaal River form the boundaries of the province, with the first delineating the southern and second the northern boundary.

Agriculture, mining and manufacturing dominate the economic sector within the province, with 90% of the geographical area used for crop production. Approximately 34% of maize, 37% of wheat, 33% of potatoes, 53% of sorghum, 30% of groundnuts, 18% of red meat and 15% of wool of South Africa's produce is produced in the province. Mining is another major economic driver with the province identified as the fifth-largest gold producer in the world, additionally the mining sector is a major employer in the province. The province also hosts a leader in the chemical manufacturing industry with Sasol as a gigantic synthetic-fuel industry. One of South Africa's world heritage site are situated within the province. The Vredefort Dome is the largest verified impact structure on Earth.

The Free State Province is divided into the Mangaung Metropolitan Municipality and four district municipalities, which are further subdivided into 18 local municipalities (Refer to Figure 5.25.)

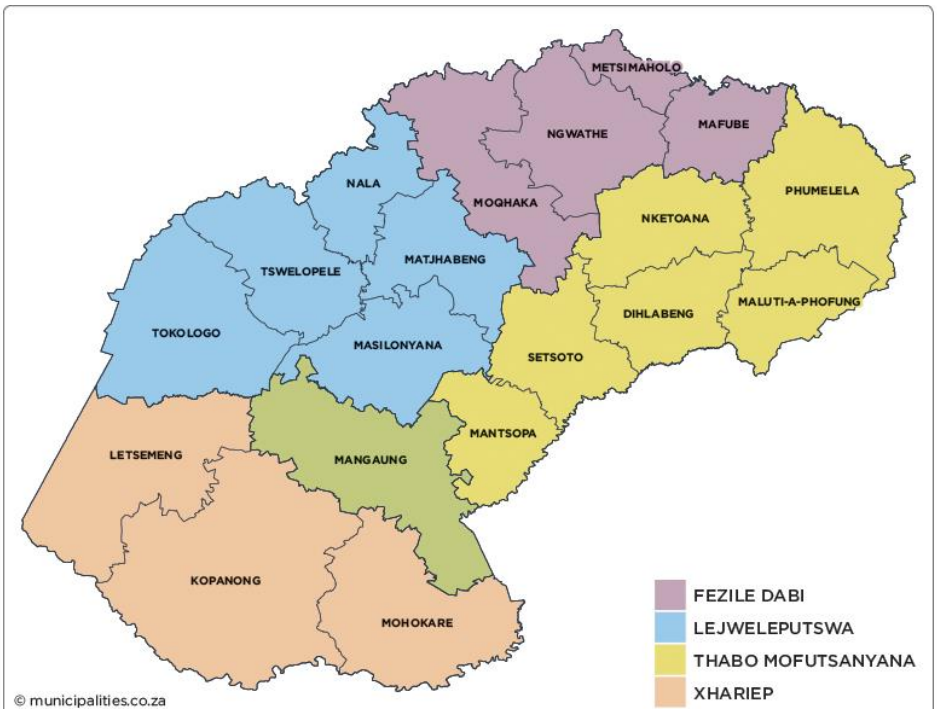


Figure 5-25: District Municipalities located within the Free State Province

Lejweleputswa District Municipality

Lejweleputswa District Municipality is a Category C municipality located in the western centralised part of the Free State Province. The district municipality is the third largest of the five district municipalities, comprising a quarter of the geographical area of the province. Masilonyana-, Tokologo-, Matjhabeng, Tselopele-, and Nala Local Municipality are the five local municipalities subdividing the Lejweleputswa District Municipality. Refer to Figure 5.26.

The region covers an area of approximately 32 286km^2 with 646 920 people (23% of the provincial population. A decrease in the district's population was observed from 2001 to 2011, declining from 657 012 to 627 626 people while an increase was observed from 2011 to 2016.

The N1 national route connecting most major cities in South Africa runs through the district municipality forming an important transportation route.

Lejweleputswa is defined as "grey rock" associated with the rich history of gold mining and prospecting in the area. The district forms the major contribution of the Free State Province

goldfields. The tourism sector of the province is driven by the Willem Pretorius Game and Nature Reserve, Soetdoring and Sandveld Nature Reserve and the annual NAMPO Harvest Day, where the farming industry and farmers congregate once a year.

Figure 5-26: Local Municipalities of the Lejweleputswa District Municipality

Tokologo Local Municipality

The Tokologo Local Municipality is a Category B municipality within the Lejweleputswa District Municipality situated in the western region of the Free State Province. It is the largest of the five municipalities in the Lejweleputswa District Municipality covering almost a third of the geographical area. Three towns are situated within the region with Boshof in the centre, Hertzogville to the north and Dealesville to the south-east.

The population density of the municipality is the lowest compared to the other municipalities in the area with only a 3.1 persons per square kilometre. The area is dominated by agricultural activities with minimal tourism attractions, with hunting associated as the main tourism attraction in the area. Some small-scale salt mining facilities can be found with numerous salt pans distributed throughout the region.

5.3.2.2 Cultural and heritage aspects

According to the Heritage Impact Assessment (Appendix D5) special attention was given to the identification of possible cultural or heritage resources on site. The Heritage Impact Assessment has considered both the archaeological and palaeontological aspects associated with Notsi PV 5.

Archaeology

Scattered throughout the Karoo is evidence of historic and prehistoric occupation in the form of Early, Middle and Later Stone Age lithics and other material remains. The descendants of the historic and prehistoric occupants of the region are found in the indigenous Khoe and San, as well as modern inhabitants of the area. According to Orton (2015 SAHRIS ID 321231), "The general vicinity of Dealesville is very flat with extensive tracts of open grassland and numerous large pans. However, close to and southwest of the town there are a number of rocky koppies. The soil is orange, coloured by the dolerite that breaks the surface in many areas. Calcrete is also common just beneath the surface with exposures visible at times where the cover sands have eroded away. The landscape is quite strongly characterised by electrical infrastructure..."

Orton (2015) also notes that "There are some important fossil sites in the greater region and thus the chance of finding material of significance does exist. Florisbad is a very well-known fossil locality lying some 35 km to the east of the present study area. Here an early human cranium was recovered in 1932 (Dreyer 1935; Rightmire 1978) while mid-Pleistocene fauna and Middle Stone Age stone artefacts have also been recovered (Brink 1987; Dreyer 1938). Because of its importance in terms of both palaeontology and archaeology, Florisbad has been declared a Provincial Heritage Site (SAHRIS n.d.). Erfkroon is another important fossil site that lies along the Modder River some 5 km southwest of the southern end of the present study area. The fossils occur over a large area and are revealed in erosion gullies. Stone artefacts from the earlier part of the Middle Stone Age (MSA) and from the Later Stone Age (LSA) have also been found associated with the bones in places (Churchill et al. 2000)."

In Orton's assessment conducted immediately north of the study area, he identified a number of artefact scatters related to the MSA, while even more widespread were individual MSA artefacts (2015). Orton (2015) notes that these were all found in areas where the surface had become denuded and often eroded and this suggests that these artefacts are generally beneath the surface sands and could in fact be far more common than is expected. The context is essentially secondary, with the artefact accumulations having been the result of erosion, deflation and reburial; they could thus be referred to as background scatter. Orton (2015) also notes that the majority of these artefacts were identified close to the rockier part of the landscape. Orton (2015) also identified artefact scatters pertaining to the LSA however these were less common on the landscape. They tended far more strongly to be associated with features on the landscape such as springs, pans and hills. Orton (2015) also noted scatters of historical artefacts that were generally associated with sites that included some structural remains. In his assessment, Orton (2015) also identified a number of ruined dry stone-walled structures. Most of which are historical in nature.

Orton (2015) notes that the vicinity of Dealesville does not have a well-developed cultural landscape. Farmsteads are widely scattered and are not linked by any features such as tree lines. Tree lines, in fact, are very rare in the area. It is therefore not likely that the study area contributes to a significant cultural landscape.

Archaeological Findings

Field assessment of the footprint of the proposed Notsi Solar Projects documented several stone artefact scatters in secondary contexts and one site in a close to primary context that needs to be avoided (DV2, located within the boundary of PV 1). The stone artefacts at DV4 (located within the boundary of PV 5) and DV1 (located within the boundary of PV 1) are ex-

situ and occur in a disturbed deflated context, whereas the MSA occupation of the Pleistocene pan margin at DV2 (located within the boundary of PV 1) needs to be avoided.

DV4 was identified within the area proposed for the Notsi PV 5 development, however the layout provided, respects the recommended buffer areas and no direct impacts is anticipated.

Concerning the Stone Age archaeology within the footprint of the proposed Notsi Solar Projects, there are no objections to the authorization of the proposed development, provided that the buffering described above is adhered to. Further, that if any evidence of human remains is exposed during excavation that development activities cease in the area of the identified remains.

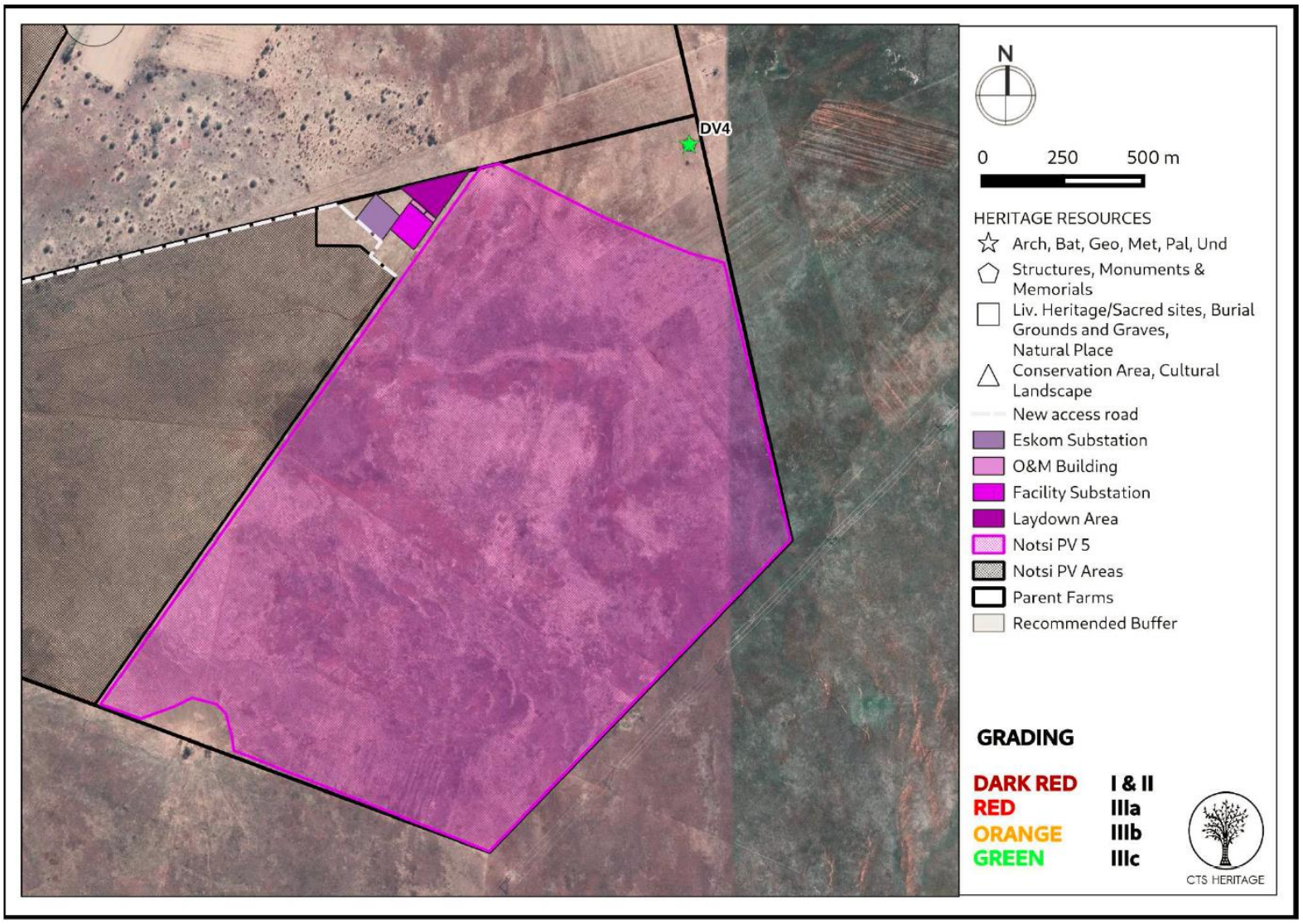


Figure 5-27: Heritage resources in relation to the Notsi PV 5 development footprint

Palaeontology

According to the SAHRIS Palaeosensitivity Map (Figure 5.28), the study area is underlain by sediments of zero, moderate and high palaeontological sensitivity. However, this map requires updating as it does not reflect the actual palaeontological sensitivity of the geology as per the PalaeoTechnic Report completed for the Free State Province by Groenwald (2014, SAHRIS NID 163080). According to the extract from the CGS Map for Kimberley 2824, the sediments underlying the study area include Jurassic Dolerite which has no palaeontological sensitivity, Quaternary Sands of the Gordonia Formation and sediments of the Tierberg Formation of the Ecca Group. The palaeontological sensitivity of the Quaternary Sands sediments derives from the likelihood of findings archaeological deposits preserved in these sediments and as such, is dealt with in the paragraphs above.

According to Groenewald (2014), in the Tierberg Formation, "Ecca Sea traces are among the most diverse and best preserved non-marine ichnofaunas from Gondwana. There have been doubtful stromatolites also recorded." Fossil heritage from the Tierberg Formation includes "Disarticulated microvertebrate remains (e.g., fish teeth, scales), sponge spicules, spare vascular plants (leaves, petrified wood), moderate diversity trace fossil assemblages (plus variety of additional taxa such as large ribbed pellet burrows, arthropod scratch burrows, Siphonichnus etc)."

An updated and more realistic palaeontological sensitivity map (Figure 5.29) has been developed which indicates that the majority of the study area is underlain by sediments of low palaeontological sensitivity (Gordonia Formation and Quaternary Sands) shaded in blue. The primary sensitivity of these deposits is archaeological in nature due to their recent age.

The development is underlain by Quaternary deposits, Jurassic dolerite, as well as the Tierberg Formation of the Ecca Group (Karoo Supergroup). According to the PalaeoMap on the South African Heritage Resources Information System (SAHRIS) database, the Palaeontological Sensitivity of the Quaternary calcrete is High, while that of Quaternary aeolian sands are Moderate, that of Jurassic dolerite is Zero and the Tierberg Formation has a Moderate Palaeontological Sensitivity (Almond and Pether, 2009; Almond et al., 2013). Recent Shape files produced by the Council of Geosciences, Pretoria) indicates that the area is underlain by calcretes, surface limestones and Hardpan superficial sediments, the Kalahari Group, Karoo Dolerite as well as the Tierberg Formation of the Ecca Group. Topographical as well as Google Earth images indicate that the relief of the proposed solar facility development footprint is low, and outcrops in the area are rare.

A site-specific field survey of the development footprint was conducted on foot in September 2022. No visible evidence of fossiliferous outcrops was found in the development footprint.

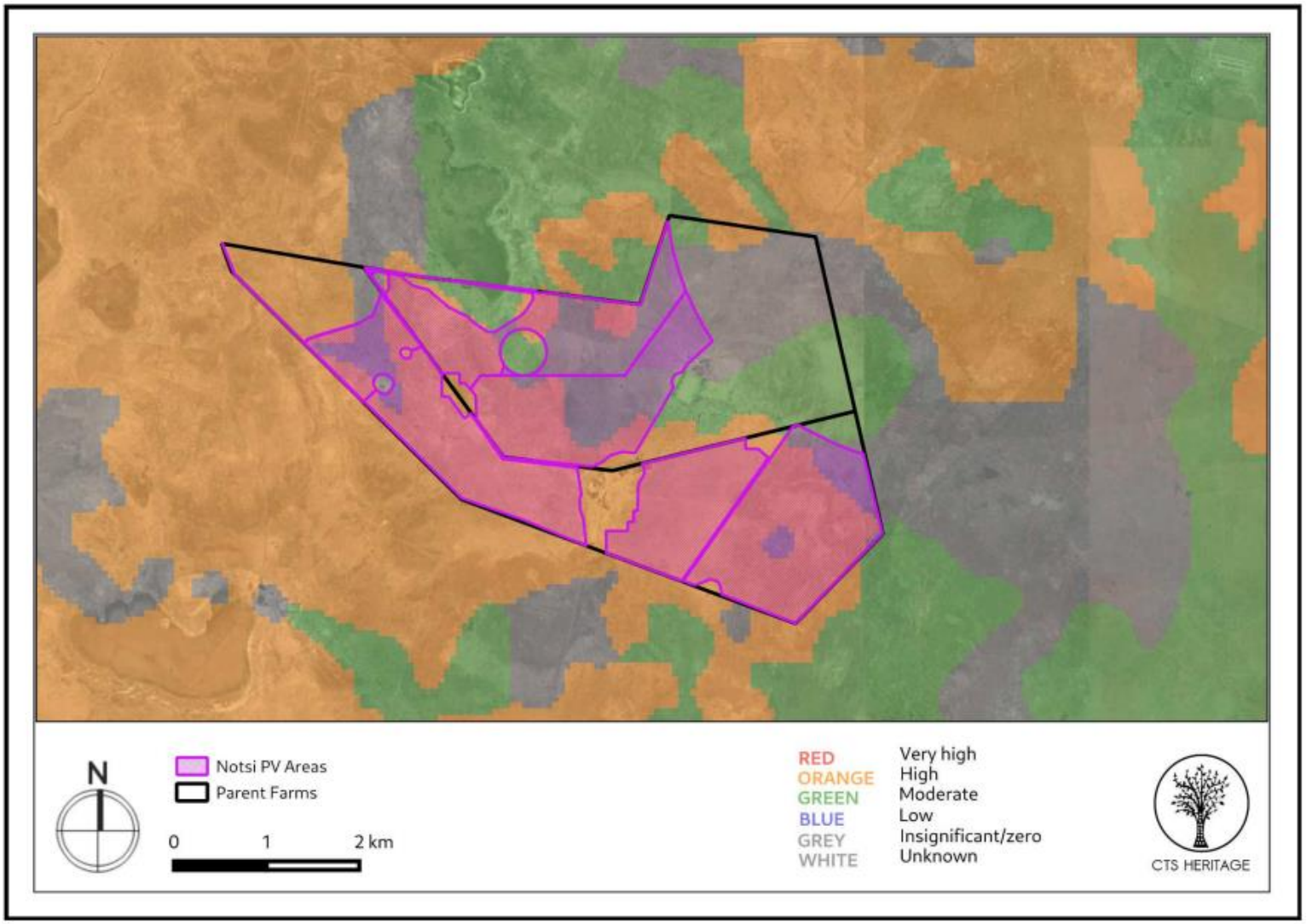


Figure 5-28: Palaeontological sensitivity in relation to the Notsi PV Cluster

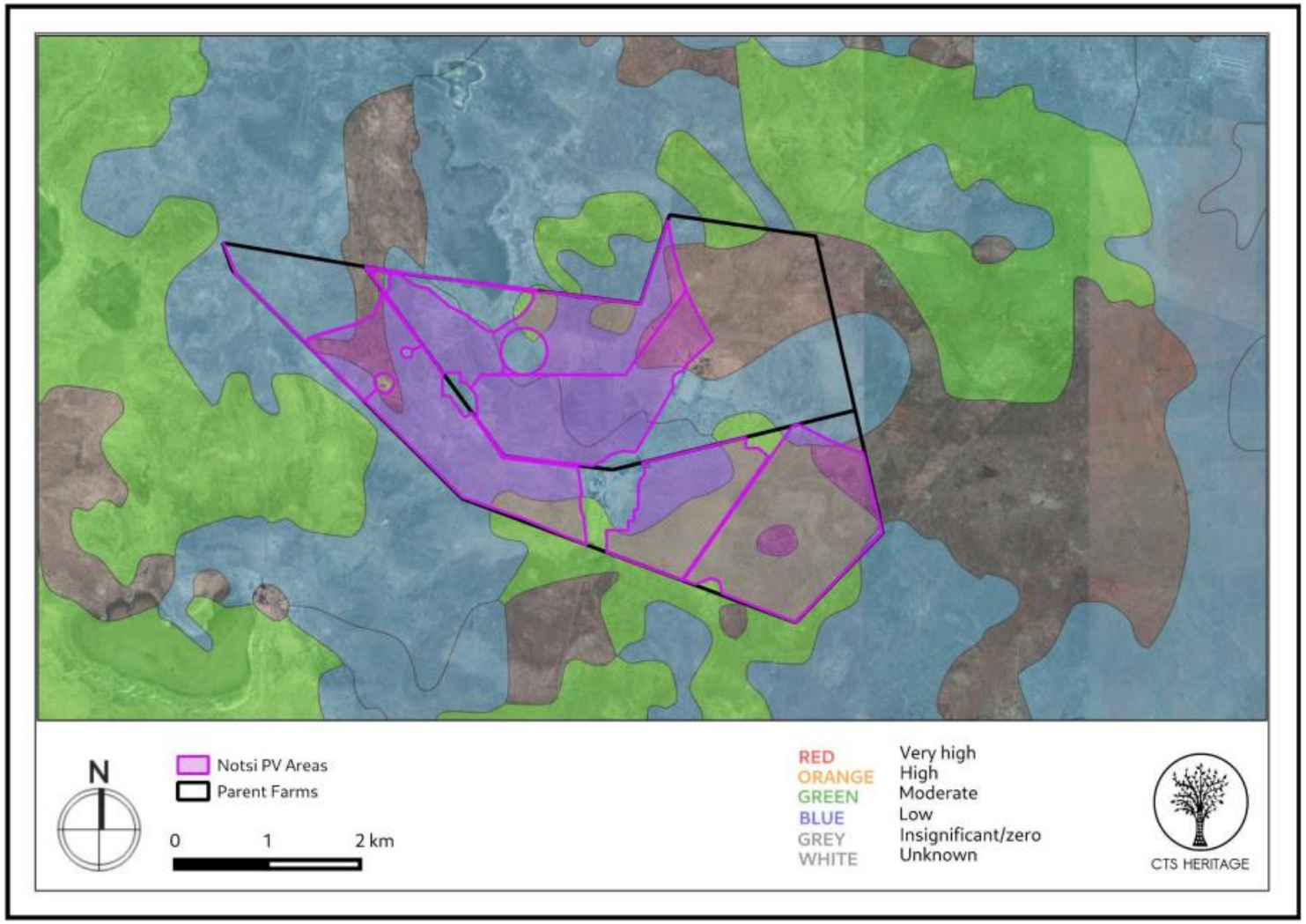


Figure 5-29: Updated Palaeontological sensitivity in relation to the Notsi PV Cluster. This map indicates zero, low and moderate palaeontological sensitivity underlying the area

5.4 SITE SELECTION MATRIX

Due to the nature of the proposed development, the location of the facility is largely dependent on technical and environmental factors such as solar irradiation, climatic conditions, topography of the site, access to the grid and capacity of the grid (although the grid connection infrastructure does not form part of this Application for Environmental Authorisation). Studies of solar irradiation worldwide indicate that the Free State Province has a huge potential for the generation of power from solar.

The receptiveness of the site to PV development includes the presence of optimal conditions for the siting of a solar energy facility due to high irradiation values and optimum grid connection opportunities, which in turn reduces the technical requirements for connecting the facility to enable the evacuation of the generated electricity. The site where the project is proposed to be located is considered favourable and suitable from a technical perspective due to the following characteristics:

- **Climatic conditions:** Climatic conditions determine if the project will be viable from an economic perspective as the solar energy facility is directly dependent on the annual direct solar irradiation values of a particular area. The Free State receives a high average of direct normal and global horizontal irradiation daily. This is an indication that the regional location of the project includes a low number of rainy days and a high number of daylight hours experienced in the region. Global Horizontal Radiation of 2146 kwh/m^2 per year is relevant in the area.

- **Extent of the sites:** A significant portion of land is required to evacuate the prescribed 100MW per facility and space is a constraining factor in PV facility installations. Provision was made to assess a larger area/site than is required for each of the facility to make provision for any other environmental or technical constraints that may arise and avoiding those areas. Larger farms are sought after to make provision for any constraints imposed by the Department of Agriculture on the extent of land that may be used for such facilities per farm, as well as the opportunities presented for the avoidance of sensitive environmental features present.

- **Renewable Energy Development Zone (REDZ):** The site is also located in the Kimberley Renewable Energy Development Zones (REDZ). The solar PV assessment domain was based on the location of the majority of existing solar PV project applications at the commencement of the Strategic Environmental Assessment (SEA) and includes the five provinces of Northern Cape, Western Cape, Eastern Cape, Free State and North West.

- **Site availability and access:** The land is available for lease by the developer and consent has been provided by the affected landowner for the undertaking of the BA process on the affected property. Reluctant farm owners or farmers over capitalizing hamper efforts to find suitable farms. Access will be obtained via the S322 secondary road (off the R64) and various gravel farm roads within the area and affected property.

- **Grid connection**: Connecting the array to the electrical grid requires the transformation of the voltage from 33kV to 132kV. The normal components and dimensions of a distribution-rated electrical substation will be required.

The onsite substation will be required on site to step the voltage up to 33kV/132kV, after which the power will be evacuated into the national grid. Available grid connections are becoming scarce and play a huge role when selecting a viable site.

A separate environmental impact assessment process will be undertaken by the Applicant to obtain Environmental Authorisation for the grid connection solution that will need to be developed to evacuate the generated solar electricity from the Notsi PV Cluster to the national electricity grid.

- **Environmental sensitivities:** From an environmental perspective the proposed site/development footprint is considered desirable due to limited environmental sensitivities in terms of geology, soils, vegetation and landscape features, climate, biodiversity and ecological features and the visual landscape – refer to Section 5.3.1 of this report. Where sensitive environmental areas or features have been identified these have been avoided by the developer through the careful placement of the development footprint to ensure that Notsi PV 5 is acceptable and appropriate from an environmental perspective and in terms of the mitigation hierarchy.

It is evident from the discussion above that the site and development footprint under assessment is considered favourable and suitable in terms of these site characteristics, as limited sensitive environmental features are present within the development footprint, and where features are present these have been avoided by the developer accordingly. As mentioned previously, no alternative areas within the affected property have been considered for the placement of the development footprint as the preferred alternative considers the environmental limitations of the area.

5.5 CONCLUDING STATEMENT ON ALTERNATIVES

When considering the information provided by the specialists with regards to the site selection criteria, the site and development footprint is identified as preferred due to the fact that opportunities are present on the site to develop the project in such a way which will be appropriate from an environmental perspective.

Therefore, development of the 100MW Notsi PV 5 on the Farm Welgeluk No. 1622, Registration Division Boshof, is the preferred option. The preferred layout included in the attached Appendix H. It is therefore concluded that no other alternatives are considered as part of the BA process.

6 DESCRIPTION OF THE IMPACTS AND RISKS

This section aims to address the following requirements of the regulations:

Appendix 1. (3)(i) A BAR (...) must include-

(i) a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred location through the life of the activity, including-

(i) a description of all environmental issues and risks that were identified during the EIA process; and

(ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.

(j) an assessment of each identified potentially significant impact and risk, including-

(i) cumulative impacts;

(ii) the nature, significance and consequences of the impact and risk;

(iii) the extent and duration of the impact and risk;

(iv) the probability of the impact and risk occurring;

(v) the degree to which the impact and risk can be reversed;

(vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and

(vii) the degree to which the impact and risk can be mitigated;

(k) where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report;

6.1 IMPACT ASSESSMENT METHODOLOGY

The contents and methodology of the basic assessment report aimed to provide, as far as possible, a user-friendly analysis of information to allow for easy interpretation.

- Checklist (see section 6.1.1): The checklist consists of a list of structured questions related to the environmental parameters and specific human actions. They assist in ordering thinking, data collection, presentation and alert against the omission of possible impacts.
- Matrix (see section 6.1.2): The matrix analysis provides a holistic indication of the relationship and interaction between the various activities, development phases and the impact thereof on the environment. The method aims at providing a first order cause and effect relationship between the environment and the proposed activity. The matrix is designed to indicate the relationship between the different stressors and receptors which leads to specific impacts. The matrix also indicates the specialist studies that have been conducted to address the potentially most significant impacts.

6.1.1 Checklist analysis

The independent consultant conducted a site visit on 14 September 2022. The site visit was conducted to ensure a proper analysis of the site-specific characteristics of the site and the area proposed for the placement of the development footprint. Table 6.1 provides a checklist, which is designed to stimulate thought regarding possible consequences of specific actions and to assist in the scoping of key issues. It consists of a list of structured questions related to the environmental parameters and specific human actions. They assist in ordering thinking, data collection, presentation and alert against the omission of possible impacts. The table highlights certain issues, which are further analysed in matrix format in section 6.2.

Table 6-1: Environmental checklist

QUESTION	YES	NO	Un-sure	Description
1. Are any of the following located on the site earmarked for the development?				
I. A river, stream, dam or wetland		×		All water features have been avoided by the proposed layout.
II. A conservation or open space area		×		The project site is located in an area classified as 'Other'. These are areas of natural habitat not required to meet biodiversity targets for ecosystem types. A very small portion of the site is classified as degraded.
III. An area that is of cultural importance		×		The HIA (refer to Appendix D4) confirms that no heritage resources were identified within the area proposed for the Notsi PV 5 development.
IV. Site of geological/palaeontological significance		×		None.
V. Areas of outstanding natural beauty		×		None. The area is mainly used for agricultural activities with limited landscape value from a visual perspective.
VI. Highly productive agricultural land		×		The site has low agricultural and cropping potential because of a combination of climate and soil constraints. As a result of the constraints, the site is unsuitable for crop production, and agricultural production is limited to grazing.
VII. Floodplain		×		None.
VIII. Indigenous Forest		×		None.

IX. Grass land	×			The site is located on the Western Free State Clay Grassland (Gh9) which is classified as least threatened.
X. Bird nesting sites		×		Not located in an IBA.
XI. Red data species		×		The site is not located within 5km of Protected Areas.
XII. Tourist resort		×		None.
2. Will the project potentially result in potential?				
I. Removal of people		×		None.
II. Visual Impacts	×			The VIA (refer to Appendix D3) confirmed that the development will have a negative low visual impact on observers. The only receptors likely to be impacted by the proposed development are the nearby property owners and nearby roads. However, a large part of the visual landscape is still reflecting a farming and intensive mining landscape with a much lower visual quality.
III. Noise pollution		×		Construction activities will result in the temporary generation of noise over a period of months up to 18 months.
IV. Construction of an access road	×			Access will be obtained via the existing S322 secondary roads. Internal access roads will be constructed for the facility.
V. Risk to human or valuable ecosystems due to explosion/fire/ discharge of waste into water or air.		×		None. The proposed BESS will be assembled off site and will be transported to site to be installed.
VI. Accumulation of large workforce (>50 manual workers) into the site.	×			Approximately 300 employment opportunities will be created during the construction and ~25 during the operational phases.
VII. Utilisation of significant volumes of local raw materials such as water, wood etc.	×			The estimated maximum amount of water required during construction is ~6000 kilolitres per year (during a construction period of up to 18 months). During operation of the facility ~4000 kilolitres per year for up to a 20-year period will be required.

VIII. Job creation	×			Approximately 300 employment opportunities will be created during the construction and ~25 during the operational phases.
IX. Traffic generation	×			Additional traffic will be generated during both the construction and operation phases, with majority of trips expected during the construction phase related to the transport of machinery and equipment, as well as employees. This will however differ during the different stages of construction.
X. Soil erosion	×			The site will need to be cleared or graded, which may potentially result in a degree of dust being created, increased runoff and potentially soil erosion. The time that these areas are left bare will be limited to the construction phase, since vegetation will be allowed to grow back after construction. No existing areas of erosion was identified.
XI. Installation of additional bulk telecommunication, transmission lines or facilities	×			There is existing Eskom infrastructure in the area and the solar facility will require the development of power lines.
3. Is the proposed project located near the following?				
I. A river, stream, dam or wetland	×			Multiple inland water areas (dams, marsh vlei, non-perennial pans and a single non-perennial river line) are located near the site. All water features have been avoided by the proposed layout.
II. A conservation or open space area	×			The closest NPAES priority focus area is over 6 km away.
III. An area that is of cultural importance		×		None.
IV. A site of geological/palaeontological resources significance		×		None.
V. An area of outstanding natural beauty		×		None.

VI. Highly productive agricultural land	×			Agricultural activities, including crop production, are undertaken within the surrounding areas of the site.
VII. A tourist resort		×		None.
VIII. A formal or informal settlement	×			The town of Dealsville is located approximately 13km to the northeast of the PV 5 site.

6.1.2 Matrix analysis

The matrix describes the relevant listed activities, the aspects of the development that will apply to the specific listed activity, a description of the environmental issues and potential impacts, the significance and magnitude of the potential impacts and possible mitigation measures. The matrix also highlights areas of particular concern (see Table 6.3). An indication is provided of the specialist studies which were conducted and that informed the assessment. The nature of the impact, duration and its significance – should no mitigation measures be applied, is considered. This is important since many impacts would not be considered significant if proper mitigation measures were implemented.

In order to conceptualise the different impacts, the matrix specify the following:

- **Stressor**: Indicates the aspect of the proposed activity, which initiates and cause impacts on elements of the environment.
- **Receptor**: Highlights the recipient and most important components of the environment affected by the stressor.
- **Impacts**: Indicates the net result of the cause-effect between the stressor and receptor.
- **Mitigation**: Impacts need to be mitigated to minimise the effect on the environment.

Detailed impact assessments have been undertaken by each of the respective specialists which has informed the matrix analysis as included in Table 6.3, as well as the key issues identified as included in sections 6.2.1-6.2.3. The Table 6.2 includes reference to the sections in the respective specialist studies where the details of the in-depth assessment of potential environmental impacts can be obtained, which has informed the matrix analysis.

Table 6-2: Reference to the sections in the respective specialist studies where the details of the in-depth assessment of potential environmental impacts can be obtained

Specialist Study	Impact Assessment (pg.)	Cumulative Impacts (pg.)	Mitigation Measures (pg.)
Terrestrial Biodiversity Impact Assessment (Appendix D1)	49-58	59-62	64-70
Avifauna Impact Assessment (Appendix D2)	34-40	40-41	34-41
Visual Impact Assessment	48-57	58-62	64-66

(Appendix D3)			
Soil and Agricultural Impact Assessment (Appendix D4)	20-21	21	20-21
Heritage Impact Assessment (Appendix D5)	34-35	34	34-35
Palaeontological Impact Assessment (Appendix D6)	39	39	39
Social Impact Assessment (Appendix D7)	62-88	88-93	63-93
Wetland Impact Assessment (Appendix D8)	19-23	19-23	19-24

Table 6-3: Matrix analysis

For ease of reference the significance of the impacts is colour-coded as follow:

Low significance	Medium significance	High significance	Positive impact

LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY		POTENTIAL IMPACTS		SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS							MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
			Receptors	Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk	
CONSTRUCTION PHASE															
Activity 11(i) (GNR 327): *"The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."* Activity 14 (GNR 327): *"The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of*	Site clearing and preparation Certain areas of the site will need to be cleared of vegetation and some areas may need to be levelled. Civil works The main civil works are: • Terrain levelling if necessary– Levelling will be minimal as the potential site chosen is relatively flat. • Laying foundation- The structures will be connected to the ground through cement pillars, cement slabs or metal screws. The exact method will depend on	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	• Direct habitat destruction • Habitat fragmentation • Increased soil erosion and sedimentation • Soil and water pollution • Spread and establishment of alien invasive species • Negative effect of human activities on fauna and road mortalities		-	S/L	M/ L	D/ Pr/ Po	PR /CR	ML	Yes	• See Table 6.4	L	Terrestrial Biodiversity Impact Assessment (Appendix D1)
			Wetland/ Riparian areas	• Increase soil erosion and sedimentation. • Disturbance of watercourse habitat and fringe vegetation • Soil and water pollution • Spread and establishment of alien invasive species	-		S/L	L	D	BR	SL	Yes	• See Table 6.4	L	Wetland Impact Assessment (Appendix D8)
			Avifauna	• Loss of priority avian species from important habitats • Loss of resident avifauna through increased disturbance • Long-term or permanent degradation and modification of the receiving environment resulting to in the loss of important avian habitats		-	S	M/ L	Pr	PR/ BR	ML/ SL	Yes	• See Table 6.4	L	Avifaunal Impact Assessment (Appendix D2)

LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY	POTENTIAL IMPACTS		SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS							MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
		Receptors	Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk	
80 cubic metres or more but not exceeding 500 cubic metres." Activity 24 (ii) (GN.R 327): *"The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters"* Activity 28 (ii) (GN.R 327): *"Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare."* Activity 56 (ii) (GN.R 327): *"The widening of a road by more than 6 metres, or the*	the detailed geotechnical analysis. • Construction of access and inside roads/paths – existing paths will be used were reasonably possible. Additionally, the turning circle for trucks will also be taken into consideration. Transportation and installation of PV panels into an Array The panels are assembled at the supplier's premises and will be transported from the factory to the site on trucks. The panels will be mounted on metal structures which are fixed into the ground either through a concrete foundation or a deep-seated screw. The BESS and grid connection corridor infrastructure will also be installed and constructed. Wiring to the Central Inverters Sections of the PV array would be wired to central		Air	• Air pollution due to the increase of traffic of construction vehicles and the undertaking of construction activities. • Ecosystem damage due to pollutants and dust	-		S	S	D	CR	NL	Yes	• A speed limit should be enforced on dirt roads (preferably 30-40km/h). • Implement standard dust control measures, including periodic spraying (frequency will depend on many factors including weather conditions, soil composition and traffic intensity and must thus be adapted on an on-going basis) of construction areas and access roads, and ensure that these are continuously monitored to ensure effective implementation.	L	Terrestrial Biodiversity Impact Assessment (Appendix D1)
			Soil and Agriculture	• Loss of land capability during the construction phase – PV Facility • Loss of land capability during the construction phase – Grid Connection	-		S/ L	S/ M	Pr	CR	NL	Yes	• See Table 6.4	L	Soil and Agricultural Impact Assessment (Appendix D4)
			Existing services infrastructure	• Generation of waste that needs to be accommodated at a licensed landfill site. • Generation of sewage that need to be accommodated by the local sewage plant. • Increase in construction vehicles on existing roads.	-		L	S	D	PR	ML	Yes	-	L	Confirmation from the Local Municipality required to confirm capacity for services
			Groundwater	• Pollution due to construction vehicles and the storage and handling of dangerous goods.	-		S	S	Pr	CR	ML	Yes	• Monitoring boreholes should be securely capped (where used), and must be fitted with a suitable sanitary seal to prevent surface	L	-

LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY	POTENTIAL IMPACTS		SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS							MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
		Receptors	Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk	
lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres…" Activity 1 (GN.R 325): *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more."* Activity 15 (GN.R 325): *"The clearance of an area of 20 hectares or more of indigenous vegetation."*	inverters. The inverter converts DC electricity to alternating electricity (AC) at grid frequency.											water flowing down the outside of the casing. Full construction details of monitoring boreholes must be recorded when they are drilled (e.g., screen and casing lengths, diameters, total depth, etc). • Sampling of monitoring boreholes should be done according to recognised standards. • Where pollution occurs, this must be reported and cleaned-up in an appropriate manner as soon as possible.		
		General Environment (risks associated with BESS)	• Mechanical breakdown / Exposure to high temperatures • Fires, electrocutions and spillage of toxic substances into the surrounding environment. • Spillage of hazardous substances into the surrounding environment. • Soil contamination – leachate from spillages which could lead to an impact of the productivity of soil forms in affected areas. • Water Pollution – spillages into surrounding watercourses as well as groundwater. • Health impacts – on the surrounding communities, particularly those relying on watercourses (i.e., rivers, streams, etc.) as a primary source of water. • Generation of hazardous waste		-	S	M	Pr	PR	ML	Yes	• Operators are trained and competent to operate the BESS. Training should include the discussion of the following: - Potential impact of electrolyte spills on groundwater; - Suitable disposal of waste and effluent; - Key measures in the EMPr relevant to worker's activities; - How incidents and suggestions for improvement can be reported. • Training records should be kept on file and be made available during audits. • Battery supplier user manuals safety specifications and Material Safety Data Sheets (MSDS) are filed on site at all times.	L	-

LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY	POTENTIAL IMPACTS		SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS							MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
		Receptors	Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk	
												• Compile method statements for approval by the Technical/SHEQ Manager for the operation and management and replacement of the battery units / electrolyte for the duration of the project life cycle. Method statements should be kept on site at all times. • Provide signage on site specifying the types of batteries in use and the risk of exposure to hazardous material and electric shock. Signage should also specify how electrical and chemical fires should be dealt with by first responders, and the potential risks to first responders (e.g., the inhalation of toxic fumes, etc.). • Firefighting equipment should readily be available at the BESS area and within the site. • Maintain strict access control to the BESS area. • Ensure all maintenance contractors / staff are familiar with the supplier's specifications. • Undertake a risk assessment prior to the commencement of general checks and maintenance tasks at the BESS. This should consider any aspects which could result in fire or spillage, and appropriate actions should be taken to prevent these.		

LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY	POTENTIAL IMPACTS		SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS							MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
		Receptors	Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk	
												• Standard Operating Procedures (SOPs) should be made available by the Supplier to ensure that the batteries are handled in accordance with required best practices. • Spill kits must be made available to address any incidents associated with the flow of chemicals from the batteries into the surrounding environment. • The assembly of the batteries on-site should be avoided as far as possible. Activities on-site for the BESS should only be limited to the placement of the container wherein the batteries are placed. • Undertake periodic inspections on the BESS to ensure issues are identified timeously and addressed with the supplier where relevant. • The applicant in consultation with the supplier must compile and implement a Leak and Detection Monitoring Programme during the project life cycle of the BESS. • Batteries must be strictly maintained by the supplier or suitably qualified persons for the duration of the project life cycle. No unauthorised personnel should be allowed to maintain the BESS. • Damaged and used batteries must be removed from site by the		

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		Receptors	Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk	
												supplier or any other suitably qualified professional for recycling or appropriate disposal. • The applicant should obtain a cradle to grave battery management plan from the supplier during the planning and design phase of the system. The plan must be kept on site and adhered to.		
		SOCIAL/ECONOMIC ENVIRONMENT	Positive social Impacts	• Creation of direct and indirect employment and skills development opportunities. • Economic multiplier effects • Improvements to shared infrastructure	+		L/R	S	D/ Pr	CR	NL	Yes	• See Table 6.4	M	Social Impact Assessment (Appendix D7)
			Visual landscape	• Construction impacts of the PV facility. • Construction impacts of power line		-	L	S	D/ Pr	PR	ML	Yes	• See Table 6.4	L	Visual Impact Assessment (Appendix D3)
			Traffic volumes	• Traffic Congestion • Increase in traffic volumes • Impact on road safety	-		N	S	D	CR	NL	Yes	• 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. • Regular maintenance of gravel roads by the Contractor during the construction phase and by	M	-

LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY	POTENTIAL IMPACTS		SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS							MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
		Receptors	Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk	
												Client/Facility Manager during operation phase • All construction vehicles must be roadworthy and drivers must have the relevant licenses for the type of vehicles they are operating. • All vehicle drivers need to strictly adhere to the rules of the road.		
		Negative social impacts	• Potential loss of productive farmland • In-migration of people (non-local workforce and jobseekers) • Impacts on safety and security. • Impacts on daily movement patterns. • Nuisance impacts (noise and dust). • Increased risk of veld fires. • Visual and sense of place impacts		-	S/ L	S/ P	Pr / D	BR / Cr / IR	ML / SL	Yes	• See Table 6.4	L	Social Impact Assessment (Appendix D7)
		Noise levels	• The generation of noise as a result of construction vehicles, the use of machinery such as drills and people working on the site.	-		L	S	D	CR	NL	Yes	• See Table 6.4	L	Social Impact Assessment (Appendix D7)
		Tourism industry	• N/A	-		L	S	D	CR	ML	Yes	• See Table 6.4	L	-
		Heritage resources	• As no sites, features or objects of cultural historic significance have been identified in the site, there would be no impact as a result of the proposed development.	-		S	S	U	CR	NL	Yes	• See Table 6.4	L	Heritage Impact Assessment (Appendix D5)

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			Receptors	Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk	
			Paleontological Heritage	• Loss of fossil heritage • Destroy or permanently seal-in fossils at or below the surface that are then no longer available for scientific study	-		S	P	U	BR	SL	Yes	• See Table 6.4	L	Paleontological Impact Assessment (Appendix D6)
OPERATIONAL PHASE															
Activity 11(i) (GNR 327): *"The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."* Activity 14 (GNR 327): *"The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of*	The key components of the proposed project are described below: PV Panel Array - To produce up to 100MW the facility will require numerous linked cells placed behind a protective glass sheet to form a panel. Multiple panels will be required to form the solar PV arrays which will comprise the PV facility. Battery Energy Storage System (BESS) –The battery energy storage system will make use of solid state or flow battery technology and will have a capacity of up to 400MWh. Both lithium-ion and Redox-flow technology are being considered for the	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	• Direct habitat destruction • Habitat fragmentation • Increased soil erosion and sedimentation • Soil and water pollution • Air pollution • Spread and establishment of alien invasive species • Negative effect of human activities on fauna and road mortalities		-	S/L	M/ L	D/ Pr/ Po	PR /CR	ML	Yes	• See Table 6.5	L	Terrestrial Biodiversity Impact Assessment (Appendix D1)
			Avifauna	• Long-term or permanent degradation and modification of the receiving environment resulting to in the loss of important avian habitats. • Loss of resident avifauna through increased disturbance. • Collisions with PV panels and electrocution risks leading to injury or loss of avian life which decreases avifauna species diversity. • Collisions with overhead power lines and electrocution risks leading to injury or loss of avian life which decreases avian diversity		-	S	L / M	Pr	BR/ PR	ML / SL	Yes	• See Table 6.5	L	Avifaunal Impact Assessment (Appendix D2)

LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY	POTENTIAL IMPACTS			SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS							MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
		Receptors	Impact description / consequence		Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk	
80 cubic metres or more but not exceeding 500 cubic metres." Activity 28 (ii) (GN.R 327): *"Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare."* Activity 1 (GN.R 325): *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more."*	project, depending on which is most feasible at the time of implementation. The extent of the system will be 3ha. The containers may be single stacked only to reduce the footprint. The containers will include cells, battery charge controllers, inverters, transformers, HVAC, fire, safety and control systems. Inverters - Sections of the PV array will be wired to inverters. The inverter is a pulse-width mode inverter that converts direct current (DC) electricity to alternating current (AC) electricity at grid frequency. Supporting Infrastructure – The following auxiliary buildings with basic services including water and electricity will be required on the site: • Operations & Maintenance Building / Office (~500m²); • Switch gear and relay room (~400m²);		Air quality	• The proposed development will not result in any air pollution during the operational phase.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Soil and Agriculture	• Loss of land capability during the construction phase – PV Facility • Loss of land capability during the construction phase – Grid Connection	-		S	S	Pr	CR	NL	Yes	• See Table 6.5	L	Soil and Agricultural Impact Assessment (Appendix D4)
			Groundwater	• Leakage of hazardous materials. The development will comprise of a distribution substation and switching station and collector substation and will include transformer bays which will contain transformer oils. Leakage of these oils can contaminate water supplies.	-		L	L	Po	PR	ML	Yes	• All areas in which substances potentially hazardous to groundwater are stored, loaded, worked with or disposed of should be securely bunded (impermeable floor and sides) to prevent accidental discharge to groundwater.	L	-
			Wetland/ Riparian areas	• Increase contamination entering wetland systems. • Increase stormwater runoff, erosion and sedimentation	-		S/L	L	D	BR	SL	Yes	• See Table 6.5	L	Wetland Impact Assessment (Appendix D8)
		SOCIAL/ECONOMIC	Visual landscape	• Potential visual impacts on sensitive visual receptors located within a 1km radius from the solar facility. • Potential visual impacts on sensitive visual receptors located within a 1km radius • Potential visual impacts on sensitive visual receptors located within a 1km radius.		-	L	L	Pr / Po	PR / CR	ML /NL / SL	Yes	• See Table 6.5	L	Visual Impact Assessment (Appendix D3)

LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY	POTENTIAL IMPACTS			SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS							MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
		Receptors		Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk	
	• Staff lockers and changing room (~200m²); • Security control (~60m²); • Temporary Laydown Areas;(~20000 m2) and construction site camp/site office; Roads – Access will be obtained via the S322 secondary road and various gravel farm roads within the area and affected property. An internal site road network will also be required to provide access to the solar field and associated infrastructure. Access roads will be up to 8m wide (6m wide road surface, with 1m drainage either side). Fencing - For health, safety and security reasons, the facilities will require perimeter fencing and internal security fencing.			• Potential visual impacts on sensitive visual receptors between a 1km and 3km radius from the solar facility. • Potential visual impacts on sensitive visual receptors between a 1km and 3km radius • Potential visual impacts on sensitive visual receptors between a 1km and 3km radius • Potential visual impacts on sensitive visual receptors between a 3km and 5km radius from the solar facility. • Potential visual impacts on sensitive visual receptors between a 3km and 5km radius • Potential visual impacts on sensitive visual receptors between a 3km and 5km radius • Potential visual impacts on sensitive visual receptors located between a 5km and 10km radius from the solar facility. • Potential visual impacts on sensitive visual receptors located between a 5km and 10km radius. • Potential visual impacts on sensitive visual receptors located between a 5km and 10km radius. • Lighting Impacts of the solar facility. • Solar glint and glare impacts of the solar facility.										

LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY	POTENTIAL IMPACTS		SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS							MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
		Receptors	Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk	
	The fencing will be up to 2.4 m in height		• Visual and sense of place impacts of the solar facility. • Visual and sense of place impacts											
		Traffic volumes	• The proposed development will not result in any major traffic impacts during the operational phase.	-		S	L	Po	PR	NL	Yes	• All operations and maintenance vehicles must be roadworthy and drivers must have the relevant licenses for the type of vehicles they are operating. • All vehicle drivers need to strictly adhere to the rules of the road.	L	-
		Heritage resources	• As no sites, features or objects of cultural historic significance have been identified in the site, there would be no impact as a result of the proposed development.	-		S	S	U	CR	NL	Yes	• See Table 6.4	L	Heritage Impact Assessment (Appendix D5)
		Paleontological Heritage	• Loss of fossil heritage • Destroy or permanently seal-in fossils at or below the surface that are then no longer available for scientific study	-		S	P	U	BR	SL	Yes	• See Table 6.4	L	Paleontological Impact Assessment (Appendix D6)
		Health & Safety	• The proposed development will not result in any health and safety impacts during the operational phase.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-	N/A	N/A
		Positive social impacts	• Direct and indirect employment and skills development opportunities • Development of non-polluting, renewable energy infrastructure • Contribution to LED and social upliftment	+		L-R/N	L	Pr/D	BR/PR/CR	NL / ML	Yes	• See Table 6.5	H-L	Social Impact Assessment (Appendix D7)

LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY	POTENTIAL IMPACTS			SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS							MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
			Receptors	Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk	
				• Potential impacts on tourism • Increased household earnings											
			Negative social impacts	• Potential impacts on tourism • Impacts associated with the loss of agricultural land. • Visual and sense of place impacts		-	S/ L	L	Pr	PR/ R	NI/ SL	Yes	• See Table 6.5	L	Social Impact Assessment (Appendix D7)
			Noise levels	• The proposed development will not result in any noise pollution during the operational phase.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Electricity supply	• Generation of additional electricity. • The power line will transport generated electricity into the grid.	+		I	L	D	I	N/A	Yes	-	N/A	-
			Electrical infrastructure	• Additional electrical infrastructure. The proposed solar facility will add to the existing electrical infrastructure and aid to lessen the reliance of electricity generation from coal-fired power stations.	+		I	L	D	I	N/A	Yes	-	N/A	-
DECOMMISSIONING PHASE															
-	<u>Dismantlement of infrastructure</u> During the decommissioning phase the Solar PV Energy facility and	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	• Direct habitat destruction • Habitat fragmentation • Increased soil erosion and sedimentation • Soil and water pollution • Air pollution		-	S/L	M/ L	D/ Pr/ Po	PR /CR	ML	Yes	• See Table 6.6	L	Terrestrial Biodiversity Impact Assessment (Appendix D1)

LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY	POTENTIAL IMPACTS		SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS							MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
		Receptors	Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk	
	its associated infrastructure will be dismantled. Rehabilitation of biophysical environment The biophysical environment will be rehabilitated.		• Spread and establishment of alien invasive species • Negative effect of human activities on fauna and road mortalities											
		Avifaunal	• Long-term or permanent degradation and modification of the receiving environment resulting to in the loss of important avian habitats. • Displacement of resident avifauna through increased disturbance.		-	S	L / M	Pr	BR/ PR	ML / SL	Yes	• See Table 6.6	L	Avifaunal Impact Assessment (Appendix D2)
		Air quality	• Air pollution due to the increase of traffic of construction vehicles	-		S	S	D	CR	NL	Yes	• Regular maintenance of equipment to ensure reduced exhaust emissions.	L	-
		Existing services infrastructure	• Generation of waste that needs to be accommodated at a licensed landfill site • Generation of sewage that needs to be accommodated by the municipal sewerage system and the local sewage plant • Increase in construction vehicles	-		L	S	D	I	NL	Yes	-	L	Confirmation from the Local Municipality is required to confirm services availability
		Groundwater	• Pollution due to construction vehicles	-		S	S	Pr	CR	ML	Yes	• All vehicles should be inspected for oil and fuel leaks on a regular basis. • Vehicle maintenance yards on site should make provision for drip trays that will be used to capture any spills. Drip trays should be emptied into a holding tank and returned to the supplier.	L	-
		Visual landscape	• Visual impact of activities on sensitive visual receptors in close proximity to the proposed Notsi PV 5.		-	L	S	D	PR	ML	Yes	• See Table 6.4	L	Visual Impact Assessment

LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY	POTENTIAL IMPACTS		SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS							MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
		Receptors	Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk	
			• The decommissioning phase of the project will result in the same visual impacts experienced during the construction phase of the project. However, in the case of Notsi PV 5 it is anticipated that the proposed facility will be refurbished and upgraded to prolong its life. No decommissioning of the facility is proposed.											(Appendix D3)
		Traffic volumes	• Road network will be affected • Increase in traffic influencing traffic congestion and road safety	-		L	S	D	CR	NL	Yes	• All decommissioning vehicles must be roadworthy and drivers must have the relevant licenses for the type of vehicles they are operating. • All vehicle drivers need to strictly adhere to the rules of the road.	L	-
		Health & Safety	• Air/dust pollution. • Road safety. • Increased crime levels. The presence of construction workers on the site may increase security risks associated with an increase in crime levels as a result of influx of people in the rural area.	-		L	S	Pr	PR	ML	Yes	• Demarcated routes to be established for construction vehicles to ensure the safety of communities, especially in terms of road safety and communities to be informed of these demarcated routes. • Where dust is generated by trucks passing on gravel roads, dust mitigation must be enforced. • Any infrastructure that would not be decommissioned must be appropriately locked and/or fenced off to ensure that it does not pose any danger to the community.	L	-

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		Receptors	Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk	
												• Components that are dismantled must be recycled / reduced as far as possible.		
		Noise levels	• The generation of noise as a result of construction vehicles, the use of machinery and people working on the site	-		L	S	D	CR	NL	Yes	• The decommissioning phase must aim to adhere to the relevant noise regulations and limit noise within standard working hours in order to reduce disturbance of dwellings in close proximity to the development.	L	-
		Tourism industry	• N/A	-		L	S	D	CR	ML	Yes	• See Table 6.4	L	-

Nature of the impact:	(N/A) No impact	(+) Positive Impact	(-) Negative Impact	
Geographical extent:	(S) Site;	(L) Local/District;	(P) Province/Region;	(I) International and National
Probability:	(U) Unlikely;	(Po) Possible;	(Pr) Probable;	(D) Definite
Duration:	(S) Short Term;	(M) Medium Term;	(L) Long Term;	(P) Permanent
Intensity / Magnitude:	(L) Low;	(M) Medium;	(H) High;	(VH) Very High
Reversibility:	(CR) Completely Reversible;	(PR) Partly Reversible;	(BR) Barely Reversible;	-
Irreplaceable loss of resources:	(IR) Irreversible	(NL) No Loss;	(ML) Marginal Loss;	(SL) Significant Loss;	(CL) Complete Loss
Level of residual risk:	(L) Low;	(M) Medium;	(H) High;	(VH) Very High	-

The recommended mitigation measures are included in the Environmental Management Programme for the project. The EMPr for the Solar Power Plant is included in Appendix F1. The EMPr for the power line is included in Appendix F2 and the EMPr for the substation is included in Appendix F3. An Alien Invasive Plant Species Management and Rehabilitation Plan is included as Appendix F4.

An Environmental Awareness and Fire Management Plan is included in Appendix C of the EMPr in Appendix F1.

6.2 KEY ISSUES IDENTIFIED

From the above it is evident that mitigation measures should be available for potential impacts associated with the proposed activity and development phases. The impact assessment methodology identified the following key issues which were addressed in more detail in the BA report.

6.2.1 Impacts during the construction phase

During the construction phase the following activities will have various potential impacts on the biophysical and socio-economic environment:

- Activity 11(i) (GN.R 327): *"The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."*
- Activity 14 (GN.R 327): *"The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres."*
- Activity 24 (ii) (GN.R 327): *"The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters".*
- Activity 28 (ii) (GN.R 327): *"Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare."*
- Activity 56 (ii) (GN.R 327): *"The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres…"*
- Activity 1 (GN.R 325): *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more."*
- Activity 15 (GN.R 325): *"The clearance of an area of 20 hectares or more of indigenous vegetation."*

During the construction phase minor negative impacts are foreseen over the short term. The latter refers to a period of months. Table 6.4 summarises the potentially most significant impacts and the mitigation measures that are proposed during the construction phase.

Table 6-4: Impacts and the mitigation measures during the construction phase

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Terrestrial Biodiversity Impact Assessment (Appendix D1)	Destruction, loss and fragmentation of habitats (including wetlands), ecosystems and the vegetation community.	Negative High	Negative Low	• Any 'High' sensitivity areas should be avoided, and these areas should be clearly demarcated by non-hazardous/dangerous fencing. Brush cutting should be implemented beneath the panels, no vegetation clearing should be permitted. • Laydown and construction preparation activities (such as cement mixing, temporary toilets, etc.) must be limited to the 'Very Low' and 'Low' sensitivity areas. • Any observed SCC flora or protected plants must be clearly demarcated prior to the commencement of site clearing. If construction activities are likely to affect any SCC or protected plants these individuals must be relocated as part of a plant rescue and protection plan, and a permit may need to be obtained before doing so. • Existing access routes, especially roads, must be made use of. • Any materials may not be stored for extended periods of time and must be removed from the PAOI once the construction phase has been concluded. No permanent construction phase structures should be permitted. Construction buildings should preferably be prefabricated or constructed of re-usable/recyclable materials. No storage of vehicles or equipment will be allowed outside of the designated laydown areas. • All construction waste must be removed from site at the closure of the construction phase.

	Introduction of IAP species and invasive fauna.	Negative Medium	Negative Low	• The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. Footprints of the roads must be kept to prescribed widths.
	Displacement of the indigenous faunal community (including SCC) due to habitat loss, direct mortalities, and disturbance (road collisions, noise, dust, light, vibration, and poaching).	Negative High	Negative Low	• A qualified environmental control officer must be on site when activities begin. A site walk through is recommended by a suitably qualified ecologist prior to any activities taking place and any SSC or protected species should be noted. In situations where these species are observed and must be removed, the proponent may only do so after the required permission/permits have been obtained in accordance with national and provincial legislation. In the abovementioned situation the development and implementation of a search, rescue and recovery program is suggested for the protection of these species. Should animals not move out of the area on their own relevant specialists must be contacted to advise on how the species can be relocated. • Clearing and disturbance activities must be conducted in a progressive linear manner, always outwards and away from the centre of the PAOI and over several days, so as to provide an easy escape route for all small mammals and herpetofauna. • The areas to be disturbed must be specifically and responsibly demarcated to prevent the movement of staff or any individual into the surrounding environments, signs must be put up to enforce this. • The duration of the activities should be minimized to as short a term as possible, to reduce the period of disturbance on fauna.

				• Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to reptile species and nocturnal mammals. • Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from any sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible. • Any holes/deep excavations must be dug in a progressive manner and shouldn't be left open overnight. Should any holes remain open overnight they must be properly covered temporarily to ensure that no small fauna species fall in. Holes must be subsequently inspected for fauna prior to backfilling. • Fencing mitigations: o Top 2 strands must be smooth wire o Routinely re-tension loose wires o Minimum 30cm between wires • Place markers on fences. • Wildlife-permeable fencing with holes large enough for mongoose and other smaller mammals should be installed, the holes must not be placed in the fence where it is next to a major road as this will increase road killings in the area. • Use environmentally friendly cleaning and dust suppressant products. • Once the development layout has been confirmed, the footprint area must be fenced off appropriately in segments pre-construction to allow animals to move or be moved out of these areas before breaking ground activities occur. Construction activities must take place systemically and the

				perimeter fence should not be completed (i.e., leaving sections unfenced to allow fauna to escape) until systematic clearing is completed. Drilling etc. should start one side of the site and progress towards the section of the site where fences are incomplete (away from the center of the PAOI).
Wetland Impact Assessment (Appendix D8) (Ratings are as per the GNR 509 Risk Assessment Matrix)	Direct disturbance / degradation to wetland soils or vegetation due to the construction of the solar facility.	Negative Low	Negative Low	• Clearly demarcate the construction footprint and restrict all construction activities to within the proposed infrastructure area. • When clearing vegetation, allow for some vegetation cover as opposed to bare areas. • Minimize the disturbance footprint and the unnecessary clearing of vegetation outside of this area. • Use the wetland shapefiles to signpost the edge of the wetlands closest to site. Place the sign 15 m from the edge (this is the buffer zone). Label these areas as environmentally sensitive areas, keep out. • Educate staff and relevant contractors on the location and importance of the identified wetlands through toolbox talks and by including them in site inductions as well as the overall master plan. • All activities (including driving) must adhere to the 15 m buffer area. • Promptly remove / control all alien and invasive plant species that may emerge during construction (i.e. weedy annuals and other alien forbs) must be removed. • Landscape and re-vegetate all denuded areas as soon as possible.
	Increased erosion and sedimentation.	Negative Low	Negative Low	• Ensure soil stockpiles and concrete / building sand are sufficiently safeguarded against rain wash. • No activities are permitted within the wetland and associated buffer areas. • Landscape and re-vegetate all unnecessarily denuded areas as soon as possible.

	Potential contamination of wetlands with machine oils and construction materials.	Negative Low	Negative Low	• Make sure all excess consumables and building materials / rubble is removed from site and deposited at an appropriate waste facility. • Appropriately stockpile topsoil cleared from the project area. • Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) or construction materials on site (e.g., concrete) in such a way as to prevent them leaking and entering the wetlands. • No activities are permitted within the wetland and associated buffer areas.
Avifaunal Impact Assessment (Appendix D2)	Loss of resident avifauna through increased disturbance	Negative High	Negative Low	• Disturbance can be managed and mitigated at the design stage by avoiding important nesting, roosting and foraging areas of sensitive species during site selection and layout design. • All identified No Go Areas must excluded from the development footprint, and areas of high sensitivity should be avoided. • The development footprint should exclude a 1 km No-Go buffer (Very High Sensitivity) surrounding any active or inactive/previous Secretarybird breeding site, as per Birdlife SA's Guideline, which is achieved for the Notsi PV 5 for the known current Secretarybird breeding site north of the proposed Notsi PV 5. • Secretarybird typically change breeding sites every 1-5 years, and an area of up to 3 km surrounding the proposed development footprint should be monitored regularly post-authorisation in order to avoid conflicts at the start of construction. • It is noted that there are currently no known Secretarybird breeding sites within 3 km of the proposed Notsi PV 5 development footprint. Should a nest be located within 3 km of the authorised facility infrastructure post-authorisation development activities within 1 to 3 km of any active

				Secretarybird breeding site must be minimised to mitigate disturbance (Birdlife SA 2022) and the applied minimisation measures and any construction activities to take place must be signed-off in advance by a SACNASP registered avifaunal specialist in discussion with the Developer. • Minimisation measures could entail amending the construction schedule to commence construction as late as possible within the inside of the buffer area, and only commence with activities that create the least amount of disturbance to a breeding pair and immature bird until it has left the nest. It should be noted that the detail of what can be expected to be acceptable will depend largely on the breeding status at the time, but due to the nature of juvenile dispersal is likely to exclude the clearing of indigenous vegetation within a 1 – 2 km Secretarybird nest buffer area, which the juvenile bird relies on to forage for food before dispersal. • Once the young bird has fledged, and this has been confirmed by an avifaunal specialist, development activities within a 1 – 3 km area may proceed normally. • Breeding sites must be monitored regularly to determine breeding activity throughout the year, as Secretarybird can breed any time of the year, influenced by rainfall, until it is confirmed to be abandoned. • A walkthrough of the authorised final development layout and the 3 km surrounding area must be conducted by an avifaunal specialist or observer trained by an avifaunal specialist within 30 days prior to the commencement of construction to confirm SCC breeding activities. • Should any SCC be found breeding within 3 km of the operational facility, or facility to be decommissioned, a 1 km area surrounding the nest must be

				cordoned off as a no-go area as far as practically possible, and an avifaunal specialist must immediately be consulted for further instruction. • All disturbance can be further minimised by demarcating the disturbance footprint, and minimising this to the development footprint as much as practically possible.
	Habitat loss and displacement	Negative High	Negative Medium	• Mitigation of habitat loss from construction of the facility is primarily achieved during the design phase by avoiding sensitive and essential habitat, and nest buffers, and minimising the development footprint as far as practically possible. • The project layout excludes development within the 250 m Greater Kestrel No Go buffer and the 1 km Secretarybird No Go buffer, as well as the delineated NFEPA wetlands and their buffers, and is supported. • The development footprint should exclude a 1 km No-Go buffer surrounding any active or inactive Secretarybird breeding site, as per Birdlife SA's Guideline (Birdlife 2022), which is achieved for the Notsi PV 5 for the known current Secretarybird breeding site to the north. Secretarybird typically change breeding sites every 1-5 years, and an area of up to 3 km surrounding the proposed development footprint should be monitored regularly post-authorisation in order to avoid conflicts at the start of construction. • A walkthrough of the authorised final development layout and the 3 km surrounding area must be conducted by an avifaunal specialist or observer trained by an avifaunal specialist within 30 days prior to the commencement of construction and decommissioning to confirm SCC breeding activities.

				• Mitigation following authorisation is only marginally possible by retaining as much of the indigenous vegetation as possible beneath the PV panels, and minimising the construction footprint of all associated infrastructure, including buildings, electrical infrastructure and the width and length of roads.
Soils and Agricultural Impact Assessment (Appendix D4)	Loss of land capability	Negative Low	Negative Low	• A system of stormwater management, which will prevent erosion, will be an inherent part of the engineering on site. • Any occurrences of erosion must be attended to immediately and the integrity of the erosion control system at that point must be amended to prevent further erosion from occurring there. • Any excavations done during the construction phase, in areas that will be re-vegetated at the end of the construction phase, must separate the upper 30 cm of topsoil from the rest of the excavation spoils and store it in a separate stockpile. • When the excavation is back-filled, the topsoil must be back-filled last, so that it is at the surface. • Topsoil should only be stripped in areas that are excavated. Across the majority of the site, including construction laydown areas, it will be much more effective for rehabilitation, to retain the topsoil in place. • If levelling requires significant cutting, topsoil should be temporarily stockpiled and then re-spread after cutting, so that there is a covering of topsoil over the entire cut surface. It will be advantageous to have topsoil and vegetation cover below the panels during the operational phase to control dust and erosion.
Heritage Impact Assessment	Loss or damage to sites, features or	Negative High	Negative Low	• A no development buffer area of 20m must be implemented around sites DV4.

(Appendix D5)	objects of cultural heritage significance			• A Heritage Agreement and Conservation Management Plan be developed for the ongoing management of these resources. • Should any buried archaeological resources or human remains or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage • Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.
Palaeontological Impact Assessment (Appendix D6)	Destroy or permanently seal-in fossils at or below the surface that are then no longer available for scientific study	Negative Medium	Negative Low	• If Palaeontological Heritage is uncovered during surface clearing and excavations the **Chance find Protocol** attached should be implemented immediately. Fossil discoveries ought to be protected and the ECO/site manager must report to South African Heritage Resources Agency (SAHRA) (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation (recording and collection) can be carried out. • Preceding any collection of fossil material, the specialist would need to apply for a collection permit from SAHRA. Fossil material must be curated in an accredited collection (museum or university collection), while all fieldwork and reports should meet the minimum standards for palaeontological impact studies suggested by SAHRA.
Visual Impact Assessment (Appendix D3)	Visual impact of construction activities of the solar facility	Negative Low	Negative Low	Planning • Retain and maintain natural vegetation immediately adjacent to the development footprint. Construction

				• Ensure that vegetation is not unnecessarily removed during the construction phase. • Plan the placement of laydown areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e., in already disturbed areas) where possible. • Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads. • Ensure that rubble, litter, etc. are appropriately stored (if it can't be removed daily) and then disposed of regularly at a licenced waste site. • Reduce and control dust during construction by utilising dust suppression measures. • Limit construction activities to normal daytime hours, where possible, in order to reduce the impacts of construction lighting. • Rehabilitate all disturbed areas immediately after the completion of construction work and maintain good housekeeping.
Social Impact Assessment (Appendix D7)	Creation of direct and indirect employment and skills development opportunities.	Positive Low	Positive Medium	Enhancement: • A local employment policy should be adopted to maximise opportunities made available to the local labour force. • Labour should be sourced from the local labour pool, and only if the necessary skills are unavailable should labour be sourced from (in order of preference) the greater Tokologo LM, Lejweleputswa DM, Free State Province, South Africa, or elsewhere. • Where feasible, training and skills development programmes should be initiated prior to the commencement of the construction phase. • As with the labour force, suppliers should also as far as possible be sourced locally.

				• As far as possible local contractors that are compliant with Broad-Based Black Economic Empowerment (B-BBEE) criteria should be used. • The recruitment selection process should seek to promote gender equality and the employment of women wherever possible. • The recruitment process should ensure that all contracts should require compliance with relevant human rights legislation and ensure human rights are maintained.
	Economic Multiplier effect	Positive Low	Positive Medium	Enhancement: • It is recommended that a local procurement policy is adopted to maximise the benefit to the local economy. • A database of local companies, specifically Historically Disadvantaged Individuals (HDIs) which qualify as potential service providers (e.g., construction companies, security companies, catering companies, waste collection companies, transportation companies etc.) should be created and companies listed thereon should be invited to bid for project-related work where applicable. • Local procurement is encouraged along with engagement with local authorities and business organisations to investigate the possibility of procurement of construction materials, goods and products from local suppliers where feasible.
	Improvements to shared infrastructure	Positive Low	Positive Low	Enhancement: • The project would contribute to an upgrade in the shared infrastructure of the LM as well as in the maintenance of this infrastructure. • The LM would be encouraged to participate in this maintenance and upgrade where it would be feasible for them to be involved.

				• A database of local companies, specifically Historically Disadvantaged Individuals (HDIs) which qualify as potential service providers (e.g., construction companies, security companies, catering companies, waste collection companies, transportation companies etc.) should be created (or sourced from the local Municipality, where available) and companies listed thereon should be invited to bid for project-related work where applicable and this would include the maintenance of this shared infrastructure.
	Potential loss of productive farmland	Negative Medium	Negative Low	• The proposed site needs to be fenced off prior to the construction phase and all construction related activities should be confined in this fenced off area. • Livestock grazing on the proposed site need to be relocated. • All affected areas outside of the development footprint, which are disturbed during the construction phase, need to be rehabilitated prior to the operational phase and should be continuously monitored. • Implement, manage and monitor a grievance mechanism for the recording and management of social issues and complaints.
	In-migration of people (non-local workforce and jobseekers).	Negative Medium	Negative Low	• Develop and implement a local procurement policy which prioritises "locals first" to prevent the movement of people into the area in search of work. • Engage with local community representatives prior to construction to facilitate the adoption of the locals first procurement policy. • Provide transportation for workers (from closest towns and surrounds) to ensure workers can easily access their place of employment and do not need to move closer to the project site. • As far as possible, working hours should be kept between daylight hours during the construction phase, and / or as any deviation that is approved by the relevant authorities.

				• Compile and implement a grievance mechanism. • Appoint a Community Liaison Officer (CLO) to assist with the procurement of local labour. • Prevent the recruitment of workers at the project site. • Implement, manage and monitor a grievance mechanism for the recording and management of social issues and complaints. • Establish clear rules and regulations for access to the proposed site. • Appoint a security company and implement appropriate security procedures to ensure that workers do not remain onsite after working hours. • Inform local community organisations and policing forums of construction times and the duration of the construction phase. • Establish procedures for the control and removal of loiterers from the construction site.
	Safety and security impacts	Negative Medium	Negative Low	• As far as possible, working hours should be kept within daylight hours during the construction phase, and / or as any deviation that is approved by the relevant authorities. • Provide transportation for workers to prevent loitering within or near the project site outside of working hours. • The perimeter of the construction site should be appropriately secured to prevent any unauthorised access to the site. The fencing of the site should be maintained throughout the construction period. • The appointed EPC Contractor must appoint a security company to ensure appropriate security procedures and measures are implemented. • Access in and out of the construction site should be strictly controlled by a security company appointed to the project.

				• A CLO should be appointed as a grievance mechanism. A method of communication should be implemented whereby procedures to lodge complaints are set out for the local community to express any complaints or grievances with the construction process. • The EPC Contractor should implement a stakeholder management plan to address neighbouring farmer concerns regarding safety and security. • The project proposed must prepare and implement a Fire Management Plan; this must be done in conjunction with surrounding landowners. • The EPC Contractor must prepare a Method Statement which deals with fire prevention and management.
	Impacts on daily living and movement patterns	Negative Medium	Negative Medium	• All vehicles must be road worthy, and drivers must be qualified, obey traffic rules, follow speed limits and be made aware of the potential road safety issues. • Heavy vehicles should be inspected regularly to ensure their road worthiness. • Provision of adequate and strategically placed traffic warning signs, that have to be maintained for the duration of the construction phase, and control measures along the S322 secondary road to warn road users of the construction activities taking place for the duration of the construction phase. Warning signs must be always visible, especially at night. • Implement penalties for reckless driving to enforce compliance to traffic rules. • Avoid heavy vehicle activity during “peak” hours (when children are taken to school, or people are driving to work).

				• The developer and EPC Contractor must ensure that all fencing along access roads is maintained in the present condition or repaired if disturbed due to construction activities. • The developer and EPC Contractor must ensure that the roads utilised for construction activities are either maintained in the present condition or upgraded if disturbed due to construction activities. • The EPC Contractor must ensure that damage / wear and tear caused by construction related traffic to the access roads is repaired before the completion of the construction phase. • A method of communication must be implemented whereby procedures to lodge complaints are set out for the local community to express any complaints or grievances with the construction process.
	Nuisance impacts (noise and dust)	Negative Medium	Negative Low	• The movement of heavy vehicles associated with the construction phase should be timed to avoid weekends, public holidays, and holiday periods where feasible. • Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers. • Ensure all vehicles are road worthy, drivers are qualified and are made aware of the potential noise and dust issues. • A CLO should be appointed, and a grievance mechanism implemented.
	Increased risk of potential veld fires	Negative Medium	Negative Low	• A firebreak should be implemented before the construction phase. The firebreak should be controlled and implemented around the perimeters of the project site.

				• Adequate fire-fighting equipment should be provided and readily available on site and all staff should be trained in firefighting and how to use the fire-fighting equipment. • No staff (except security) should be accommodated overnight on site and the contractor should ensure that no open fires are allowed on site. The use of cooking or heating implements should only be used in designated areas. • Contractors need to ensure that any construction related activities that might pose potential fire risks, are done in the designated areas where it is also managed properly. • Precautionary measures need to be taken during high wind conditions or during the winter months when the fields are dry. • The project will adhere to the National Forest and Veld Fires act and the fire management plan. It is recommended that the project proponent join the local fire association.
	Visual and sense of place impacts	Negative Low	Negative Low	• Implement mitigation measures identified in the Visual Impact Assessment (VIA) prepared for the project. • As far as possible, limit noise generating activities to normal daylight working hours and avoid weekends and public holidays. • The movement of heavy vehicles associated with the construction phase should be timed to avoid weekends, public holidays, and holiday periods where feasible. • Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers. • All vehicles must be road-worthy, and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits.

				• Communication, complaints, and grievance channels must be implemented and contact details of the CLO must be provided to the local community in the study area.

6.2.2 Impacts during the operational phase

During the operational phase the study area will serve as a solar energy. The potential impacts will take place over a period of 20 – 30 years. During the operational phase the following activities will have various potential impacts on the biophysical and socio-economic environment:

- Activity 11(i) (GN.R 327): *"The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."*
- Activity 14 (GN.R 327): *"The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres."*
- Activity 28 (ii) (GN.R 327): *"Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare."*
- Activity 1 (GN.R 325): *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more."*

Table 6.5 summarised the negative impacts are generally associated with the Notsi PV 5 (including other associated infrastructure and grid connection infrastructure), which include impacts on the fauna and flora, soils, avifauna, surface water, the pressure on existing services infrastructure, and visual impacts. The provision of sustainable services delivery also needs to be confirmed. The operational phase will have a direct positive impact through the provision of employment opportunities for its duration, and the generation of income to the local community

Table 6-5: Impacts and the mitigation measures during the operational phase

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Terrestrial Biodiversity Impact Assessment (Appendix D1)	Continued fragmentation and degradation of natural habitats and ecosystems (including wetlands).	Negative High	Negative Low	• The clearing of vegetation must be minimized where possible. All activities must be restricted to within the authorised areas. It is recommended that areas to be developed be specifically and responsibly demarcated so that during the construction phase only the demarcated areas be impacted upon. • Existing access routes, especially roads, must be made use of. • Any materials may not be stored for extended periods of time and must be removed from the PAOI once the construction phase has been concluded. No permanent construction phase structures should be permitted. Construction buildings should preferably be prefabricated or constructed of re-usable/recyclable materials. No storage of vehicles or equipment will be allowed outside of the designated laydown areas. • Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat. This will also reduce the likelihood of encroachment by invasive alien plant species. All grazing mammals must be kept out of the areas that have recently been re-planted.

				• A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. ○ Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. ○ No servicing of equipment on site unless necessary. ○ All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers. ○ Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them from leaking and entering the environment. ○ Construction activities and vehicles could cause spillages of lubricants, fuels and waste material negatively affecting the functioning of the ecosystem. ○ All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the project area. • It must be made an offence for any staff to take/ bring any plant species into/out of any portion of the project area. No

				plant species whether indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants. • A fire management plan needs to be complied and implemented to restrict the impact fire would have on the surrounding areas.
	Continuing spread of IAP and weed species.	Negative High	Negative Low	• An Invasive Alien Plant Management Plan must be compiled and implemented. This should regularly be updated to reflect the annual changed in IAP composition. • The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. Footprints of the roads must be kept to prescribed widths. • Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site. A location specific waste management plan must be put in place to limit the presence of rodents and pests and waste must not be allowed to enter surrounding areas. • A pest control plan must be put in place and implemented; it is imperative that poisons not be used to control pests due to the likely occasional presence of SCC.
	Ongoing displacement and direct mortalities of the faunal community	Negative High	Negative Low	• The areas to be disturbed must be specifically and responsibly demarcated to prevent the movement of staff or

	(including SCC) due to continued disturbance (road collisions, noise, light, dust, vibration, poaching, etc.)			any individual into the surrounding environments, signs must be put up to enforce this. • Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to reptile species and nocturnal mammals. • No trapping, killing, or poisoning of any wildlife is to be allowed and • Signs must be put up to enforce this. Monitoring must take place in this regard. • Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from any sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible. • All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must be enforced to ensure that road killings and erosion is limited. • Schedule activities and operations during least sensitive periods, to avoid migration, nesting, and breeding seasons. • Fencing mitigations: o Top 2 strands must be smooth wire o Routinely re-tension loose wires o Minimum 30cm between wires • Place markers on fences.

				• Use environmentally friendly cleaning and dust suppressant products.
Wetland Impact Assessment (Appendix D8) (Ratings are as per the GNR 509 Risk Assessment Matrix)	Potential for increased stormwater runoff leading to Increased erosion and sedimentation.	Negative Low	Negative Low	• Design and Implement an effective stormwater management plan. • Promote water infiltration into the ground beneath the solar panels. • Release only clean water into the environment. • Stormwater leaving the site should not be concentrated in a single exit drain but spread across multiple drains around the site each fitted with energy dissipaters (e.g., slabs of concrete with rocks cemented in). • Re-vegetate denuded areas as soon as possible. Regularly clear drains. • • Minimise the extent of concreted / paved / gravel areas. • A covering of soil and grass (regularly cut and maintained) below the solar panels is ideal for infiltration. If not feasible then gravel is preferable over concrete or paving. • Avoid excessively compacting the ground beneath the solar panels.
	Potential for increased contaminants entering the wetland systems.	Negative Low	Negative Low	• Where possible minimise the use surfactants to clean solar panels and herbicides to control vegetation beneath the panels. If surfactants and herbicides must be used do so well prior to any significant predicted rainfall events.
Avifauna Impact Assessment	Loss of resident avifauna through increased disturbance	Negative High	Negative Low	• See construction mitigation measures provided in Table 6-4.

(Appendix D2)	Collisions with PV Panels and Associated Infrastructure	Negative Medium	Negative Low	• Mitigation measures to avoid collisions with PV panels are limited, but collisions can be reduced by site selection away from areas where birds congregate or known flyways, which the project has achieved, and by making the site otherwise unattractive to avifauna, i.e. by minimising any available perching and nesting structures, closing open water bodies, reducing attractive or disorientating lighting, and by implementing an operational monitoring programme with carcass searching (Bennun et al. 2021). • The perimeter and internal fencing should consist of a single-fence design and be in line with the Birdlife SA guideline on Fences & Birds. • All internal power lines must be buried. • Operational phase monitoring of mortalities should be undertaken in line with current Best Practice Guidelines and if unacceptably high levels of mortalities are recorded, adaptive mitigation measures such as deterrent devices may need to be considered.
	Electrocution risks leading to injury or loss of avian life which decreases avifauna species diversity	Negative Medium	Negative Low	• Bird electrocutions can easily be prevented with bird-friendly pole design i.e., creating separation between conductors of differing electric potential, by placing insulation over conductors, or by redirecting birds to perch or nest away from conductors (APLIC 2006, Dwyer et al. 2017).
	Barrier effect	Negative Low	Negative Low	• The only realistic option to mitigate this impact is to select a site away from known migratory corridors and flyways between roosting and nesting areas.

				• There are no major known migratory flyways in the region, as migrating birds generally disperse into the interior of South Africa, and no distinct flyways between roosting and nesting areas were identified during pre-application monitoring. • The final layout must ensure habitat connectivity for Secretarybird breeding sites and foraging habitat with an infrastructure-free corridor consisting of a 90° area from a Secretarybird breeding site to the foraging habitat / site boundary, as per Birdlife SA guidance (Birdlife SA 2022).
Soils and Agricultural Impact Assessment (Appendix D4)	Loss of land capability	Negative Low	Negative Low	• See construction mitigation measures provided in Table 6-4.
Visual Impact Assessment (Appendix D3)	Potential visual impacts on sensitive visual receptors located within a 1km radius from the solar facility.	Negative High	Negative Medium	Planning • Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint. • Where insufficient natural vegetation exists next to the property, a 'screen' can be planted if the landowner requests additional mitigation. This can be done using endemic, fast growers that are water efficient. Operations • Maintain general appearance of the facility as a whole.
	Potential visual impacts on sensitive visual receptors	Negative Medium	Negative Medium	Planning

	located within a 1km and 3km radius			• Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint. Operations • Maintain general appearance of the power line corridor. • Screening can be established near sensitive receptors, upon request, rather than to mitigate the impact at the source.
	Potential visual impacts on sensitive visual receptors located within a 3km and 5km radius.	Negative Medium	Negative Low	
	Potential visual impacts on sensitive visual receptors between a 5km and 10km radius from the solar facility.	Negative Low	Negative Low	Planning • Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint. • Where insufficient natural vegetation exists next to the property, a 'screen' can be planted if the landowner requests additional mitigation. This can be done using endemic, fast growers that are water efficient. Operations • Maintain general appearance of the facility as a whole.
	Lighting Impacts of the solar facility.	Negative Medium	Negative Low	Planning & Operation As far as practically possible: • Shield the source of light by physical barriers (walls, vegetation etc.) • Limit mounting heights of lighting fixtures, or alternatively use footlights or bollard level lights. • Make use of minimum lumen or wattage in fixtures. • Make use of down-lighters, or shield fixtures. • Make use of low-pressure sodium lighting or other types of low impact lighting.

				• Make use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes. • The use of night vision or thermal security cameras are very effective and can replace security lighting entirely.
	Solar glint and glare impacts of the solar facility.	Negative Low	Negative Low	No mitigation measures are required
	Visual and sense of place impacts of the solar facility.	Negative Medium	Negative Low	• It is believed that renewable energy resources are essential to the environmental well- being of the country and planet (WESSA, 2012). Aesthetic issues are subjective, and some people find solar farms and their associated infrastructure pleasant and optimistic while others may find it visually invasive; it is mostly perceived as symbols of energy independence; and local prosperity. • The subjectivity towards the project in its entirety can be influenced by creating a "Green Energy" awareness campaign, educating the local community and potentially tourists on the benefits of renewable energy. This can be achieved by also hosting an 'open day' where the local community can have the opportunity to view the completed project which may enlist a sense of pride in the renewable energy project in their area. Note that this is not a requirement, but is encouraged, where possible. • Implement good housekeeping measures.

Social Impact Assessment (Appendix D7)	Direct and Indirect employment opportunities and skills development	Positive Low		Positive Medium		Enhancement: • It is recommended that local employment policy is adopted to maximise the opportunities made available to the local community. • The recruitment selection process should seek to promote gender equality and the employment of women wherever possible. • Vocational training programs should be established to promote the development of skills.
	Development of non-polluting, renewable energy infrastructure	Positive Medium		Positive Medium		• No enhancement identified.
	Contribution to Local Economic Development (LED) and social upliftment	Positive Medium		Positive High		Enhancement: • A CNA must be conducted to ensure that the LED and social upliftment programmes proposed by the project are meaningful. • Ongoing communication and reporting are required to ensure that maximum benefit is obtained from the programmes identified, and to prevent the possibility for such programmes to be misused. • The programmes should be reviewed on an ongoing basis to ensure that they are best suited to the needs of the community at the time (bearing in mind that these are likely to change over time).
	Impact on tourism	Negative Low	Positive Low	Negative Low	Positive Low	• Due to the extent of the project no viable mitigation measures can be implemented to eliminate the visual impact

				of the PV panels, but the subjectivity towards the PV panels can be influenced by creating a "Green Energy" awareness campaign, educating the local community and tourists on the benefits of renewable energy. Tourists visiting the area should be made aware of South Africa's movement towards renewable energy. This might create a positive feeling of a country moving forward in terms of environmental sustainability.
	Visual and sense of place impacts	Negative Low	Negative Low	• To effectively mitigate the visual impact and the impact on sense of place during the operational phase of the proposed project, it is suggested that the recommendations made in the Visual Impact Assessment (specialist study) should be followed in this regard
	Improvement of safety and security	Positive Medium	Positive Medium	• None identified.
	Increasement in household earnings	Positive Low	Positive Medium	• It is recommended that local employment policy is adopted to maximise the opportunities made available to the local community. • With the recruitment of the local community for job creation and increasement in household earnings will automatically be seen in the area surrounding the development.

6.2.3 Impacts during the decommissioning phase

The physical environment will benefit from the closure of the solar facility since the site will be restored to its natural state. Table 6.6 provides a summary of the impacts during the decommissioning phase. The decommissioning phase will however potentially result in impact on soils, pressure on existing service infrastructure, surface water and the loss of permanent employment. Skilled staff will be eminently employable, and a number of temporary jobs will also be created in the process. Decommissioning of a PV facility will leave a positive impact on the habitat and biodiversity in the area as the area will be rehabilitated to its natural state.

Table 6-6: Impacts and the mitigation measures during the decommissioning phase

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Terrestrial Biodiversity Impact Assessment (Appendix D1)	Destruction, loss and fragmentation of habitats (including wetlands), ecosystems and the vegetation community.	Negative High	Negative Low	• See construction mitigation measures provided in Table 6-4.
	Introduction of IAP species and invasive fauna.	Negative Medium	Negative Low	• See construction mitigation measures provided in Table 6-4.
	Displacement of the indigenous faunal community (including SCC) due to habitat loss, direct mortalities, and disturbance (road collisions, noise, dust, light, vibration, and poaching).	Negative Medium	Negative Low	• See construction mitigation measures provided in Table 6-4.
Wetland Impact Assessment	Potential loss or degradation of nearby	Negative Low	Negative Low	• Develop and implement a rehabilitation and closure plan.

(Appendix D8) (Ratings are as per the GNR 509 Risk Assessment Matrix)	wetlands through inappropriate closure.			• Appropriately rehabilitate the project area by ripping, landscaping and re-vegetating with locally indigenous species.
Avifauna Impact Assessment (Appendix D2)	Displacement of resident avifauna through increased disturbance	Negative High	Negative Low	• See construction mitigation measures provided in Table 6-4.
	Loss of important avian habitats	Negative Low	Negative Low	• See construction mitigation measures provided in Table 6-4.

6.3 SUMMARY OF IMPACTS AND RECOMMENDATIONS FROM SPECIALIST STUDIES

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

- Terrestrial Biodiversity Impact Assessment – The Biodiversity Company (see Appendix D1)
- Avifaunal Impact Assessment – Holland and Associates Environmental Consultants (see Appendix D2)
- Visual Impact Assessment – Donaway Environmental Consultants (see Appendix D3)
- Soils and Agricultural Impact Assessment – Johann Lanz (see Appendix D4)
- Heritage Impact Assessment – CTS Heritage (see Appendix D5)
- Palaeontological Impact Assessment – CTS Heritage (see Appendix D6)
- Social Impact Assessment – Donaway Environmental Consultants (see Appendix D7)
- Wetland Impact Assessment – The Biodiversity Company (see Appendix D8)

The following sections summarise the main findings from the specialist reports in relation to the key issues raised during the scoping phase.

6.3.1 Issue 1: Heritage and archaeological impacts

South Africa's heritage resources comprise a wide range of sites, features, objects and beliefs. According to Section 27(18) of the National Heritage Resources Act (NHRA), No. 25 of 1999, no person may destroy, damage, deface, excavate, alter, remove from its original position, subdivide or change the planning status of any heritage site without a permit issued by the heritage resources authority responsible for the protection of such site. In accordance with Section 38 of the NHRA, an independent heritage consultant was therefore appointed to conduct a Heritage Impact Assessment (HIA) to determine if any sites, features or objects of cultural heritage significance occur within the proposed site. The main question which needs to be addressed is:

"Will the proposed development impact on any heritage or archaeological artefacts?"

According to the Heritage Impact Assessment (Appendix D5) no heritage resources were identified within the footprint proposed for the Notsi PV 5 development. The field assessment for the proposed development identified that most of the area under assessment has been previously disturbed through extensive agricultural activity. Stone Age archaeological heritage resources were identified within the broader area proposed for development, however these were largely in disturbed contexts. One significant in situ archaeological site (DV4) was identified but, due to the buffer and proposed layout, it is located outside of the propoased Notsi PV 5 footprint.

Overall the heritage sensitivity of the area proposed for development is low except for the sites identified. There is no objection to the proposed development here on condition that the recommendations outlined below are implemented.

6.3.2 Issue 2: Terrestrial Biodiversity Impacts

The potential impact of the proposed development on flora and fauna known to occur in the Free State Province had to be determined. The main question which needs to be addressed is:

"How will the proposed development impact on the ecology?"

According to the Terrestrial Ecology Baseline & Impact Assessment (Appendix D1), the Notsi PV 5 PAOI overlaps with portions of land that are provincially classified as 'Other Natural Areas' and a very small portion that is classified as degraded.

No flora or faunal SCC were recorded during the survey, and it is unlikely that any floral SCC occur within the PAOI. Certain local fauna SCC may however occasionally be found foraging within the PAOI, and the regionally 'Near Threatened' Pyxicephalus adspersus (Giant Bull Frog) could potentially utilise some of the seasonally wet areas as breeding habitat. No protected tree species are likely to occur, although two provincially protected plants were recorded and several Schedule 1 provincially protected fauna species were observed, including *Otocyon megalotis* (Bat-eared Fox) and *Stigmochelys pardalis* (Leopard Tortoise).

The Notsi PV 5 PAOI is assigned an overall sensitivity of 'Medium', because of the relatively low levels of historical disturbance present in the area – which means that the ecosystems may be considered functional. The main impacts that may be expected to occur, as a result of the proposed activities, include the following:

- Direct habitat loss and fragmentation (including the loss of functional ONA areas and protected plants);
- Degradation of surrounding habitat;
- Disturbance and displacement of protected fauna (including direct mortality); and
- Introduction and further spreading of IAP and weed species.

Considering the assessment findings, no fatal flaws are evident for the proposed project. It is the opinion of the specialists that the project may be favourably considered, on condition that all prescribed mitigation measures are implemented.

6.3.3 Issue 3: Wetland / Riparian Impacts

The potential impact of the proposed development on wetlands known to occur on site, had to be determined. The main question which needs to be addressed is:

"How will the proposed development impact on the wetlands?"

According to the Wetland Impact Assessment (Appendix D8), two HGM units were identified and assessed within the project area of influence. These comprise of two depression wetlands. The wetlands scored an overall PES scores ranging from D "Largely Modified" to E "Critically Modified" due to the modification to both the hydrology and vegetation of the wetlands through anthropogenic activities. The wetlands scored "Moderate" importance and sensitivity scores due to the low protection level of both the wetland vegetation and units. The average ecosystem service score was determined to range between "Intermediate" and "Moderately High". A 15 m post mitigation buffer was assigned to the wetland systems.

The risk assessment for the Notsi PV 5 area showed that the proposed activity will pose no risks to any wetlands. Thus, avoidance can be met, and the focus should be to stay clear of the wetlands buffers while constructing the PV plant. Based on the results and conclusions presented in this report, the specialist recommends that if all mitigation measures can be met with the designing of the PV area, it is expected that the proposed activities will pose low residual risks on the wetlands and thus no fatal flaws were identified for the project.

6.3.4 Issue 4: Avifaunal Impacts

The potential impact of the proposed development on birds known to occur in Free State Province had to be determined. The main question which needs to be addressed is:

"How will the proposed development impact on the avifauna?"

According to the Avifaunal Assessment (Appendix D2), due to the footprints of the proposed development, a loss of SCC grassland habitat is however unavoidable, and even with mitigation this impact is expected to be of medium negative significance for the SCCs that occur here (confirmed or high probability of occurrence). These are Black Harrier (Endangered), Blue Crane (Near-threatened), and Secretary bird (Endangered).

As Secretary bird are confirmed as breeding in the area, but > 3 km from the Notsi PV 5 Site, it is only a recommendation (not a requirement) that regular nest surveys (twice a year) are conducted post-authorisation within a 3 km radius of the site in the years before construction. Secretary bird hold large territories and typically change breeding sites under 5 years. Should a Secretary bird nest be discovered in the avifaunal specialist walk through within 3 km of the development footprint in the walk through required to be conducted immediately (within 30 days) prior to construction, then this will have significant implications on the construction schedule.

All other identified impacts are expected to be of low negative significance with mitigation. The Notsi PV 5 site would not lead to the loss of any CBA areas, and the loss of 80 ha of ESA1 and 120 ha of ESA is considered to be acceptable, as there is more suitable grassland and wetland marsh habitat to the west of the site, which is not surrounded by authorised developments and traversed by high voltage transmission lines.

If proposed mitigation measures are implemented, the proposed development is deemed acceptable from an avifaunal perspective and can be authorised in the specialist's considered opinion.

6.3.5 Issue 5: Visual Impacts

Due to the extent of the proposed photovoltaic solar plant it is expected that the plant will result in potential visual impacts. The main question which needs to be addressed is:

"To what extent will the proposed development be visible to observers and to what extent will the landscape provides any significant visual absorption capacity"

The Visual Impact Assessment (Appendix D3) confirms that the significance of the visual impact will be a "Negative Low Impact". Sensitive receptors likely to be impacted by the proposed development are the nearby property owners and nearby roads. However, a large part of the visual landscape is still reflecting a farming landscape with a better visual appearance.

The construction and operational phase of the proposed PV facility and associated infrastructure will have a visual impact on the study area, especially within (but not restricted to) a 1km radius of the proposed project. The visual impact will differ amongst places, depending on the distance to the project. Receptors that might be the most sensitive to the proposed development are residents living and working on nearby farms and people travelling on the S322 secondary road. The PV facility will have a negative low visual impact on the surrounding environment after mitigation, within a 10km radius. Referring to the ZTV assessments, the PV facility has a line-of-sight low average visual coverage percentage within the 10km radius of 34.51%. Sensitive visual receptors are sparsely scattered throughout the region and tourism developments are low.

In terms of possible landscape degradation, the landscape does not appear to have any specific protection and is characterised by agricultural developments with a better visual quality. No buffer areas or areas to be avoided are applicable for this development in terms of possible landscape degradation, the landscape does not appear to have any specific protection and is characterised by agricultural developments with a better visual quality. No buffer areas or areas to be avoided are applicable for this development.

Considering all positive factors of such a development including economic factors, social factors and sustainability factors, especially in a semi-arid country, the visual impact of this proposed development will be insignificant and is suggested that the development commence, from a visual impact point of view.

6.3.6 Issue 6: Agricultural / impacts on the soil

In order to determine the potential impacts that the proposed development will have on agricultural production, the soil forms and current land capability of the area where the proposed project will be situated was investigated. The main question which needs to be addressed is:

"To what extent will the proposed development compromise (negative impacts) or enhance (positive impacts) current and/or potential future agricultural production?"

The Soils and Agricultural Impact Assessment (Appendix D4) the site has low agricultural and cropping potential because of a combination of climate and soil constraints. As a result of the constraints, the site is unsuitable for crop production, and agricultural production is limited to grazing. The land across the site is verified in these assessments being of medium agricultural sensitivity.

Two potential mechanisms of negative agricultural impact were identified, occupation of agricultural land and land degradation. One potential mechanism of positive agricultural impact was identified as increased financial security for farming operations. All mechanisms are likely to lead to low impact on the agricultural production potential and the agricultural impact is therefore assessed as having low significance. From an agricultural impact point of view, it is recommended that the development be approved.

6.3.7 Issue 7: Socio-economic impacts

A Social Impact Assessment (Appendix D7) has been compiled in order to provide a description of the environment that may be affected by the activity and the manner in which the environment may be affected by the proposed facility; to provide a description and assessment of the potential social issues associated with the proposed facility; and the identification of enhancement and mitigation aimed at maximizing opportunities and avoiding and or reducing negative impacts (refer to Appendix D7). The main question which needs to be addressed is:

"How will the proposed development impact on the socio-economic environment?"

The Dealesville, Tswaraganang and surrounding communities are some vulnerable communities within the project area that may be affected by the development of the Notsi PV 5 and its associated infrastructure. The construction is traditionally associated with the greatest social impact communities, as a result the town of Dealesville and its surrounding communities may be affected by social impacts. Many of the social impacts are unavoidable and will take place to some extent but can be managed through the careful planning and implementation of appropriate mitigation measures. Several potential positive and negative social impacts have been identified for the project, however an assessment of the potential social impacts indicated

that there are no perceived negative impacts that are sufficiently significant to allow them to be classified as “fatal flaws”. Based on the social impact assessment, the following general conclusions and findings can be made:

- Potential negative social impacts can be associated with the construction phase of the Notsi PV 5 social impacts are not only associated with the construction phase of PV projects but typical of construction on all projects. It is related to the influx of non-local workforce and jobseekers, intrusion and disturbance impacts (i.e., noise and dust, wear and tear on roads, and safety and security risks) and could be reduced with the implementation of mitigation measures proposed. The significance of such impacts on the Dealesville and surrounding communities can therefore be mitigated.
- The development of the Notsi PV 5 will introduce employment opportunities for people from the Dealesville and surrounding communities, especially during the construction phase with approximately 300 employment opportunities to be created. Most opportunities would be temporarily available during the construction phase with a limited number of permanent employment opportunities during the operational phase. This would reduce the dependency in the region and improve overall lifestyle quality.
- Employment opportunities will improve skill development in the community, providing workers with additional knowledge and skill that may be of value in future work-related opportunities. This Notsi PV 5 will improve the overall educational level of people in the Tokologo LM.
- The proposed project could assist the Tokologo LM’s economy in creating entrepreneurial growth and opportunities, especially local businesses in Dealesville involved in the provision of general material, goods and service during the construction and operational phases. These positive impacts are likely to be compounded by the cumulative impact associated with the development of several other solar facilities within the surrounding area, and because of the project’s location within an area which is characterised by high levels of solar irradiation, and which is therefore well suited to the development of commercial solar energy facilities.
- The proposed development of the Notsi PV 5 also presents an investment in infrastructure for the generation of non-polluting, Renewable Energy, which, when compared to energy generated because of burning fossil fuels, presents a positive social benefit for society.
- When considering Notsi PV 5, it is also important to consider the cumulative social impacts that may arise with other proposed PV projects in the area. Specifically with the area situated in the Kimberley Solar Renewable Energy Development Zone (REDZ5). The cumulative impact could improve living standards and economies on a greater regional scale.
- It should be noted that the perceived benefits associated with the Notsi PV 5, which include RE generation and local economic and social development, outweigh the perceived impacts associated with the project.

The proposed project and associated infrastructure are unlikely to result in permanent damaging social impacts. From a social perspective it is concluded that the project could be developed subject to the implementation of recommended mitigation measures and management actions identified for the project.

6.3.8 Issue 8: Paleontological Impacts

South Africa's heritage resources comprise a wide range of sites, features, objects and beliefs. According to Section 27(18) of the National Heritage Resources Act (NHRA), No. 25 of 1999, no person may destroy, damage, deface, excavate, alter, remove from its original position, subdivide or change the planning status of any heritage site without a permit issued by the heritage resources authority responsible for the protection of such site. The main question which needs to be addressed is:

"How will the proposed development impact on the Palaeontological resources?"

According to the Palaeontological Impact Assessment (Appendix D6) underlain by Quaternary deposits, Jurassic dolerite, as well as the Tierberg Formation of the Ecca Group (Karoo Supergroup). According to the Palaeo Map on the South African Heritage Resources Information System (SAHRIS) database, the Palaeontological Sensitivity of the Quaternary calcrete is High, while that of Quaternary aeolian sands are Moderate, that of Jurassic dolerite is Zero and the Tierberg Formation has a Moderate Palaeontological Sensitivity (Almond and Pether, 2009; Almondet al., 2013). Recent Shape files produced by the Council of Geosciences, Pretoria) indicates that the study area is underlain by calcretes, surface limestones and Hardpan superficial sediments, the Kalahari Group, Karoo Dolerite as well as the Tierberg Formation of the Ecca Group. Topographical as well as Google Earth images indicate that the relief of the proposed project is low, and outcrops in the area are rare.

A site-specific field survey of the development footprint was conducted on foot on September 2022. No visible evidence of fossiliferous outcrops was found in the development footprint and thus an overall LOW palaeontological significance is allocated to the development footprint. It is therefore considered that the proposed development will not lead to detrimental impacts on the palaeontological reserves of the area and construction of the development may be authorised in its whole extent.

6.3.9 Risk Assessment for battery storage system

Battery storage facilities are a relatively new technology, particularly in South Africa. Batteries, as with most electrical equipment, can be dangerous and may catch fire, explode or leak dangerous pollutants if damaged, possibly injuring people working at the facility or polluting the environment. Common failure scenarios of Li-ion batteries include: electrical, mechanical, and thermal. The potential hazards associated with them are fire with consequent emission of gas and explosion. The major risks include thermal runaway, difficulty of fighting battery fires, failure of control systems and the sensitivity of Li-ion batteries to mechanical damage and electrical transients.

As with any fire or explosion, a potential consequence of Li-ion battery fires is the endangerment of life and property. These consequences are assessed based on their severity and likelihood. First, the severity of this consequence changes based on the quantity of cells in a system, as well as the system's proximity to people and property. Therefore, the size and location of the installation should be taken into consideration. For the Notsi PV 5 the location of the BESS and the fact that the area is sparsely populated will reduce the risk associated with toxic chemicals, flammability and overpressure from explosions. The risk level is seen to be of a low risk that is unlikely to occur with the proper safety measures taken as mitigation. Provided that the facility is designed and managed properly, and the batteries are handled in the manner prescribed by the manufacturer, an incident is unlikely to happen. However, because of the risk, special

management actions are recommended in the EMPr to reduce the risk of an incident and manage an incident should one ever occur.

6.4 SENSITIVITY ANALYSIS

The sensitivity analysis undertaken as part of the BAR focusses on providing an understanding of the environmentally sensitive areas and features identified within the development footprint proposed for Notsi PV 5. This section considers the findings of each of the independent specialist studies undertaken for the development and considers the sensitive features and areas identified, including the location, the sensitivity rating of the features or areas as well as the associated buffers recommended by the specialist (where a buffer is considered to be relevant). The sensitive areas and features identified are also displayed on the sensitivity maps included as Figures H of this BA report. The following points below provide the sensitivity analysis for the Notsi PV 5:

Ecology:

The Terrestrial Biodiversity Impact Assessment (refer to Appendix D1) identified two habitat types, namely Modified Grassland and Rocky Ridge. The majority of the site was found to be representative of Modified Grassland habitat, which encompasses open grassland areas with a higher diversity of herbaceous indigenous species and a greater density of climax grasses and shrublets. This habitat unit has a higher level of functionality than the Critically Modified Grassland and local SCC fauna species may occasionally forage in these areas. A medium Habitat Sensitivity is assigned to this habitat type.

A small portion of land within the north-eastern quadrant of the site contains a linear collection of natural rocky material which serves as a unique microhabitat feature that is likely to be supportive of reptile and small mammal species native to the area. Disturbance should still be limited in the areas classified as Rocky Ridge habitat, were possible.

Wetland Areas:

The Wetland Impact Assessment (refer to Appendix D8) identified two HGM units within the project area of influence. These comprise of two depression wetlands. The wetlands scored an overall PES scores ranging from D – “Largely Modified” to E “Critically Modified” due to the modification to both the hydrology and vegetation of the wetlands through anthropogenic activities. The wetlands scored “Moderate” importance and sensitivity scores due to the low protection level of both the wetland vegetation and units. The average ecosystem service score was determined to range between “Intermediate” and “Moderately High”. There are no wetlands within proximity of the Notsi PV 5 site and the proposed activity will post no risks to any wetlands.

Avifauna:

No residual impacts of high significance were identified for the proposed development if the proposed mitigation measures are implemented. Therefore, from an avifauna perspective, no areas have been identified as no-go for the development footprint of the Notsi PV 5 and associated infrastructure.

Heritage:

The heritage sensitivity of the overall area proposed for development is low. There was one significant *in situ* archaeological site (DV2) identified to the north-west of the proposed Notsi PV 5 site, although there were no heritage resources identified within the project footprint.

Agriculture:

The Agricultural Compliance Statement (refer to Appendix D4) confirmed that the site has a low agricultural and cropping potential because of a combination of climate and soil constraints. As a result of the constraints, the site is unsuitable for crop production, and agricultural production is limited to grazing. There is not a scarcity of such agricultural land in South Africa and its conservation for agricultural production is not therefore a priority. The proposed development is within a REDZ, which is an area that has specifically been designated within South Africa for the prioritisation of renewable energy development.

Visual:

No specific areas of sensitivity have been identified from a visual perspective (Visual Impact Assessment, Appendix D3). Therefore, from a visual perspective, no areas have been identified as no-go for the development of Notsi PV 5 and associated infrastructure.

Palaeontology:

No palaeontological no-go areas have been identified for the project (Palaeontological Impact Assessment, Appendix D6). Therefore, from a palaeontological perspective, no areas have been identified as no-go for the development of Notsi PV 5 and associated infrastructure.

Social:

No specific areas of sensitivity have been identified from a social perspective (Social Impact Assessment, Appendix D7). Therefore, from a social perspective, no areas have been identified as no-go for the development of Notsi PV 5 and associated infrastructure.

6.5 METHOD OF ENVIRONMENTAL ASSESSMENT

The environmental assessment aims to identify the various possible environmental impacts that could results from the proposed activity. Different impacts need to be evaluated in terms of its significance and in doing so highlight the most critical issues to be addressed.

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale i.e., site, local, national or global whereas intensity is defined by the severity of the impact e.g., the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in Table 6.8.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

6.5.1 Impact Rating System

Impact assessment must take account of the nature, scale and duration of impacts on the environment whether such impacts are positive or negative. Each impact is also assessed according to the project phases:

- planning
- construction
- operation

- decommissioning

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance should also be included. The rating system is applied to the potential impacts on the receiving environment and includes an objective evaluation of the mitigation of the impact. In assessing the significance of each impact the following criteria is used:

Table 6-7: The rating system

NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity.		
GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be experienced.		
1	Site	The impact will only affect the site.
2	Local/district	Will affect the local area or district.
3	Province/region	Will affect the entire province or region.
4	International and National	Will affect the entire country.
PROBABILITY		
This describes the chance of occurrence of an impact.		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
DURATION		
This describes the duration of the impacts. Duration indicates the lifetime of the impact as a result of the proposed activity.		
1	Short term	The impact will either disappear with mitigation or will be mitigated through natural processes in a span shorter than the construction phase (0 – 1 years), or the impact will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).

2	Medium term	The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered indefinite.
INTENSITY/ MAGNITUDE		
Describes the severity of an impact.		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired. Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
REVERSIBILITY		
This describes the degree to which an impact can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures.
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.

3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts. A cumulative impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible cumulative impact	The impact would result in negligible to no cumulative effects.
2	Low cumulative impact	The impact would result in insignificant cumulative effects.
3	Medium cumulative impact	The impact would result in minor cumulative effects.
4	High cumulative impact	The impact would result in significant cumulative effects
SIGNIFICANCE		
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The calculation of the significance of an impact uses the following formula: (Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity. The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.		
Points	Impact significance rating	Description
6 to 28	Negative low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive low impact	The anticipated impact will have minor positive effects.

29 to 50	Negative medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative high impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive high impact	The anticipated impact will have significant positive effects.
74 to 96	Negative very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive very high impact	The anticipated impact will have highly significant positive effects.

7 CUMULATIVE EFFECTS ASSESSMENT

This section aims to address the following requirements of the regulations:

Appendix 1. (3)(i) A BAR (...) must include-

(j) an assessment of each identified potentially significant impact and risk, including- (i) cumulative impacts.

7.1 INTRODUCTION

The EIA Regulations (as amended) determine that cumulative impacts, "*in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities*." Cumulative impacts can be incremental, interactive, sequential or synergistic. EIAs have traditionally failed to come to terms with such impacts, largely as a result of the following considerations:

- Cumulative effects may be local, regional or global in scale and dealing with such impacts requires coordinated institutional arrangements;
- Complexity - dependent on numerous fluctuating influencing factors which may be completely independent of the controllable actions of the proponent or communities; and
- Project level investigations are ill-equipped to deal with broader biophysical, social and economic considerations.

Despite these challenges, cumulative impacts have been afforded increased attention in this Basic Assessment Report and for each specialist field a separate section has been added which discusses any cumulative issues, and where applicable, draws attention to other issues that may contextualise or add value to the interpretation of the impact. This chapter analyses the proposed project's potential cumulative impacts in more detail by: (1) defining the geographic area considered for the cumulative effects analysis; (2) providing an overview of relevant past and present actions in the project vicinity that may affect cumulative impacts; (3) presenting the reasonably foreseeable actions in the geographic area of consideration; and (4) determining whether there are adverse cumulative effects associated with the resource areas analysed.

The term "Cumulative Effect" has for the purpose of this report been defined as: the summation of effects over time which can be attributed to the operation of the project itself, and the overall effects on the ecosystem of the site that can be attributed to the project and other existing and planned future projects.

7.2 GEOGRAPHIC AREA OF EVALUATION

The geographic area of evaluation is the spatial boundary in which the cumulative effects analysis was undertaken. The spatial boundary evaluated in this cumulative effects analysis generally includes an area of a 30km radius surrounding the proposed development – refer to Figure 7.1 below and Figure G.

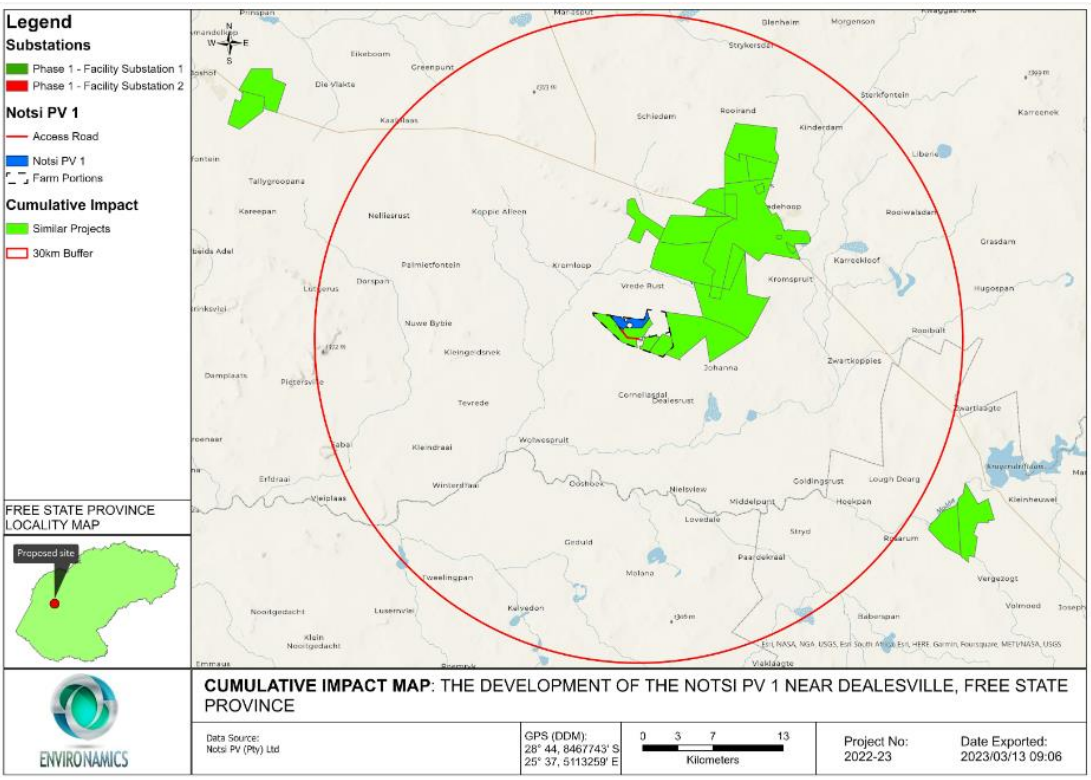

Figure 7-1: Geographic area of evaluation with utility-scale renewable energy generation sites

The geographic spread of solar PV projects, administrative boundaries and any environmental features (the nature of the landscape) were considered when determining the geographic area of investigation. It was argued that a radius of 30km would generally confine the potential for cumulative effects within this particular environmental landscape. The geographic area includes projects located within the Free State Province. A larger geographic area may be used to analyse cumulative impacts based on the specific temporal or spatial impacts of a resource. For example, the socio-economic cumulative analysis may include a larger area, as the construction workforce may draw from a much wider area. The geographic area of analysis is specified in the discussion of the cumulative impacts for that resource where it differs from the general area of evaluation described above.

7.3 TEMPORAL BOUNDARY OF EVALUATION

A temporal boundary is the timeframe during which the cumulative effects are reasonably expected to occur. The temporal parameters for this cumulative effects analysis are the anticipated lifespan of the proposed project, beginning in 2024 and extending over at least 20-30 years, which is the expected project life of the proposed project. Where appropriate, particular focus is on near-term cumulative impacts of overlapping construction schedules for proposed projects in the area of evaluation.

7.4 OTHER PROJECTS IN THE AREA

The following section provides details on existing projects, and projects being proposed in the geographical area of evaluation.

Table 7-1: A summary of related facilities, that may have a cumulative impact, in a 30 km radius of the study area

Site	Distance from Study Area	Proposed generating capacity	DEFF Reference	EIA Process	Project status
Visserpan solar photovotaic facility	18km	100 MW	14/12/16/3/3/1/2154	BAR	Approved
Visserpan solar photovotaic facility project 3	18km	100 MW	14/12/16/3/3/1/2155	BAR	Approved
Visserpan solar photovotaic facility project 4	18km	100 MW	14/12/16/3/3/1/2156	BAR	Approved
The eleven (11) Kentani Photovoltaic solar Energy Facilities and Supporting Electrical Infrastructure	9km	75 MW	14/12/16/3/3/2/717	Scoping and EIA	Approved
The eleven (11) Kentani Photovoltaic solar Energy Facilities and Supporting Electrical Infrastructure	9km	75 MW	14/12/16/3/3/2/718	Scoping and EIA	Approved
The eleven (11) Kentani Photovoltaic solar Energy Facilities and Supporting Electrical Infrastructure	12km	75 MW	14/12/16/3/3/2/719	Scoping and EIA	Approved
The eleven (11) Kentani Photovoltaic solar Energy Facilities and Supporting Electrical Infrastructure	14km	75 MW	14/12/16/3/3/2/720	Scoping and EIA	Approved
The eleven (11) Kentani Photovoltaic solar Energy Facilities and Supporting Electrical Infrastructure	12km	75 MW	14/12/16/3/3/2/721	Scoping and EIA	Approved
The eleven (11) Kentani Photovoltaic solar Energy Facilities and Supporting Electrical Infrastructure	5km	75 MW	14/12/16/3/3/2/722	Scoping and EIA	Approved

The eleven (11) Kentani Photovoltaic solar Energy Facilities	15km	75 MW	14/12/16/3/3/2/723	Scoping and EIA	Approved
The eleven (11) Kentani Photovoltaic solar Energy Facilities and Supporting Electrical Infrastructure	8km	75MW	14/12/16/3/3/2/724	Scoping and EIA	Approved
The eleven (11) Kentani Photovoltaic solar Energy Facilities and Supporting Electrical Infrastructure	6.5km	75 MW	14/12/16/3/3/2/725	Scoping and EIA	Approved
The eleven (11) Kentani Photovoltaic solar Energy Facilities and Supporting Electrical Infrastructure	5km	75 MW	14/12/16/3/3/2/726	Scoping and EIA	Approved
The eleven (11) Kentani Photovoltaic solar Energy Facilities and Supporting Electrical Infrastructure	5km	75 MW	14/12/16/3/3/2/727	Scoping and EIA	Approved
The eleven (11) Kentani solar PV facility and supporting electrical infrastructure	0km	75 MW	14/12/16/3/3/2/728	Scoping and EIA	Approved
Sebina Letsatsi Solar PV Facility	12km	75 MW	14/12/16/3/3/2/755	BAR	Approved
The Edison Photovoltaic (PV) Solar Facility and shared electricity Infrastructure	7km	100 MW	14/12/16/3/3/2/851	Scoping and EIA	Approved
Maxwell Photovoltaic (Pv) Solar Facility and shared electricity Infrastructure	6.5km	100 MW	14/12/16/3/3/2/852	Scoping and EIA	Approved
The Marconi PV 100 MW solar projects and associated infrastructure	6.7km	100 MW	14/12/16/3/3/2/853	Scoping and EIA	Approved
The Watt PV 100 MW solar projects and associated infrastructure	7km	100 MW	14/12/16/3/3/2/854	Scoping and EIA	Approved

Farday PV 100 MW solar projects and associated infrastructure	6.5km	100 MW	14/12/16/3/3/2/855	Scoping and EIA	Approved
Development of the Notsi PV 2	1km	100MW	14/12/16/3/3/1/2798	BAR	In process
Development of the Notsi PV 3	1km	100MW	14/12/16/3/3/1/2799	BAR	In process
Development of the Notsi PV 4	0km	100MW	14/12/16/3/3/1/2800	BAR	In process
Development of the Notsi PV 1	2km	100MW	14/12/16/3/3/1/2797	BAR	In process

It is unclear whether other projects not related to renewable energy is to be constructed in this area, and whether other projects are proposed. In general, development activity in the area is focused on agriculture and mining, with the landscape already transformed by these two existing land use activities. It is quite possible that further solar energy development may take place within the general area in the future.

7.5 SPECIALIST INFORMATION ON CUMULATIVE EFFECTS

In line with the EIA Regulations, specialists were asked to, where possible, take into consideration the cumulative effects associated with the proposed development and other projects which are either developed or in the process of being developed in the local area – refer to Figure 7.2 for a process flow. The following sections present their findings.

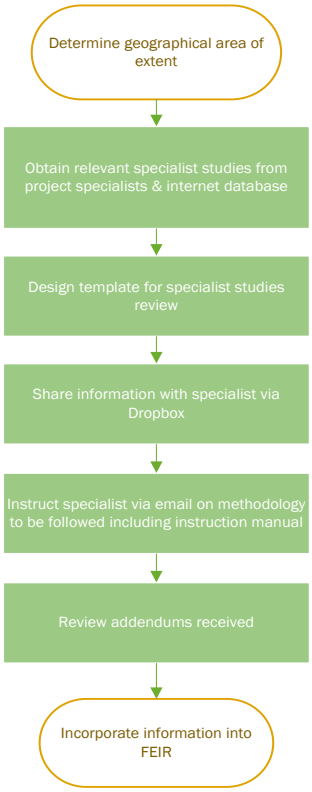

Figure 7-2: Process flow diagram for determining cumulative effects

7.5.1 Soil, Land Capability and Agricultural Potential

According to the Agricultural Compliance Statement (Appendix D4) all of these projects have the same agricultural impacts in an almost identical agricultural environment, and therefore the same mitigation measures apply to all.

The cumulative impact is affecting an agricultural environment that has been declared a Renewable Energy Development Zone (REDZ)– the Kimberly Solar Renewable Energy Development Zone (REDZ5)- because it is an environment that can accommodate numerous renewable energy developments without exceeding acceptable levels of loss of agricultural production potential. This is primarily because of the low agricultural capability of land across the REDZ, and the fact that such land is not a scarce resource in South Africa.

In quantifying the cumulative impact, the area of land taken out of grazing as a result of all the projects listed in Appendix 4 (total generation capacity of 3,375 MW) will amount to a total of approximately 8,468 hectares. This is calculated using the industry standards of 2.5 and 0.3 hectares per megawatt for solar and wind energy generation respectively, as per the Department of Environmental Affairs (DEA) Phase 1 Wind and Solar Strategic Environmental Assessment (SEA) (2015). As a proportion of the total area within a 30km radius (approximately 282,700 ha), this amounts to 2.98% of the surface area. That is within an acceptable limit in terms of loss of low potential agricultural land which is only suitable for grazing and of which there is no scarcity in the country. This is particularly so when considered within the context of the following point.

In order for South Africa to develop the renewable energy generation that it urgently needs, agriculturally zoned land will need to be used for renewable energy generation. It is far more preferable to incur a cumulative loss of lower potential agricultural land in a region which has been designated as a REDZ, than to lose agricultural land that has a higher potential, and that is much scarcer, to renewable energy development elsewhere in the country. It should also be noted that there are few land uses, other than renewable energy, that are competing for agricultural land use in this area. The cumulative impact from developments, other than renewable energy, is therefore likely to be very low. As discussed above, the risk of a loss of agricultural potential by soil degradation can effectively be mitigated for renewable energy developments and the cumulative risk is therefore low.

7.5.2 Terrestrial Biodiversity Impact Assessment

The Terrestrial Biodiversity Impact Assessment (Appendix D1) explains that according to the 2018 National Biodiversity Assessment, the total amount of Western Free State Clay Grassland habitat within 30 km of the PAOI amounts to 189 816 ha, but when considering the transformation that has taken place within this radius – 173 033 ha remains. Therefore, the area within 30 km of the project has experienced approximately 8.8% loss in natural clay grassland habitat. Additionally, it is noted that the largest sub-project footprint is 370 ha (for Notsi PV 3, and assuming the total extent of the EIA footprint for the sub-project area is developed), and up to 17 additional similar projects exist, or will soon be constructed, in the 30 km region (as per the latest South African Renewable Energy EIA Application Database) – measuring up to a total of 14 500 ha. This means that the total amount of remaining habitat lost as a result of all existing and/or approved solar projects in the region amounts to 8.6% (the sum of all related developments as a percentage of the total remaining habitat). If all five sub-projects are developed, measuring a total of up to 1265 ha, then the total remaining habitat lost would amount to 9.1%.

The cumulative impact of a single sub-project development is rated as 'Low', due to the smaller overall footprint of the individual area and the fact that more functional habitat remains as viable corridor area (note: this assessment assumes that no other sub-projects would be developed).

Although only a low quantity of the local habitat has already been transformed, the contribution of the total new development (overall project) to further loss is considered high, due to the extensive number of approved solar developments immediately adjacent and nearby – and because of the fact that a large number of protected areas and an IBA exist within the 30 km radius. Therefore, the overall cumulative impact of the overall project is rated as 'Medium'. Careful and considerate spatial management and planning within the region must be a priority, in order to preserve important and functional habitat corridors.

7.5.3 Wetland Riparian Impact Assessment

The Wetland Impact Assessment (Appendix D8) has indicated that the solar energy facilities proposed in the area are not proposed to be developed in major wetlands and therefore the cumulative impact on wetlands is not foreseen to be significant.

7.5.4 Avifaunal Assessment

The Avifauna Impact Assessment (Appendix D2) states that cumulative impacts assessed include the combination of all the impacts discussed previously for this project, which may be higher than the sum of impacts, as well as the associated Notsi PV Facilities and associated electrical grid infrastructure.

The project is located within a Renewable Energy Development Zone, and close to an MTS, from which twelve existing high voltage transmission lines run in all directions. Other existing impacts are largely of agricultural nature and overall, the significance of current impacts on avifauna is estimated as low to moderate. However, the cumulative impact of authorised projects in this area is estimated to be of medium to potentially high negative significance, in particular with regards to the impacts on Secretarybirds.

The reviewed avifauna reports indicate that the latest authorisations have included mostly adequate assessments of impacts on avifauna and mitigation measures that should minimise cumulative impacts, while some older projects did not consider impacts on avifauna at all.

If all the mitigation measures recommended in this report are implemented the contribution of the Notsi PV 5 site to the cumulative impact is considered to be acceptable and unlikely to change the overall significance of cumulative impacts.

7.5.5 Social Impact Assessment

The Social Impact Assessment (Appendix D7) indicates that potential cumulative impacts identified for the project include positive impacts on the economy, business development, and employment, as well as negative impacts such as a large-scale in-migration of people.

Notsi PV 5 and the establishment of other solar power projects within the area has the potential to result in significant positive cumulative impacts, specifically with regards to the creation of a number of socio-economic opportunities for the region, which in turn, can result in positive social benefits. The positive cumulative impacts include creation of employment, skills development and training opportunities, and downstream business opportunities. The cumulative benefits to the local, regional, and national economy through employment and procurement of services are more considerable than that of Notsi PV 5 alone.

While the development of a single solar power project may not result in a major influx of people into an area, the development of several projects may have a cumulative impact on the in-migration and movement of people. In addition, the fact that the project is proposed within an area characterised by good levels of solar irradiation suitable for the development of commercial solar energy facilities implies that the surrounding area is likely to be subject to considerable future applications for PV energy facilities. Levels of unemployment, and the low level of earning potential may attract individuals to the area in search of better employment opportunities and higher standards of living. It is exceedingly difficult to control an influx of people into an area, especially in a country where unemployment rates are high. It is therefore important that the developer implement and maintain strict adherence with a local employment policy in order to reduce the potential of such an impact occurring.

The positive cumulative impacts will be of a medium significance and the negative cumulative impacts will be of a low significance.

7.5.6 Visual Impact Assessment

The Visual Impact Assessment (Appendix D3) indicates that the proposed development is located in a close proximity to intensive existing power infrastructure and might have a cumulative impact on viewers. Twenty-eight (28) other solar facilities are also proposed in the area and the potential for cumulative impacts to occur as a result of the projects is therefore highly likely. Permanent residents of the area might be desensitised over time with the construction of more solar facilities but will stay subjective for each viewer. Although the cumulative impact might be very high if all proposed projects be constructed, the location of the solar facilities within the study area (also a REDZ) will contribute to the consolidation of solar PV structures to this locality and avoid a potentially scattered proliferation of solar energy infrastructure throughout the region.

The anticipated cumulative visual impacts for the solar facility are expected to include the change in sense of place, as well as the precedent being set for solar development in the area where currently there is only a precedent for agricultural and mining related activities. Further construction and operation of the development in the area is likely to have a negative impact.

7.5.7 Heritage Impact Assessment

The area proposed for development is presently dominated by agricultural activities and as such, the pattern of settlement within this landscape reflects this. A series of farm werfs runs down the centre of the development area. None of these farms were identified as having significant heritage value. However, the proposed development of this PV facility and the adjacent PV facilities is likely to negatively impact on the broader context of these farm werfs. The area proposed for development is located more than 8km from the nearest significant road (the R64). Furthermore, there are a number of approved renewable energy facility developments located between this proposed facility and the nearest significant town of Dealesville.

At this stage, there is the potential for the cumulative impact of proposed renewable energy facilities to negatively impact the cultural landscape due to a change in the landscape character from natural wilderness to semi-industrial. This project is located within a Renewable Energy Development Zone1 (REDZ) area, and it is noted that it is preferable to have renewable energy facility development clustered in an area such as a REDZ. The number of proposed renewable energy developments located in the vicinity of this project is likely to impact the character of the broader area – changing it from predominantly agricultural and rural to predominantly industrial, at least in the immediate context of this development. However, this is to be expected within a REDZ area.

7.5.8 Paleontological Impact Assessment

In general, development activity in the area is focused on agriculture. It is quite possible that future solar farm developments may take place within the general area. Solar Facilities in a 30km radius of Notsi PV 5 will have a Zero to High Palaeontological Sensitivity. However, it is important to note that the quality of preservation of these different sites will most probably vary and it is therefore difficult to allocate a cumulative sensitivity rating to the projects. If all the mitigation measures are carried out, a conservative estimate of the cumulative impacts on fossil Heritage will vary between low and medium.

7.6 IMPACT ASSESSMENT

Following the definitions of the term, the "residual effects on the environment", i.e., effects after mitigation measures have been put in place, combined with the environmental effects of past, present and future projects and activities will be considered in this assessment. Also, a "combination of different individual environmental effects of the project acting on the same environmental component" can result in cumulative effects.

7.6.1 Potential Cumulative Effects

The receptors (hereafter referred to as Valued Ecosystem Components (VECs) presented in Section 6 (refer to the matrix analysis) have been examined alongside other past, present and future projects for potential adverse cumulative effects. A summary of the cumulative effects discussed are summarized in Table 7.2. Specific VECs have been identified with reference to the Solar Project (Table 6.2), which relates to the biophysical and socio-economic environments. Table 7.2 indicates the potential cumulative effects VECs and the rationale for inclusion/exclusion.

Table 7.2: Potential Cumulative Effects for the proposed project

	Valued Ecosystem Components (VECs)	Rationale for Inclusion / Exclusion	Level of Cumulative Effect
Construction Phase			
Terrestrial Biodiversity Impact Assessment	Impacts to terrestrial biodiversity	In terms of the impacts identified to be associated with the development the Terrestrial Biodiversity Impact Assessment has indicated the following considering the cumulative assessment: • Loss of habitat, and disruption of surrounding ecological corridors. As well as the influences of pollution (water, noise, air, etc.).	- Medium
Wetland Impact Assessment	Impacts on wetland features	The solar energy facilities proposed in the area are not proposed to be developed in major wetlands and therefore the cumulative impact on wetlands is not foreseen to be significant.	- Negligible
Avifaunal Impact Assessment	Cumulative avifauna impacts	Cumulative impacts are expected to be associated with the development of the solar facility and the grid connection. The impacts are as follows: • Loss of priority avian species from important habitats;	- Medium

		• Loss of resident avifauna through increased disturbance; • Long-term or permanent degradation and modification of the receiving environment resulting to the loss of important avian habitats; • Collisions with PV panels and power line and electrocution risks leading to injury or loss of avian life which decreases avifauna species diversity; and • Cumulative displacement of resident avifauna.	
Soils and Agricultural Impact Assessment	Loss of land capability	The cumulative impacts for the proposed development in terms of loss of land capability have been scored "Low," indicating that the potential incremental, interactive, sequential, and synergistic cumulative impacts are within acceptable levels. It is probable that the impact will result in spatial and temporal cumulative change. Furthermore, it is indicated that limited residual impacts will be associated with these activities, assuming that all recommended mitigation measures in the report are strictly adhered to by the development. However limited mitigation is required given the fact that the pre- mitigation significance rating has been scored as "Low – Negative" and the post- mitigation significance rating being scored as "Low – Negative".	- Low
Heritage Impact Assessment	Direct or physical impacts, implying alteration or destruction of heritage features within the project boundaries and indirect impacts, e.g., restriction of access or visual intrusion concerning the broader environment.	The cultural heritage profile of the larger region is very low. Most frequently found are stone artefacts, mostly dating to the Middle Stone Age. Sites containing such material are usually located along the margins of water features (pans, drainage lines), small hills and rocky outcrops. Such surface scatters or 'background scatter' is usually viewed to be of limited significance (Orton 2016). The colonial period manifests largely as individual farmsteads, in all its complexity, burial sites and infrastructure features such as roads, railways and power lines. Overall, however, the heritage sensitivity of the area proposed for development is low except for the sites identified. These are avoided by the development area. There is no objection to the proposed development, on condition that the recommendations outlined below are implemented	- Low
Palaeontological Impact Assessment	Destroy or permanently seal-in fossils at or below the surface that are then no longer available for scientific study	Solar Facilities in a 30km radius of Notsi PV 5 Project will have a Zero to High Palaeontological Sensitivity. However, it is important to note that the quality of preservation of these different sites will most probably vary and it is therefore difficult to allocate a cumulative sensitivity rating to the projects. If all the mitigation measures are carried out, a conservative estimate of the cumulative impacts on fossil Heritage will vary between low and medium.	- Medium

Social Impact Assessment	Impacts of employment opportunities, business opportunities and skills development	Notsi PV 5 and the establishment of other solar power projects within the area has the potential to result in significant positive cumulative impacts, specifically with regards to the creation of a number of socio-economic opportunities for the region, which in turn, can result in positive social benefits. The positive cumulative impacts include creation of employment, skills development and training opportunities, and downstream business opportunities. The cumulative benefits to the local, regional, and national economy through employment and procurement of services are more considerable than that of Notsi PV 5 alone.	+ Medium
	Impact of large-scale in-migration of people	While the development of a single solar power project may not result in a major influx of people into an area, the development of several projects may have a cumulative impact on the in-migration and movement of people. In addition, the fact that the project is proposed within an area characterised by good levels of solar irradiation suitable for the development of commercial solar energy facilities implies that the surrounding area is likely to be subject to considerable future applications for PV energy facilities. Levels of unemployment, and the low level of earning potential may attract individuals to the area in search of better employment opportunities and higher standards of living. It is exceedingly difficult to control an influx of people into an area, especially in a country where unemployment rates are high. It is therefore important that the project proponent implement and maintain strict adherence with a local employment policy in order to reduce the potential of such an impact occurring.	- Low
Visual Impact Assessment	Visual impacts related to the solar facility and power line	The anticipated cumulative visual impact for the solar facility and power line are expected to include the change in sense of place, as well as the precedent being set for solar development in the area where currently there is only a precedent for agricultural and mining related activities. Further construction and operation of the development in the area is likely to have a negative impact.	- High
Operational Phase			

Terrestrial Biodiversity Impact Assessment	Impacts to terrestrial biodiversity	In terms of the impacts identified to be associated with the development the Terrestrial Biodiversity Impact Assessment has indicated the following considering the cumulative assessment: • Habitat Destruction: Medium significance without mitigation, low significance with mitigation. • Habitat fragmentation: Low significance without mitigation, negligible significance with mitigation. • Soil erosion and sedimentation: Medium significance without mitigation, negligible significance with mitigation. • Soil and water pollution: Medium significance without mitigation, negligible significance with mitigation. • Air pollution: Low significance without mitigation, negligible significance with mitigation. • Spread and establishment of alien invasive species: Medium significance without mitigation, negligible significance with mitigation. • Fauna mortalities: Low significance without mitigation, negligible significance with mitigation.	- Low
Wetland Impact Assessment	Impacts on wetland features	The solar energy facilities proposed in the area are not proposed to be developed in major wetlands and therefore the cumulative impact on wetlands is not foreseen to be significant.	- Negligible
Avifaunal Impact Assessment	Cumulative avifauna impacts	Cumulative impacts are expected to be associated with the development of the solar facility and the grid connection. The impacts are as follows: • Loss of priority avian species from important habitats; • Loss of resident avifauna through increased disturbance; • Long-term or permanent degradation and modification of the receiving environment resulting to the loss of important avian habitats; • Collisions with PV panels and power line and electrocution risks leading to injury or loss of avian life which decreases avifauna species diversity; and • Cumulative displacement of resident avifauna.	- Low
Soils and Agricultural Impact Assessment	Loss of land capability	The cumulative impacts for the proposed development in terms of loss of land capability have been scored "Low," indicating that the potential incremental, interactive, sequential, and synergistic cumulative impacts are within acceptable levels. It is probable that the impact will result in spatial and temporal cumulative change. Furthermore, it is indicated that limited residual impacts will be	- Low

		associated with these activities, assuming that all recommended mitigation measures in the report are strictly adhered to by the development. However limited mitigation is required given the fact that the pre- mitigation significance rating has been scored as "Low – Negative" and the post- mitigation significance rating being scored as "Low – Negative".	
Visual Impact Assessment	Visual impacts related to the solar facility and power line	The anticipated cumulative visual impact for the solar facility and power line are expected to include the change in sense of place, as well as the precedent being set for solar development in the area where currently there is only a precedent for agricultural and mining related activities. Further construction and operation of the development in the area is likely to have a negative impact.	- High
Decommissioning Phase			
	Impacts to terrestrial biodiversity	In terms of the impacts identified to be associated with the development the Terrestrial Biodiversity Impact Assessment has indicated the following considering the cumulative assessment: • Habitat Destruction: Medium significance without mitigation, low significance with mitigation. • Habitat fragmentation: Low significance without mitigation, negligible significance with mitigation. • Soil erosion and sedimentation: Medium significance without mitigation, negligible significance with mitigation. • Soil and water pollution: Medium significance without mitigation, negligible significance with mitigation.	- Low
Terrestrial Biodiversity Impact Assessment		• Air pollution: Low significance without mitigation, negligible significance with mitigation. • Spread and establishment of alien invasive species: Medium significance without mitigation, negligible significance with mitigation. • Fauna mortalities: Low significance without mitigation, negligible significance with mitigation.	
Wetland Impact Assessment	Impacts on wetland features	The solar energy facilities proposed in the area are not proposed to be developed in major wetlands and therefore the cumulative impact on wetlands is not foreseen to be significant.	- Negligible

Avifauna Impact Assessment	Cumulative avifauna impacts	Cumulative impacts are expected to be associated with the development of the solar facility and the grid connection. The impacts are as follows: • Loss of priority avian species from important habitats; • Loss of resident avifauna through increased disturbance; • Long-term or permanent degradation and modification of the receiving environment resulting to the loss of important avian habitats; • Collisions with PV panels and power line and electrocution risks leading to injury or loss of avian life which decreases avifauna species diversity; and • Cumulative displacement of resident avifauna.	- Low
Visual Impact Assessment	Visual Intrusion	The decommissioning of the solar facility and 132kV power line may increase the cumulative visual impact together with farming activities and people using the existing gravel roads adjacent to site increasing the amount of dust generated. Dust control and housekeeping will be the main factors to consider.	- Low
Other	Generation of waste	An additional demand on municipal services could result in significant cumulative impacts with regards to the availability of landfill space.	- Medium

7.7 CONCLUSION

This chapter of the Basic Assessment Report addressed the cumulative environmental effects of the construction, operation and decommissioning project phases. The information to date has shown that no significant adverse residual impacts are likely. However, cumulative impacts could arise as other similar projects are constructed in the area. Majority of the cumulative impacts will be of a medium or low significance, with the exception of visual cumulative impacts, which is of a high significance due to the amount of proposed solar energy development which will further add to the change of the landscape.

Considering the extent of the project and information presented in section 7 of this report, it can be concluded that the cumulative impacts will not result in large scale changes and impacts on the environment, especially since the environment and general area has experienced transformation including the undertaking of mining and agricultural activities which has created disconnect between natural systems within the landscape.

Photovoltaic solar energy technology is a clean technology which contributes toward a better-quality environment. The proposed project will contribute to local economic growth by supporting industry development in line with provincial and regional goals and ensuring advanced skills are drawn to the Free State Province.

In terms of the desirability of the development of renewable energy, it may be preferable to incur a higher cumulative loss in such a region as this one (which has already been degraded by agricultural activities), than to lose land with a higher environmental value elsewhere in the country. Also, the cumulative impacts expected will not result in a whole-scale change of the environment and therefore are considered to be acceptable, and considering the associated

positive impacts associated with the development of solar energy facilities, the proposed facility is considered desirable. It must further be considered that the area is categorised as a Renewable Energy Development Zone which aims to concentrate the impacts of the developments to specific areas so that impacts are not distributed throughout the landscape. There is therefore an opportunity to develop a renewable energy facility in an area where historical land uses have caused degradation to the environment, which will contribute to the generation of clean energy for the country as a whole.

8 ENVIRONMENTAL IMPACT STATEMENT

This section aims to address the following requirements of the regulations:

Appendix 3. (3) A BAR (...) must include-

(l) an environmental impact statement which contains-

(i) a summary of the key findings of the environmental impact assessment:

(ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and

(iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;

(m) based on the assessment, and where applicable, impact management measures from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr;

(n) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;

(o) a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;

(q) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;

8.1 SUMMARY OF KEY FINDINGS AND ASSESSMENT RESULTS

Based on the contents of the report the following key environmental issues were identified, which have been assessed and addressed in this final BA report. The ratings provided gives an indication of the impact significance with the implementation of the recommended mitigation measures.

- Impacts during construction phase:
  - Destruction, loss and fragmentation of habitats (- Low)
  - Introduction of IAP species and invasive fauna (- Low)
  - Displacement of the indigenous faunal community (including SCC) (- Low)
  - Disturbance to avifauna (- Low)
  - Avifaunal habitat loss (- Medium)
  - Destroy or permanently seal-in fossils (- Low)
  - Direct and indirect employment opportunities and skills development (+ Medium)
  - Economic Multiplier effect (+ Medium)

- Potential loss of productive farmland (- Low)
- In-migration of people (non-local workforce and jobseekers) (- Low)
- Safety and security impacts (- Low)
- Impacts on daily living and movement patterns (- Medium)
- Nuisance impacts (noise and dust) (- Low)
- Increased risk of potential veld fires (- Low)
- Visual and sense of place impacts (- Low)

➢ Impacts during the operational phase:

- Continued fragmentation and degradation of natural habitats and ecosystems Habitat fragmentation (- Low)
- Continuing spread of IAP and weed species (- Low)
- Ongoing displacement and direct mortalities of the faunal community (including SCC) (- Low)
- Disturbance to avifauna (- Low)
- Collisions with PV Panels and Associated Infrastructure (- Low)
- Electrocution risks leading to injury or loss of avian life which decreases avian diversity (- Low)
- Barrier Effects (- Low)
- Potential visual impacts on sensitive visual receptors located within a 1km radius from the solar facility (- Medium)
- Potential visual impacts on sensitive visual receptors between a 1km and 3km radius from the solar facility (- Medium)
- Potential visual impacts on sensitive visual receptors between a 3km and 5km radius (- Low)
- Lighting Impacts of the solar facility (- Low)
- Visual and sense of place impacts of the solar facility (- Low)
- Direct and Indirect employment opportunities and skills development (+ Medium)
- Development of non-polluting, renewable energy infrastructure (+ Medium)
- Contribution to Local Economic Development (LED) and social upliftment (+ High)
- Improvement of safety and security (+ Medium)
- Increase in household earnings (+ Medium)

- Impacts during the decommissioning phase:
    - Habitat fragmentation (- Low)
    - Introduction of IAP species and invasive fauna (- Low)
    - Displacement of the indigenous faunal community (including SCC) (- Low)
    - Displacement of resident avifauna through increased disturbance (-Low)
- The cumulative impact for the proposed development is medium to low. Only one cumulative impact of a high significance has been identified and assessed, which relates the cumulative visual impacts within the current landscape. The cumulative impacts will not result in large scale changes and impacts on the environment considering the transformation of the area which has historically been undertaken through agricultural and mining activities.

8.2 SENSITIVITY ANALYSIS SUMMARY AND SITE-SPECIFIC CONDITIONS

The sensitivity analysis has guided the developer in optimising the final layout of the Notsi PV 5 through identifying specific environmental areas and features present within the site which needs to be avoided through the careful placement of infrastructure as part of the development footprint. Mitigation measures for the development, as recommended by the independent specialists, have been included in the EMPr(s) for the project as per Appendix F1-F3.

8.3 TECHNICAL DETAILS OF THE PROPOSED INFRASTRUCTURE TO BE AUTHORISED

- PV Panel Array - To produce up to 100MW the facility will require numerous linked cells placed behind a protective glass sheet to form a panel. Multiple panels will be required to form the solar PV arrays which will comprise the PV facility.
- Battery Energy Storage System (BESS) –The battery energy storage system will make use of solid state or flow battery technology and will have a capacity of up to 400MWh. Both lithium-ion and Redox-flow technology are being considered for the project, depending on which is most feasible at the time of implementation. The extent of the system will be 3ha. The containers may be single stacked only to reduce the footprint. The containers will include cells, battery charge controllers, inverters, transformers, HVAC, fire, safety and control systems.
- Inverters - Sections of the PV array will be wired to inverters. The inverter is a pulse-width mode inverter that converts direct current (DC) electricity to alternating current (AC) electricity at grid frequency.
- Electrical reticulation network – An internal electrical reticulation network will be required and will be lain ~2-4 m underground as far as practically possible.
- Supporting Infrastructure – The following auxiliary buildings with basic services including water and electricity will be required on site:
    - Temporary Laydown Areas (~20000 m2);
    - construction site camp/site office;
    - Site Administration Office (~500m²);

- Switch gear and relay room (~400m²);
- Staff lockers and changing room (~200m²);
- Security control (~60m²);
- Operations & Maintenance (O&M) building (~ 500 m2); and
- Warehouse.

- Roads – Access will be obtained via the S322 secondary road and various gravel farm roads within the area and affected property. An internal site road network will also be required to provide access to the solar field and associated infrastructure. Access roads will be up to 8m wide (6m wide road surface, with 1m drainage either side).

- Fencing - For health, safety and security reasons, the facilities will require perimeter fencing and internal security fencing. The fencing will be up to 2.4m in height.

8.4 RECOMMENDATION OF EAP

The final recommendation by the EAP considered firstly if the legal requirements for the EIA process had been met and secondly the validity and reliability of the substance of the information contained in the BA report. In terms of the legal requirements it is concluded that:

- All key consultees have been consulted as required by Chapter 6 of the EIA Regulations (as amended).
- The Basic Assessment process has been conducted as required by the EIA Regulations (as amended), Regulations 19 and Appendix 1.
- The EMPr was compiled in conjunction with the Generic EMPr for the development of the associated substation infrastructure for transmission as per Government Notice 435, which was published in Government Gazette 42323 on 22 March 2019.
- The EMPr was compiled for the Notsi PV 5 as per Appendix 4 of the EIA Regulations (GN.R. 326), published in Government Gazette 40772 on 07 April 2017.
- The proposed mitigation measures will be sufficient to mitigate the identified impacts to an acceptable level.
- The development on the affected property will create agricultural opportunities for the landowner which will assist the landowner in the current climatic and economic conditions experienced. There will be a benefit for the property owner but also the community through the creation of additional employment opportunities in agriculture. The development is therefore highly desirable not only for the Country, but also for the developer, the landowner and the community as a whole.

In terms of the contents and substance of the BA report the EAP is confident that all key environmental issues were identified, assessed and appropriate mitigation measures recommended for the reduction of the impact significance expected to occur. These key issues have been adequately assessed during the BA process to provide the competent authority and registered I&APs with sufficient information to allow them to provide comment and raise any further potential issues.

The final recommendation of the EAP is that:

It is the opinion of the independent EAP that the proposed development will have a net positive impact for the area and will subsequently ensure the optimal utilisation of resources and land, specifically in an area which has been transformed through historical agricultural and mining activities. All negative environmental impacts can further be effectively mitigated through the proposed mitigation measures.

Based on the contents of the report it is proposed that an environmental authorisation be issued, which states (amongst other general conditions) that the Notsi PV 5 and associated infrastructure on the farm Welgeluk No. 1622, Registration Division Boshof, Free State Province be approved subject to the following conditions:

- Implementation of the proposed mitigation measures set out in the EMPr(s).
- Implementation of the proposed mitigation measures set out in the specialist studies.
- The proposed solar facility must comply with all relevant national environmental laws and regulations.
- All actions and tasks allocated in the EMPr(s) should not be neglected and a copy of the EMPr(s) should be made available onsite at all times.
- Should archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.
- A Search and Rescue Plan to remove and relocate Species of Conservation Concern identified within the study area must be developed by a professional and qualified ecologist.
- A Maintenance Plan and Rehabilitation Plan of Natural Vegetation should be developed and incorporated.

We trust that the department finds the report in order and eagerly await your comment and input in this regard.

Hanlie Stander

SOLIS ENVIRONMENTAL

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