Cape Environmental Assessment Practitioners (Pty) Ltd
Reg. No. 2008/004627/07

Telephone: (044) 874 0365
Facsimile: (044) 874 0432
Web: www.cape-eaprac.co.za

1st Floor Eagles View Building
5 Progress Street, George
PO Box 2070, George 6530

FINAL ENVIRONMENTAL IMPACT REPORT & ENVIRONMENTAL MANAGEMENT PROGRAMME

for

POSTMASBURG SOLAR PV ENERGY FACILITY 2

on

A portion of Remainder of Farm 436 Kapstewel, Postmasburg, Northern Cape

In terms of the

National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended & Environmental Impact Regulations 2010

Prepared for Applicant: Postmasburg Solar PV Energy Facility 2 (Pty) Ltd

By: *Cape EAPrac*

Report Reference: TSA309/25

Department Reference: 14/12/16/3/3/2/698

Case Officer: Mmamohale Kabasa

Date: 3 March 2015

APPOINTED ENVIRONMENTAL ASSESSMENT PRACTITIONER:

***Cape EAPrac* Environmental Assessment Practitioners**

PO Box 2070
George
6530
Tel: 044-874 0365
Fax: 044-874 0432

Report written & compiled by: Siân Holder (MEd Environmental Education, Btech & Nat.Diploma Nature Conservation), who has 6 years' experience as an environmental practitioner.

Report reviewed by: Dale Holder (Nat.Diploma Nature Conservation), who has 12 years' experience as an environmental practitioner.

Director: Louise-Mari van Zyl (MA Geography & Environmental Science [US]; Registered Environmental Assessment Practitioner with the Interim Certification Board for Environmental Assessment Practitioners of South Africa, EAPSA). Ms van Zyl has over thirteen years' experience as an environmental practitioner.

PURPOSE OF THIS REPORT:

Stakeholder Review & Comment

APPLICANT:

Postmasburg Solar PV Energy Facility 2 (Pty) Ltd.

CAPE EAPRAC REFERENCE NO:

TSA309/25

DEPARTMENT REFERENCE:

14/12/16/3/3/2/698

SUBMISSION DATE

03 March 2015

FINAL ENVIRONMENTAL IMPACT REPORT

in terms of the
National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended &
Environmental Impact Regulations 2010

POSTMASBURG SOLAR PV ENERGY FACILITY 2

A portion of Remainder of Farm 436 Kapstewel, Postmasburg, Northern Cape

Submitted for:

Departmental Review

Report Issued by:
Cape Environmental Assessment Practitioners

Tel: 044 874 0365
Fax: 044 874 0432
Web: www.cape-eaprac.co.za

PO Box 2070
5 Progress Street
George 6530

TABLE OF CONTENTS

FIGURES

TABLES

ORDER OF REPORT

Executive Summary

Final Environmental Impact Report – Main Report

Appendix A : Location, Topographical, Biodiversity Maps (Vegetation, NFEPA, NPAES) & Sensitivity Maps

Appendix B : Site Photographs

Appendix C : Facility Layout Alternatives

Appendix D : Specialist Reports

Annexure D1 : Flora, Fauna & Avifaunal Report (Todd, 2015)

Annexure D2 : Agricultural Potential Report (Lubbe, 2014)

Annexure D3 : Integrated Heritage Impact Assessment Report (de Kock, 2014)

Annexure D4 : Archaeology Impact Assessment (Webley, 2014)

Annexure D5 : Palaeontology Statement (Almond, 2014)

Annexure D6 : Technical Layout Development Report (Atlantic Energy Partners, 2015)

Annexure D7 : Visual Impact Assessment Report (Stead, 2014)

Appendix E : Public Participation Process

Annexure E1
- List of Registered I&AP & Stakeholders
- Comments & Response Table

Annexure E2 :
- Final EIR Notification Letters to Registered I&APs & Stakeholders
- Draft EIR Notification Letters to Registered I&APs & Stakeholders
- Copies of Comments & Responses on Draft EIR

Annexure E3 :
- Final Scoping Report Notification Letter to I&APs & Stakeholders
- Copies of Comment & Responses on FSR

Annexure E4 :
- Draft Scoping Report Notification Letter to I&APs & Stakeholders
- Copies of Comment & Responses on DSR

Annexure E5 :
- Initial Notification Letters to Landowner & Adjacent Landowners
- Copies of Initial Correspondence & Registration

Annexure E6 :
- Advert (Kathu Gazette, 5 July 2014)
- Site Notices (11 June 2014)

Appendix F : Environmental Management Programme (EMPr)

Annexure F1 : Plant Rescue and Protection Plan (Todd, 2014)

Annexure F2 : Re-vegetation and Restoration Plan (Todd, 2014)

Annexure F3 : Alien vegetation Management Plan (Todd, 2014)

Annexure F4 : Open Space Management Plan (Todd, 2014)

Annexure F5 : Stormwater Management Plan (Aurecon, 2014)

Annexure F6 : Transportation and Traffic Management Plan (Aurecon, 2014)

Appendix G : Other Information

Annexure G1 : Correspondence with Authorities – Acceptance of Application & Acceptance of Final Scoping Report.

Annexure G2 :
- Werksmans Attorneys letter regarding Planning process
- Copy of Title Deed for RE/436 Kapstewel

Annexure G3 : Proof of Submission of WULA & Letter from Specialist on hydrological features.

Annexure G4 : Proof of Availability of Municipal Services

Annexure G5 : CIPC Document regarding Name Change

ABBREVIATIONS

AIA	Archaeological Impact Assessment
BGIS	Biodiversity Geographic Information System
BID	Background Information Document
CBD	Central Business District
ACMP	Archaeological Conservation Management Plan
CDSM	Chief Directorate Surveys and Mapping
CEMP	Construction Environmental Management Plan
dBA	Decibel (measurement of sound)
DEA	Department of Environmental Affairs
DEA&DP	Department of Environmental Affairs and Development Planning
DEIR	Draft Environmental Impact Report
DME	Department of Minerals and Energy
DSR	Draft Scoping Report
DWS	Department of Water & Sanitation
FEIR	Final Environmental Impact Report
EAP	Environmental Impact Practitioner
EHS	Environmental, Health & Safety
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMP	Environmental Management Programme
GPS	Global Positioning System
GWh	Giga Watt hour
HIA	Heritage Impact Assessment
HWC	Heritage Western Cape
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
IFC	International Finance Corporation
IPP	Independent Power Producer
KNP	Karoo National Park
KOP	Key Observation Point
kV	Kilo Volt
$L_{Aeq,T}$	Time interval to which an equivalent continuous A-weighted sound level
LLRC	Low Level River Crossing
LUDS	Land Use Decision Support
LUPO	Land Use Planning Ordinance
MW	Mega Watt
NEMA	National Environmental Management Act
NEMAA	National Environmental Management Amendment Act
NEMBA	National Environmental Management: Biodiversity Act
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act
NID	Notice of Intent to Develop
NSBA	National Spatial Biodiversity Assessment
NWA	National Water Act
PIA	Paleontological Impact Assessment
PM	Post Meridiem; “Afternoon”

SACAA	South African Civil Aviation Authority
SAHRA	South African National Heritage Resources Agency
SANBI	South Africa National Biodiversity Institute
SANS	South Africa National Standards
SDF	Spatial Development Framework
SMME	Small, Medium and Micro Enterprise
SAPD	South Africa Police Department
TIA	Traffic Impact Assessment
VIA	Visual Impact Assessment

REPORT DETAILS

Title:	**FINAL ENVIRONMENTAL IMPACT REPORT (FEIR)** **for proposed 'Postmasburg Solar PV Energy Facility 2'**
Purpose of this report:	This Environmental Impact Report (FEIR) forms part of a series of reports and information sources prepared during the Environmental Impact Assessment (EIA) for the proposed Postmasburg Solar PV Energy Facility 2, Postmasburg, Northern Cape Province. In accordance with the EIA Regulations, the purpose of this Environmental Impact Report is to: • Provide a detailed description of the proposed project, including a description of identified potential alternatives and their comparative assessment; • Describe the local environmental and developmental context within which the project is proposed; • Provide an overview of the environmental process into the EIR phase, in particular the public participation process and specialist findings; • Present a summary of the findings and recommendations of the specialist impact assessments and studies; • Describe how the issues, concerns and potential constraints identified by stakeholders and specialists in the Scoping Phase have been assessed, the significance of issues and the extent to which the issues can be addressed by the adoption of mitigation measures. This Final Environmental Impact Report (FEIR) is made available to all stakeholders for a 21-day review & comment period, **Friday 6 March to Friday 27 March 2015.**
Prepared for:	Postmasburg Solar PV Energy Facility 2 (Pty) Ltd.
Published by:	*Cape Environmental Assessment Practitioners (Pty) Ltd. (Cape EAPrac)*
Authors:	Mrs. Siân Holder
Reviewed by:	Mr. Dale Holder
Cape EAPrac Ref:	TSA309/25
DEA Case officer & Ref. No:	Mmamohale Kabasa 14/12/16/3/3/2/698
Date:	5 March 2015
To be cited as:	*Cape EAPrac,* 2015. Final Environmental Impact Report for the proposed Postmasburg Solar PV Energy Facility 2. Report Reference: TSA309/25, George.

TECHNICAL CHECKLIST

The following technical checklist is included as a quick reference roadmap to the proposed project.

Developer Details		
Developer profile	Independent Power Producer (IPP):	**Postmasburg Solar PV Energy Facility 2 (Pty) Ltd** is the IPP for the proposed Postmasburg Solar PV Energy Facility 2.
Site Details		
Property 21 digit codes	A portion of Remainder of Farm 436 Kapstewel, Postmasburg	C03100000000043600000
Size of the site	Size of Property: Initial Solar Study Area:	RE/436 Kapstewel = 1070,27ha +/- 450ha
Development Footprint	This includes the total footprint of PV panels, auxiliary buildings, onsite substation, inverter stations and internal roads.	The total footprint of Postmasburg Solar PV Energy Facility 2 will not exceed **225ha.**
Technology Details		
Capacity of facility (MegaWatts)	Net generating capacity: Installed capacity:	75MW (Alternating Current, AC) 86.25MW (Direct Current, DC)
Solar Technology selection	Type of technology	Solar PV with fixed, single- or double- axis tracking technology.
	Capacity and dimensions of the PV field	Net generation of 75 MW (86.25MW_{DC} installed) Footprint of **not more than 225ha** .
	Structure height	<4 meters
	Surface area to be covered (including associated infrastructure)	Not exceeding 225ha.
	Structure orientation	North-facing (tracking from east to west)
Grid Connection Details		
Grid connection	Substation to which project will connect.	Existing **ESKOM Manganore 132/11Kv Distribution Substation**, on property.
	Capacity of substation to allow connection of solar facility.	Manganore Substation upgrade should see at least 1 x 240MVA 400/132kV transformer be installed.
Power line/s	Number of overhead power lines	One (1).
	Route/s of power lines	+/- 800m–1km powerline aligned from south-western corner of PV layout, south-west to the existing Manganore Substation.
	Voltage of overhead power lines	132kV
	Height of the Power Line	Pylon height +/-35m expected for monopole steel structures.
	Servitude Width	31-40m
Auxiliary Infrastructure		
Other infrastructure	Number of Inverters: Area to be occupied by inverter / transformer stations:	60 x inverter stations, at height of +/- 3.5m. 60 x 25m² = +/- 1500m²
	Capacity of On-site Substation: Area of On-site Substation:	132/11Kv ±120m x 70m = ± 8400m²
	Auxiliary Buildings:	Auxiliary buildings, including on-site substation, approximately 2068m² (0.2ha): • Control Building / Centre (± 31m x 8m); • Office (± 22m x 11m); • Warehouses (x2) (± 50m x 20m) • Canteen & Visitors Centre (± 30m x 10m) • Staff Lockers & Ablution (± 22m x 11m); • Gate house / security offices (± 6m x 6m); and • Rainwater tanks.

	Access & Internal Roads:	**Two access road options** considered – both viable and aligned along existing farm roads: Option 1: from R325, across Portion 4 of Farm 436 parallel to the 132kV powerline from the west (± 3200m in length to the PV facility security checkpoint); Option 2: from R325, across Portions 2 & 5 of Farm 436 (the old mine land), entering the property from the south (± 6980m in length to the PV facility security checkpoint). Access roads not exceeding 6m in width. **Internal road network** within and around the PV panel arrays will not exceed 5m in width or 25km in length, and will to be designed as site layout plans are defined, and contained within the preferred facility footprint as assessed in the EIAr.
	Extent of areas required for temporary laydown of materials, equipment etc. Perimeter Fencing	Approximately 200m x 150m of laydown areas will be required, but will not exceed 3ha. **Steel palisade fencing of max. 2.5m in height** (20 cm gaps min. or with lowest strand or bottom of the fence will be elevated to 15 cm above the ground, at least at strategic places to allow for fauna to pass under the fence). Electrified strands may only be placed above 20 cm off the ground and may only be installed on the inside of the fence. Access control required.

ENVIRONMENTAL IMPACT REPORTING COMPLIANCE CHECKLIST

Regulation 543 of NEMA, Section 31(2) details the legislatively required "*Contents of an Environmental Impact Report*".

The following is included as a "route map" for stakeholders and officials considering and reviewing this report. It contains the minimum requirements for an environmental impact report and guides the reader to the relevant pages where specific aspects are detailed:

	Requirement	Section No.
(a)	Details of the **EAP** who compiled the report and the expertise of the EAP to carry out an EIA.	Cape Environmental Assessment Practitioners (*Cape EAPrac)* was responsible for the compilation of this Environmental Impact Assessment Report (EIAr). Details of the qualifications and expertise of the EAP are contained on the second cover page.

(b)	Detailed description of the **proposed activity**.	This is contained in Section 6 of the Executive Summary and Section 3 of Main Report. In summary, the activity includes the following:
		
		A photovoltaic (PV) solar facility with a generation (contracted) capacity of 75MW. The PV technology will consist of either conventional PV or Concentrated PV with a maximum height of 4m above ground level. The following additional infrastructure will be constructed as part of this development:
		
		- 60 x inverter stations;
		- an on-site substation (including a feed-in transformer to allow the generated power to be connected to Eskom's electricity grid)
		- an 132kV overhead transmission power line to distribute the generated electricity from the on-site substation to the existing Manganore Eskom Substation;
		- auxiliary buildings:
		  o administration / office & security (gate house),
		  o control room & workshop,
		  o visitor centre,
		  o ablution / change room and
		  o warehouse / storeroom.
		- a laydown area of approximately 3ha;
		- internal electrical reticulation network ;
		- access roads from the R325 & an internal road / track network
		- 10 x 10kLt rainwater tanks; and
		- electrified perimeter fencing around the solar facility, including security cameras.

(c)	Description of the **property** on which the activity is to be undertaken and the location of the activity on the property.	Section 4 & 5 of Exec.Summary and Section 4 of Main Report Appendix A – Location, Topographical & Biodiversity Maps
(d)	Description of the **environment** that may be affected and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected.	Section 4, 7, 8, 9, 10 , 11 & 12 of Main Report.
(e)	Details of the **public participation process**: 1. Steps undertaken in accordance with the PoS EIR 2. List of persons, organizations and organs of state that were registered as interested & affected parties 3. Summary of comments received from, and a summary of issues raised by registered I&AP's, the date of receipt of the comments and the responses of the EAP to those comments 4. Copies of any representations, objections	Section 9 of Exec.Summary and Section 17 of Main Report Appendix E of this report & Final and Draft Scoping Reports

	Requirement	Section No.
	and comments received from registered I&AP's	
(f)	Description of the **need & desirability** of the proposed activity.	Section 2 of Exec.Summary & Sections 1.1, 1.2 & 1.3 of Main Report
(g)	A description of identified **potential alternative** to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity.	Section 6 of Exec.Summary & Section 3 of Main Report
(h)	An indication of the **methodology** used in determining the significance of potential environmental impacts.	Section 6 of Main Report
(i)	A description and **comparative assessment of all alternatives** identified during the environmental impact assessment process.	Section 3 & 8-12
(j)	A summary of the **findings and recommendations** of any specialist report or report on a specialised process.	Sections 7-13
(k)	Description of all **environmental issues**, an assessment of the **significance** of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures.	Sections 7-13
(l)	An assessment of each identified potentially significant impact, including: • cumulative impacts • nature of the impact • extent and duration of the impact • probability of the impact occurring • degree to which the impact can be reversed • degree to which the impact may cause irreplaceable loss of resources; and • degree to which the impact can be mitigated.	Sections 7-13
(m)	A description of any **assumptions**, **uncertainties** and **gaps** in the knowledge.	Section 15
(n)	A **reasoned opinion** as to whether the activity should be authorized, any conditions that should be made in respect of that authorisation.	Sections 7.3, 8.3, 9.2, 10.3, 11.2, 12.5 & 18
(o)	An **environmental impact statement** which contains: • a summary of the key findings; and • comparative assessment of the positive and negative implications of the proposed activity and identified alternatives.	Sections 13 & 18
(p)	An **Environmental Management Programme** that complies with Regulation 33 of NEMA.	Appendix F
(q)	Copies of any **specialist reports** and reports on specialized processes complying with Regulation 32 of NEMA.	Appendix D & Annexures F1-F6
(r)	Any specific information that may be required by the competent authority.	Section 16 Refer to table below for specific requirements required by the

	Requirement	Section No.
		competent authority in their acceptance of the Final Scoping Report
(s)	Any other matters required in terms of Sections 24(4)(a) and (b) of the Act.	Refer to table below for specific requirements required by the competent authority in their acceptance of the Final Scoping Report

FINAL SCOPING REPORT REQUIREMENTS

The acceptance of the Final Scoping Report by DEA on 12 December 2014 was subject to various conditions and information that must be included in the Draft and Final Environmental Impact Reports. The checklist below serves as a summary of how these requirements were incorporated into this Final Environmental Impact Report.

Requirement	Description
General Requirements	
All comments & recommendations made by all stakeholders and Interested & Affected Parties (I&APs) in the Scoping Report must be taken into consideration in the Environmental Impact Assessment report (EIAr) in respect the proposed development.	Please refer Annexure E1 for the Comments & Responses Table detailing all comments received during the Scoping phase of the environmental process.
Ensure all mitigation measures and recommendations in the specialist studies are addressed and included in the final EIAr and Environmental Management Programme (EMPr).	Section 16 of Main Report & Appendix F.
Comments from relevant stakeholders are to be included in the Final EIR. These stakeholders must include: Northern Cape Department of Environment and Nature Conservation; Department of Agriculture, Forestry and Fisheries (DAFF); South African Civil Aviation Authority (SACAA); Department of Transport; the Tsantsbane Local Municipality; the Siyanda District Municipality; Department of Water Sanitation (DWS); Department of Communications; SENTECH, Eskom Holdings SOC Limited; South African National Roads Agency Limited (SANRAL); South African Heritage Resources Agency (SAHRA); Endangered Wildlife Trust (EWT); Birdlife SA; Department of Mineral Resources; Department of Rural Development and Land Reform & Square Kilometre Array (SKA).	Section 17.1 & Appendix E. All authorities listed were given an opportunity to comment on all reports that form part of this environmental process. State departments who fail to submit comments within the allocated commenting timeframes are deemed to have no comments.
An A3 regional map of the area and the site layout to illustrate the PV positions and associated infrastructure.	This is attached in **Appendix C** of this report.
Specific Requirements	
i. Ensure all relevant listing notice activities applied, are specific and can be linked to the development activity or infrastructure. The application form must be amended and resubmitted to department to reflect any changes.	An amended application submitted to the National Department of Environmental Affairs with the Final EIAr.
ii. The amended application form must indicate the applicability of the following activities: GN R544 11(x) & 18(i); GN R546 4(a)(i), 14(3)(a)(i), 16 & 19.	Applicability of these Activities confirmed a pertain to the upgrade of existing access road/s to 6m and construction of 5m-wide internal roads for the construction and operation phases of the solar facility, outside the urban edge of Tsantsabane municipal area. Activities pertaining to watercourses relate to the widening of Option 2 access road (from south) and associated stormwater culvert over a run-off wash aligned across the southern boundary.
iii. Relevant authorities must be kept involved throughout the EIAr as the development property falls within the geographical designated areas in GN R546, and comments submitted to the Department. A graphical representation of the proposed development with the respective geographical area must be provided.	All relevant authorities have been registered and requested to provide comment on this development proposal. Please refer to Appendix A for all maps all graphic representation.
iv. The EIAr must provide an assessment of the impacts and mitigation measures for each of the listed activities.	Sections 8-13
v. Technical details of facility must be provided in a table format, as well as their description and dimensions.	Refer to Technical Table above & Section 3 of Main Report.
vi. Corner / bend co-ordinates of the development site, as	*Please note co-ordinates are approximate only.* Preferred Layout / Development Site (rotating clockwise

Requirement	Description
well as start, middle and end of all linear activities.	from south-western corner of layout): 1: 28º07'48.41"S; 23º06'15.22"E 2: 28º07'30.76"S; 23º06'12.09"E 3: 28º06'49.67"S; 23º06'19.93"E 4: 28º06'37.85"S; 23º07'04.16"E 5: 28º06'47.33"S; 23º07'04.41"E 6: 28º06'47.50"S; 23º06'50.78"E 7: 28º07'11.11"S; 23º06'53.70"E 8: 28º07'11.40"S; 23º07'11.30"E 9: 28º07'35.90"S; 23º07'12.54"E 10: 28º07'39.63"S; 23º07'08.04"E 11: 28º07'41.87"S; 23º06'59.50"E 12: 28º07'41.99"S; 23º06'42.77"E 13: 28º07'45.96"S; 23º06'43.27"E 14: 28º07'48.61"S; 23º06'30.75"E
	Grid connection / transmission line: **Start (on-site substation):** 28º07'43.62"S; 23º06'28.03"E **Middle:** 28º07'46.12"S; 23º06'19.63"E **End (Manganore Substation):** 28º07'48.68"S; 23º06'11.19"E
	Access Road from R325 – Option 1: 1: 28º08'18.69"S; 23º04'46.70"E 2: 28º07'48.80"S; 23º05'57.29"E 3: 28º07'50.17"S; 23º06'08.26"E 4: 28º07'53.54"S; 23º06'08.98"E 5: 28º07'54.30"S; 23º06'13.02"E 6: 28º07'51.58"S; 23º06'17.30"E 7: 28º07'49.40"S; 23º06'30.01"E 8: 28º07'48.62"S; 23º06'29.89"E Access Road from R325 – Option 2: 1: 28º08'56.12"S; 23º04'53.61"E 2: 28º08'56.78"S; 23º04'55.05"E 3: 28º09'09.17"S; 23º04'59.04"E 4: 28º09'15.93"S; 23º06'00.65"E 5: 28º09'21.84"S; 23º06'06.78"E 6: 28º09'11.51"S; 23º06'38.77"E 7: 28º09'03.18"S; 23º06'46.13"E 8: 28º08'10.60"S; 23º07'01.26"E 9: 28º08'04.88"S; 23º07'08/06"E 10: 28º07'52.74"S; 23º07'11.38"E 11: 28º07'46.74"S; 23º06'48.91"E 12: 28º07'46.75"S; 23º06'38.62"E 13: 28º07'47.02"S; 23º06'38.40"E
vii. Clear indication of envisioned area of solar energy facility and associated infrastructure, including powerlines, internal roads, buildings and substations.	Refer to Appendix C
viii. As Section 19 & 21 of the National Water Act are triggered by Activities GN R544: 11 & 18, a hydrological study should be conducted.	It has been confirmed by the Ecological Specialist that no watercourses occur on the site. A stormwater wash, associated with run-off from the existing access road (from the south) crosses the south boundary via an existing road culvert. This road and culvert will need to be upgraded (widened to 6m) should this existing road be used). Comment in this regard has be requested from the Department of Water and Sanitation.
ix. As the property is zoned agriculture, an agricultural potential study must form part of the EIA.	Refer to Section 7 of Main Report & Annexure D2
x. The Department of Mineral Resources: Northern Cape Mineral Regulation must be consulted for all necessary advice & approvals, as there may be mining interference between the proposed solar facility and	Ntsundeni Ravhugoni & M.K. Mutheiwana of the Kimberly office of Department of Mineral Resources registered. SAMANCOR Manganese (Pty) Ltd.; Department of Mineral Resources: Regional Manager and Autumn Skies

Requirement	Description
future mining projects on the property.	128CC (prospecting company) have been registered and requested to provide comment.
xi. A comments & response report, in terms of EIA Regulations 2010, must be included.	Refer to Annexure E1.
xii. Detail inclusive of the PPP in accordance with Reg. 54 of the EIA Regulations.	Refer to Appendix E & Section 17.
xiii. Details for future plans for the site and infrastructure after decommissioning in 20-30 years and the possibility of upgrading the proposed infrastructure to more advanced technologies.	Refer to Section 3.3.8 of Main Report. The Environmental Management Programme attached in Appendix F, also contains specific management recommendations for the closure and decommissioning phases of the development.
xiv. An Avifaunal Assessment must be conducted, including impacts and mitigation measures related to avifauna.	Section 4.5.4 and Appendix D1: The Avifaunal section of the Flora, Fauna & Avifauna Impact Assessment Report.
xv. Should a water use licence be required, proof of application for a licence needs to be submitted.	Annexure G3 The Department of Water Affairs have confirmed that they will only consider water use licences for REIPP's after projects are selected as preferred bidders. The Applicant has however applied for a non-binding water agreement from the Department of Water Affairs.
xvi. Information on services required on site e.g. sewerage, refuse removal, water and electricity. Who will supply these services and has an agreement and confirmation of capacity been obtained? Proof of these agreements must be provided.	Annexure G4 Refer to Section 3.3 of Main Report.
xvii. Detailed description of Need & Desirability (not only motivation on need for clean energy in South Africa) if proposed development needed in region and if location is desirable for the activity compared to other sites.	Refer to Section 2 of Exec.Summary and Section 1.1-1.3 of Main Report.
xviii. A copy of the final site layout map. All available biodiversity information must be used in finalisation of the layout map. Existing infrastructure must be used as far as possible e.g. roads.	Refer to Appendix C.
xix. An environmental sensitivity map indicating environmental sensitive areas and features identified during the EIA process.	Refer to Appendix C.
xx. A map combining the final layout map superimposed on the environmental sensitivity map	Refer to Appendix C.
xxi. A shape file of the preferred development layout	Shapefiles showing the development layout are included on the **CD** attached to this report.
EIA INFORMATION REQUIRED FOR SOLAR FACILITIES	
1. General Information	
Description of the affected farm portions	**Remainder of Farm 436 Kapstewel**.
21 digit Surveyor General codes of all affected farm portions	**C03100000000043600000.**
Copies of deeds of all affected farm portions	The title deed for RE/436 Kapstewel attached as **Annexure G2.**
Photos of areas that give a visual perspective of all parts of the site.	A full photographic record of the site is attached in **Appendix B.**
Solar plant design specifications: • Type of technology: • Structure height: • Surface area to be covered (incl. associated	The design specifications of the facility are detailed in the Technical Report attached as **Annexure D6**. • Solar PV with fixed, single- or double- axis tracking technology. • Maximum of 4m • 225ha

Requirement	Description
infrastructure): • Structure orientation: • Laydown area dimensions (construction period & thereafter) • Generation capacity	• North-facing (tracking from east to west) • 3 ha • Total Generation Capacity of 75MW_{AC}
Generation Capacity of the Facility as a whole at delivery points	Net generation of 75 MW (86.25MW_{DC} installed)
2. Site Maps and GIS information	
All maps and information layers must also be provided in ESRI Shapefile format.	All Shapefiles (layout, cadastral units, biodiversity and sensitivity layers) are included on CD attached to this report.
All affected farm portions must be indicated	The affected farm portions are indicated on all maps and plans.
The exact site of the application must be indicated.	The exact site is indicated on all maps and plans.
A Status Quo Map must be provided that includes the following: - Current land use of the site, - Rivers streams and watercourses, - Ridgelines and 20m continuous contours, - Fountains, boreholes, dams, - High potential agricultural areas, and - Buffer Zones.	This is included in the regional land use / topographical plans attached in **Appendix A.**
Slope Analysis that includes the following slope ranges: - Less than 8% slope. - Between 8% and 12% slope. - Between 12% and 14 % slope. - Steeper than 18% slope.	Included as part of Visual Impact Assessment Report attached as **Annexure D7.**
Site Development proposal map that indicates: - Foundation footprint, - Permanent laydown area, - Construction period laydown area, - Internal roads, - River, stream and water crossings, - Substations, - Cable routes, - Connection routes, - Cut and fill areas, - Borrow pits, - Spoil heaps, and - Buildings including accommodation.	These items are indicated on the series of plans attached in the Layout Report attached as **Appendix C**.
3. Regional map and GIS information	
All maps must be provided in ESRI shape file format.	ESRI Shapefiles are included on the attached **CD**.
The map/layer must cover an area of 20km around the site.	All cadastral and regional biodiversity data contains a 20km buffer of the site.
Indicate the following on the Map: - Roads, - Railway lines and their stations, - Industrial areas, - Harbour and Airports, - Electricity transmission, - Pipelines, - Water Sources, - Visibility Assessment, - Critical Biodiversity Areas & Ecological Support Areas, - Critically endangered & Endangered vegetation areas, - Agricultural fields, - Irrigated Areas, and	These are indicated on the Topographical plan and Biodiversity overlays in **Appendix A.**

Requirement	Description
- New Roads and upgrades to existing roads.	
AGRICULTURAL STUDY REQUIREMENTS	
Detailed Soil Assessment of the site including the following: - Identification of soil forms present, - Size of the area where a particular soil form is found, - GPS readings of soil survey points, - The depth of the soil at each survey point, - Soil colour, - Limiting factors, - Clay content, - Slope of the site, - A detailed map indicating the locality of the soil forms within the specified area, and - Size of the site	A full agricultural potential study was undertaken and this is included in **Annexure D2**.
Exact locality of the site.	The proposed development will take place on the Remainder of Farm 436 Kapstewel. Detailed in the study site description in **Section 4.1** of this report as well as on all plans attached in **Appendix A & B.**
Current activities on the site, developments, buildings	Refer to Section 4 of Main Report.
Surrounding developments and land uses.	Refer to Maps/Plans **Appendix A, Section 4 of Exec. Summary and Main Report.**
Access routes and the condition thereof.	Refer to Technical Report in **Annexure D6** & Transport & Traffic Report in **Annexure F6**.
Current status of the land	The land is currently **vacant** and is marginally used for **livestock grazing**.
Possible land use options for the site	These are considered in the **Need and Desirability** section 1 of this report.
Water availability, source and quality	Refer to Section 3.3 of main report.
Detailed descriptions as to why agriculture should or should not be the land use of choice	These are included in the Agricultural Potential Study attached in **Annexure D2**.
Impact of the change in land use of the surrounding area	This has been assessed under the cumulative assessment of impacts included in the various specialist studies: Sections 7-13 of this report.
A Shapefiles containing the soil forms and relevant attribute data.	The map showing the soil forms is indicated in the Agricultural Study.
ASTRONOMY GEOGRAPHIC ADVANTAGE ACT, 2007	
Indicate the applicability of the Astronomy Geographic Advantage Act.	SKA were approached to provide comment on this proposal. The nearest SKA station has been identified as Rem-Opt-08, at approximately 98km from the proposed installation, therefore facility poses a low risk of detrimental impact on the SKA and no mitigation measures required.
Obtain comment from the South African Large Telescope (SALT) if the proposed development is situated within a declared astronomy Advantage Area.	The project is situated outside of the defined buffer from SALT. The information provided by SKA, indicates that Re Capital 10 is not situated in a declared astronomy advantage area.

EXECUTIVE SUMMARY

1 PROJECT OVERVIEW

Cape EAPrac has been appointed by **Postmasburg Solar PV Energy Facility 2 (Pty) Ltd.**, hereafter referred to as the Applicant, as independent environmental practitioner responsible for facilitating the Scoping & Environmental Impact Assessment (EIA) process required in terms of the National Environmental Management Act (NEMA, Act 107 of 1998, as amended) for the proposed **Postmasburg Solar PV Energy Facility 2**, near Postmasburg, Northern Cape.

Postmasburg Solar PV Energy Facility 2 (Pty) Ltd. has sub-leased a portion of Remainder of Farm 436 Kapstewel from the landowner, Mr. Schalk Victor, for the purposes of developing the proposed solar facility.

The project involves the development of a solar-energy facility with a net generation (contracted) capacity of **75MW$_{AC}$ renewable electricity** to be supplied to the national Eskom grid via the existing Manganore Substation, adjacent to the site. The project infrastructure covers an area of approximately **225ha**. The necessary associated infrastructure, including access roads, overhead electric line, substation and control building(s) form part of this application.

NOTE: ***A fundamental change to the environmental process that has been affected since the submission of the Final Scoping Report, is as follows:***
The original Applicant, RE Capital 10 (Pty) Ltd., underwent a name change (approved by the Companies and Intellectual Properties Commission (CIPC) during the environmental process. RE Capital 10 (Pty) Ltd is now known as ***Postmasburg Solar PV Energy Facility 2 (Pty) Ltd.*** *In order to maintain consistency throughout the environmental process and to avoid confusion amongst Stakeholders and I&AP's, the reports made available to the public during the environmental project maintained references to RE Capital 10. See Annexure G5 for CIPC document on name change.*

2 NEED AND DESIRABILITY

The supply of electricity in South Africa has become constrained, primarily because of insufficient generation capacity, but also due to constraints on the transmission and distribution of electricity. Considering this situation and the impact that carbon emissions from existing (and future) coal-fired power stations have on the environment (Climate Change), this **renewable energy project** will contribute to the generation of 'clean' or so-called 'green' electricity for input into the national grid to augment Eskom's power supply.

The South African Government has set a 10 year cumulative target for renewable energy of 10 000GWh renewable energy contribution to final energy consumption by 2013, to be produced mainly from biomass, wind, solar and small-scale hydro power (White Paper on Renewable Energy Policy, 2003). This amounts to approximately 4% (1667MW) of the total estimated electricity demand (41 539MW) by 2013. The majority of this power will be generated by Eskom. However, in order to meet the increasing power demand within the country, the Department of Energy (DoE) has set a target of 30% of all new power generation to be derived from **independent power producers** (IPPs).

Postmasburg Solar PV Energy Facility 2 (Pty) Ltd is one such IPP which intends to generate electricity from the proposed **Postmasburg Solar PV Energy Facility 2**. This will contribute to South Africa's commitment to the Convention on Climate Change through emission-free generation of electricity and working towards an investor-friendly climate in the energy sector.

3 NEMA REQUIREMENTS

The proposed solar energy facility project is subject to the requirements of the Environmental Impact Assessment Regulations (2010 EIA Regulations) in terms of the **National Environmental Management Act** (NEMA, Act 107 of 1998, as amended)[1]. This Act makes provision for the identification and assessment of activities that are potentially detrimental to the environment and which require authorisation from the competent authority (in this case, the national Department of Environmental Affairs, DEA) based on the findings of an EIA. An application for authorisation has been accepted by the DEA (under the Application Reference number 14/12/16/3/3/2/698).

This Scoping and Environmental Impact Assessment process was initiated under the 2010 NEMA Regulations and thus the Transitional Arrangements specified in Regulation 53 of GN No. R. 982 of 4 December 2014[2] are applicable i.e. the impact assessment is being undertaken in terms of the 2010 Listed Activities GN Reg.R544, R545 & R546:

Regulation 544 (Basic Assessment): 10(i), 11(x)&(xi) & 18(i);

Regulation 545 (Scoping & EIA): 1 & 15;

Regulation 546 (Basic Assessment): 4(a)(ii), 14(3)(a)(i); 16(iv)(a)(ii) & 19(a)(ii).

No different activities in terms of GN 983, 984 or 985 of the 2014 Regulations are triggered, however those similar / applicable to the 2010 Listed Activities are listed as follows:

Regulation 983 (Basic Assessment): 11(i) & 19(i);

Regulation 984 (Scoping & EIA): 1, 2 & 15;

Regulation 985 (Basic Assessment): 4(a)(i)(aa) & 18(a)(i)(aa).

Before any of the above mentioned listed activities may be undertaken, authorisation must be obtained from the relevant competent authority, in this case, the **National Department of Environmental Affairs** (DEA).

4 BROAD CONTEXT

The target property, Remainder of Farm 436 Kapstewel, is located in the ZF Mcgawu District (the old 'Hay' District) of the Northern Cape Province, within the jurisdiction area of the Tsantsabane Local Municipality. The property is approximately 1070ha is extent and is located approximately 21km north of the town of Postmasburg.

The proposed solar development site is situated east of the R325 Provincial Road, directly adjacent and north-east of the existing Eskom Manganore Substation.

5 SITE DESCRIPTION

The area of land designated for the proposed Postmasburg Solar PV Energy Facility 2, associated with the lease agreement with the landowner, is approximately 450ha in size and located in the northern half / portion of Farm RE/436. This northern portion of the property

[1] On 18 June 2010 the Minister of Water and Environmental Affairs promulgated new regulations in terms of Chapter 5 of the National Environmental Management Act (NEMA, Act 107 of 1998), viz, the Environmental Impact Assessment (EIA) Regulations 2010. These regulations came into effect on 02 August 2010 and replace the EIA regulations promulgated in 2006. New EIA Regulations were promulgated in Dec.2014, however this Application is being dealt with in terms of the 2010 Regulations.

[2] On 4 December 2014 the Minister of Water and Environmental Affairs promulgated new regulations in terms of Chapter 5 of the National Environmental Management Act (NEMA, Act 107 of 1998), viz, the Environmental Impact Assessment (EIA) Regulations 2014. These regulations came into effect on 8 December 2014 and replace the EIA regulations promulgated in 2010 & 2006.

consists of relatively flat plains with low hills to the east and north-east, while the southern portion of the property is covered with high hills, historically mined for manganese and iron ore. The target northern half of the property is conveniently separated from the southern portion by an existing 132kV overhead powerline and servitude / farm road, aligned east-west, to the Manganore Substation.

The abovementioned 450ha study area was assessed by the various specialists to identify sensitive areas on which proposed solar development may impact on. These site sensitivities / constraints have been considered and avoided as far as possible in the design of the preferred / mitigated layout alternative of approximately 225ha in size (Alternative 3).

6 DEVELOPMENT PROPOSAL & ALTERNATIVES

The proposed Postmasburg Solar PV Energy Facility 2 is to consist of solar photovoltaic (PV) technology with fixed, single or double axis tracking mounting structures, with a net generation (contracted) capacity of 75MW_{AC} (MegaWatts - Alternating Current) (and up to 86.25MW_{DC} Direct Current installed/nameplate capacity), as well as associated infrastructure, which will include:

- On-site switching-station / substation;
- Auxiliary buildings (gate-house and security, control centre, office, warehouse, canteen & visitors centre, staff lockers etc.);
- Inverter-stations, transformers and internal electrical reticulation (underground cabling);
- Access and internal road network;
- Laydown area;
- Overhead electrical transmission line / grid connection (connect to existing Manganore Substation);
- Rainwater tanks; and
- Parameter fencing.

Various alternatives, in terms of technology of the solar arrays, as well as layout of the solar arrays and associated infrastructure on the development site, have been considered and informed by the environmental sensitivities / constraints identified and assessed by the various specialists as part of the on-going environmental process.

The following layout alternatives, as well as the no-go option, have been considered for the Postmasburg Solar PV Energy Facility 2:

- **Alternative 1 – Conceptual / Uniform Layout (*excluded)***, which proposes the development of the entire study site (450ha northern portion of the property). As this initial uniform layout does not consider any of the existing infrastructure located on and adjacent to the site (existing access / internal roads, transmission lines, dwelling & reservoirs etc.), nor any site constraints / environmental sensitive areas (identified by the various specialist studies), it has been **excluded from the on-going environmental process and will therefore not be assessed further**.
- **Alternative 2 – Preliminary Layout (*discarded)*** considers a layout of approximately 225ha in size and concentrated to the western portion of the abovementioned 450ha study area, close to the Manganore Substation. Although this alternative considered the **existing infrastructure on and adjacent to the site, as well as the potential site constraints identified during the scoping phase,** it has not considered the site sensitivities / constraints confirmed by the specialists during details site surveys / assessments. Therefore **this Preliminary Alternative 2 layout has been discarded from the on-going environmental process.**

- **<u>Alternative 3</u> – Preferred / Mitigated Layout**
  The preferred Alternative 3 layout is ± 225ha is size and concentrated to the western portion of the abovementioned 450ha study site, close to the Manganore Substation. This layout has taken **the existing infrastructure on- and adjacent to- the site into account,** as well as sensitive **ecological, visual and heritage/archaeological features** confirmed to occur on the site. These sensitive features are centred predominantly on- and between- the hills located across the eastern portion of the site, as well as a small wash / stormwater run-off line aligned across the south-eastern site boundary (across the servitude road under the 132kV line). A large no-go area has thus been excluded from the PV layout to prevent encroachment on these sensitive ecological, visual and archaeological features. This no-go area has been accommodated in this preferred solar layout alternative.
- **<u>NO-GO / Status-Quo</u> Alternative**, which proposes that the Postmasburg Solar PV Energy Facility 2 not go ahead and that the farm remain undeveloped as it is currently. This alternative served as the baseline against which all development alternatives were assessed, and was found not to be a preferred option.

No other feasible / reasonable alternatives, other than the above, were identified during the environmental process.

7 SPECIALIST STUDIES

The following aspects have been considered by specialists in order to determine the current status and sensitivity of the target development site, as well as to identify potential risks and constraints associated with the development of the renewable energy facility. These are described in greater detail in the main report, while the full specialist reports are available in Appendix D (Annexure D1 – D7) and Appendix F (Annexures F1 – F6).

The following specialist studies have been undertaken to inform this Environmental Impact Assessment Report:

- Flora, Fauna & Avifaunal Impact Assessment Report (Todd, 2015) (**Annexure D1**)
- Agricultural Potential Study (Lubbe, 2014) (**Annexure D2**)
- Integrated Heritage Impact Assessment (De Kock, 2014) (**Annexure D3**)
- Archaeology Impact Assessment (Webley, 2014) (**Annexure D4**)
- Palaeontology Statement (Almond, 2014) (**Annexure D5**)
- Technical Layout Development Report (Atlantic Renewable Energy Partners, 2015) (**Annexure D6)**
- Visual Impact Assessment Report (Stead, 2015) (**Annexure D7)**

Additional specialist reports undertaken for inclusion with the Environmental Management Programme (EMPr):

- Plant Rescue & Protection Plan (Todd, 2015) (**Annexure F1**)
- Re-vegetation & Restoration Plan (Todd, 2015) (**Annexure F2**)
- Alien vegetation Management Plan (Todd, 2015) (**Annexure F3**)
- Open Space Management Plan (Todd, 2015) (**Annexure F4**)
- Stormwater Management Plan (Aurecon, 2014) (**Annexure F5**)
- Transportation & Traffic Management Plan (Aurecon, 2014) (**Annexure F6**)

8 PLANNING CONTEXT

A Town and Regional Planner within Werksmans Attorneys' Environmental Law firm has been appointed to facilitate the necessary Planning Application processes for the proposed

Postmasburg Solar PV Energy Facility 2, which will include a land use change application for the rezoning of at least 225ha, from Agricultural Zone I to Special Zone, and will be lodged at the Tsantsabane Local Municipality, in accordance with the Northern Cape Planning and Development Act (Act 7 of 1998), to allow for the development of the proposed Postmasburg Solar PV Energy Facility 2. See letter from Werksmans Attorneys attached in Annexure G2, along with the title deed for RE/436.

Parallel to the rezoning application, a long term lease application will be lodged at the National Department of Agriculture, in accordance with the Subdivision of Agricultural Land Act (Act 70 of 1970) to allow for the development of the proposed Postmasburg Solar PV Energy Facility 2.

According to Part B of the Department of Energy RFP criteria, clause 2.3.2 states:

"From the Fourth Bid Submission Date Bidders will no longer be required to provide proof that all necessary applications, including, but not limited to land use change, subdivision, removal of restrictive conditions and zoning applications have been made by the Project Company to secure the right to lawfully use the Project Site for the intended purpose of constructing and operating the Facility at the Bid Submission Date, but will be required to provide this post-appointment, if appointed, as a Preferred Bidder."

Since the scoping phase of the environmental process has not identified any major planning constraints, it is likely that the formal planning processes will only commence at a later stage.

9 PROCESS TO DATE

This Final Environmental Impact Report (FEIR) follows on the Draft Environmental Impact Report (DEIR), which was made available to registered Interested & Affected Parties (I&APs) and Stakeholders as a follow-up to the Final Scoping Report (FSR) and Plan of Study for EIR which was accepted by the Department of Environmental Affairs (DEA) on 12 December 2014 permitting this office to proceed with the Environmental Impact Assessment phase of the environmental process. The Draft and Final Scoping Reports were made available for public review and comment August – October 2014. This scoping process was preceded by the Application Form which was accepted by the DEA on 19 May 2014 (Ref: 14/12/16/3/3/2/698) authorising *Cape EAPrac* to commence with the public participation phase of the environmental process. This project and the environmental process was advertised in the *Kathu GAZETTE* newspaper (issue of 5 July 2014), inviting the public to register as interested and affected parties.

This FEIReport reflects the findings of specialist scoping and **impact assessments.**

As part of the public participation process various key stakeholders were identified and notified of the project and their right to participate and comment on the proposal. The project has been advertised and stakeholders who responded to the adverts, notices and written notices were kept informed throughout the environmental process. Please see **Section 17** in the main report and **Appendix E** for evidence of the Public Participation process.

10 CONCLUSIONS & RECOMMENDATIONS

Renewable energy is considered a favourable alternative to conventional electricity generation methods, which include coal fired stations. International literature confirms the long-term benefits of the generation of electricity from renewable / alternative energy sources (e.g. solar / wind) to far exceed those associated with fossil fuel energy, and as such it should be supported. The associated impacts of the Postmasburg Solar PV Energy Facility 2, which include mainly biophysical, visual and archaeological aspects, must be considered within this context.

This Final Environmental Impact Report (FEIR) concludes that the proposed Postmasburg Solar PV Energy Facility 2 has been considered via a balanced approach, mindful of cumulative impacts and need and desirability requirements, and that no fatal flaws have been identified that warrant refusal of the proposed development. As such, it can be considered for environmental authorisation subject to implementation of the EMPr and specific specialist mitigation measures as specified in this report.

Members of the public and registered I&APS, stakeholders and authorities are requested to review this FEIR and provide any final comments to the National Department of Environmental Affairs (DEA) for decision-making.

This FEIR is available for a review on the *Cape EAPrac* website for a period of 21-days, extending from 6 March to 27 March 2015. Any further comments must be submitted directly to the DEA case officer, Mmamohale Kabasa before 27 March 2015. These comments must also be copied to Siân Holder of *Cape EAPrac,* via the details below. Please refer to the DEA Reference No: 14/12/16/3/3/2/698 is all correspondence regarding this project.

Department of Environmental Affairs Attention: Mmamohale Kabasa P/Bag X447, Pretoria, 0001 Tel: (012) 399 9420 Email: mkabasa@environment.gov.za	***Cape EAPrac* (Pty) Ltd** Attention: **Mrs Siân Holder** PO Box 2070, George, 6530 Tel: (044) 874 0365 Fax: (044) 874 0432 Email: sian@cape-eaprac.co.za

FINAL ENVIRONMENTAL IMPACT REPORT

MAIN REPORT

1 INTRODUCTION

Cape EAPrac has been appointed by **Postmasburg Solar PV Energy Facility 2 (Pty) Ltd.**[3], hereafter referred to as the Applicant, as independent environmental practitioner, to facilitate the Scoping & Environmental Impact Reporting (S&EIR) process required in terms of the National Environmental Management Act (NEMA, Act 107 of 1998) for the proposed '**Postmasburg Solar PV Energy Facility 2'** near Postmasburg, Northern Cape.

Postmasburg Solar PV Energy Facility 2 (Pty) Ltd. has sub-leased the northern portion of Remainder of Farm 436 Kapstewel from the landowner, Mr. Schalk Victor, for the purposes of developing the proposed solar facility. The net generation (contracted) capacity of the solar facility will not exceed **75MW$_{AC}$** for input into the national Eskom grid.

The purpose of this ***Final*** **Environmental Impact Report** is to describe the environment to be affected, the proposed project, the process followed to date (focussing on the outcome of the Scoping & EIR public participation process and specialist studies), to present the findings and recommendations presented in the specialist impact assessment studies, and provide a description of how the development concept has been adjusted to consider the above.

1.1 WHY RENEWABLE ENERGY? WHY NORTHERN CAPE?

South Africa has for several years been experiencing considerable constraints in the availability and stability of electrical supple. Load shedding procedures have been applied since December 2005 due to multi-technical failures, as well as capacity and transmission constraints.

Eskom generates about 95% of South Africa's electricity supply, and has undertaken to increase capacity to meet growing demands. At the moment, the country's power stations are 90% coal-fired, and two huge new facilities are being built to add to this capacity. However, Eskom's plans to increase its national capacity by 40 000 megawatts in the period to 2025 have had to be scaled down due to the global economic recession (Northern Cape Business website).

International best-practice requires a 15% electricity reserve margin to deal with routine maintenance requirements and unexpected shutdowns in electricity supply systems. South Africa has historically enjoyed a large reserve margin (25% in 2002, 20% in 2004 and 16% in 2006), but that has declined over the recent past to 8% - 10%, as a result of robust economic growth and the associated demand for electricity. The spare power available to provide supply at any time of the day is known as the reserve capacity and the spare plant available when the highest demand of the year is recorded is known as the reserve margin (National Response to South Africa's Electricity Shortage, 2008). This has resulted in limited opportunities for maintenance and necessitated that power stations are run harder. This results in station equipment becoming highly stressed and an increase in unplanned outages and generator trips. The expected demand growth will rapidly erode this margin, as well as Eskom's ability to recover after it's already stressed systems shutdown.

[3] Postmasburg Solar PV Energy Facility 2 (Pty) Ltd. was originally named RE Capital 10 (Pty) Ltd. For the sake of consistency and to avoid confusion among registered I&APs and Stakeholders, reference to the Applicant & Project name remained RE Capital 10 up until the end of the Draft EIR phase of the environmental process. For the purpose of submission of this final report to the competent authority for decision-making, the current Applicant & Project names are referred to.

This necessitates the additional generation of at least 3 000MW in the shortest possible time, to allow the reserve necessary to bring Eskom's system back into balance (*ibid*). This need can either be addressed from the *supply* or the *demand* side. Where the demand side interventions include short, medium and long term aspects of a national Power Conservation Programme to incentivise the public to use less electricity (as mentioned above), one of the supply side options (besides Eskom building new plants and returning old plants to service) is to allow **Independent Power Producers** (IPPs) to contribute electricity to the national grid (National Response Document, 2008). **Postmasburg Solar PV Energy Facility 2 (Pty) Ltd.** is one such body, which intends generating electricity from a renewable energy resource, namely solar.

In March 2011, the Cabinet approved South Africa's Integrated Resource Plan 2010, in terms of which energy from renewable sources will be expected to make up a substantial 42% of all new electricity generation in the country over the next 20 years. The government's New Growth Path for the economy also envisages up to 300 000 jobs being created in the "green" economy by 2020 (South Africa info website).

The Northern Cape is suggested by many to be the ideal location for various forms of alternative energy. This has resulted in a number of feasibility studies being conducted, not least of which an investigation by the Industrial Development Corporation in 2010 (R33-million spent) into potential for photo-voltaic, thermal, solar and wind power (Northern Cape Business website).

The area of the Northern Cape that borders on the Gariep (Orange) River and Namibia boasts the highest solar radiation intensity anywhere in southern Africa. Solar energy is therefore likely to be the most viable alternative energy source for the Northern Cape, although wind-power potential is generally good along the coast (State of the Environment, S.A.)

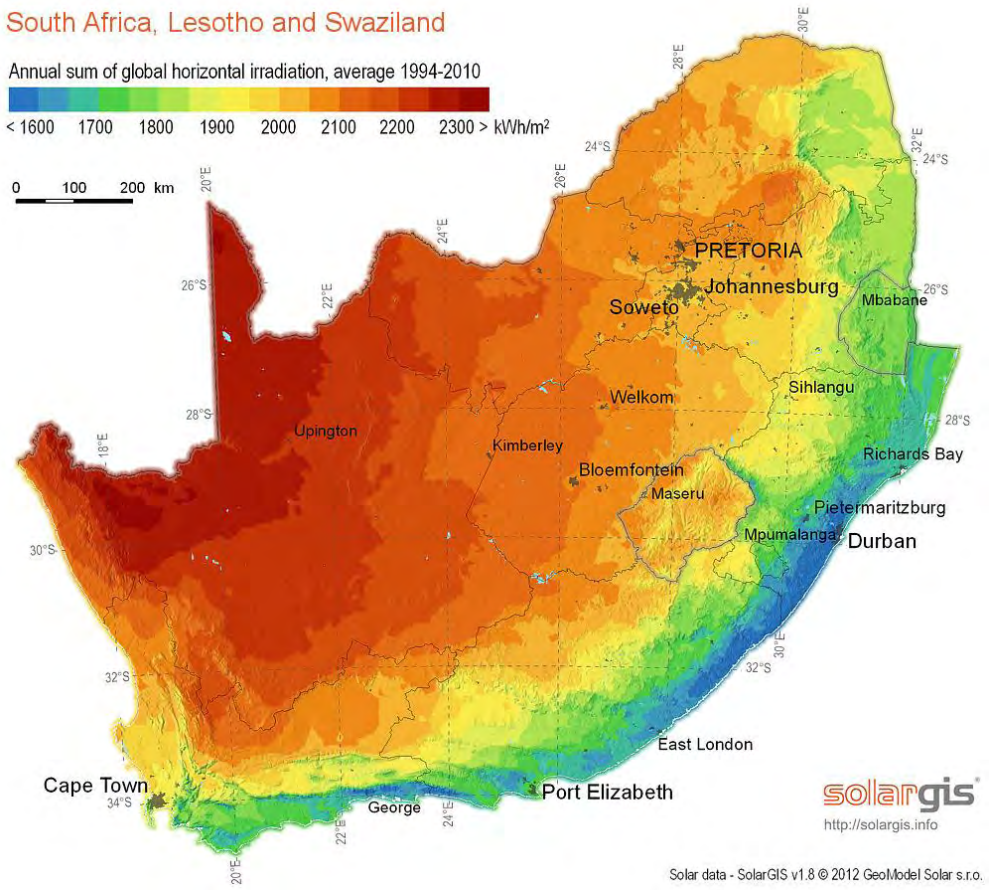


Figure 1: Solar radiation map for South Africa (Source: Solargis/info accessed on 15 August 2012).

The Northern Cape area is considered to have **extremely favourable solar radiation levels** over the majority of the year, making it ideal for the production of solar-power via Photovoltaic (fixed

and tracking panels) and Concentrated (solar thermal) Solar systems. Several solar irradiation maps have been produced for South Africa, all of which indicate that the Northern Cape area **high solar irradiation**.

A solar-investment conference was held in November 2010 at Upington and was attended by 400 delegates from all over the world. Dipuo Peters, the national Minister of Energy at the time, outlined the competitive advantages of the Northern Cape, over and above its extremely high irradiation levels, amongst others:

- relative closeness to the national power grid compared to other areas with comparable sunshine;
- water from the Orange River;
- access to two airports; and
- good major roads and a flat landscape (Northern Cape Business website – solar power).

The Northern Cape is not too dusty, the land is flat and sparsely populated, and there are little to no geological or climate risks, meaning that the sun can be used year-round (BuaNews online). An advantage that the Northern Cape has over the Sahara Desert is the relatively wind-free environment that prevails in the province. A Clinton Climate Initiative (CCI) pre-feasibility study has found that South Africa has one of the best solar resources on the planet (Northern Cape Business website – solar power).

To take advantage of this potential for the Northern Cape to become a national renewable-energy hub, the groundwork is being done on a mega-project that has the capacity to fundamentally change the structure of South Africa's power sector: to build a massive solar park that will generate an eighth of the country's electricity needs – 5 000MW – in the Northern Cape near Upington. Sixteen square kilometres of land (thousands of hectares) have been identified and Eskom is looking for private partners. The park, which will cost more than R150-billion, will generate 1 000MW in its first phase. A full feasibility study will now be conducted with the support of the Central Energy Fund and the Development Bank of Southern Africa (Northern Cape Business website – solar power). Significant job creation, lucrative private-sector investments, local industry development and a cleaner, more secure power supply are among the benefits of a large-scale park such as this (BuaNews online).

Indeed this potential for solar energy generation plants has resulted in the emergence of smaller solar energy projects throughout the Northern Cape. The Energy Minister at the time, Dipuo Peters announced in February 2012 that 16 of the initial 28 preferred projects identified by the Department of Energy (DoE) under the renewable energy independent power producer (IPP) programme were located in the sun-drenched province (Creamer, Feb. 2012). Mining companies in the Northern Cape are looking to concentrating solar power (CSP) to provide power for their operations. Engineering company Group Five announced in 2011 that they were investigating the construction of a 150MW plant near Kathu. The Industrial Development Corporation (IDC) is supporting a number of projects in the province. These include a 100MW plant conceived by Abengoa Solar, a Spanish company with a global presence, and a Solafrica scheme to spend more than R3-billion on a Concentrated Solar Plant at Groblershoop (Northern Cape Business website – solar power).

Not comparable in size with these larger projects, the Postmasburg Solar PV Energy Facility 2 (Pty) Ltd. is one such smaller IPP solar project which intends to generate 75MW of electricity from solar-energy for inclusion into the National grid. The Postmasburg Solar PV Energy Facility 2 development site is considered ideal, primarily due to:

- The flat topography of the north-western portion of the development site and it's the availability for use for an alternative energy generation facility, which allows for optimisation

of the layout and minimum interference with identified environmental sensitive features and with respect to technical issues, such as shadows between individual solar infrastructure;
- The grid connection potential based in proximity to existing transmission & substation infrastructure – existing on-site Manganore Substation.
- The site is located outside the urban edge of Postmasburg, in close proximity to an existing major transport route – the R325, easily accessible via existing national and provincial roads;
- The site falls within a high solar radiation area which allows for the maximisation of solar energy received.
- The site falls in the centre of three identified solar-energy focus areas / hubs (Areas 5, 6 & 7 as identified by CSIR) and is within ±35km of at least four other proposed solar-energy facilities. These other solar facilities, including Bid-window 1 Lesedi and Bid-window 2 Jasper Solar PV Energy Facilities, neither impact in the layout of the proposed Postmasburg Solar PV Energy Facility 2, nor the proposed routing of the 132kV overhead grid connection to the Manganore Substation.
- The northern orientation with no obstructions to the north optimises efficiency.
- The fact that the proposed activity falls within an area with low agricultural potential and low ecosystem sensitivity reduces the environmental cost.
- Ground conditions are considered suitable, which reduces construction costs.

The Renewable Energy Independent Power Producer Programme (REIPPP) has made 3725 MW of power available to be generated as part of a first phase initiative, after which a number of phases would follow. So far, the first two bidding windows have taken up 2459.4 MW of this target. The Department of Energy (DoE) has set a number of dates for the submission of bid documents for private companies to apply for a licence to generate electricity. The bidding deadlines for the first two stages were as follow:

- 1st Bid Submission: 4 November 2011.
- 2nd Bid Submission: 5 March 2012.
- 3rd Bid submission: 19th of August 2013.
- 4th Bid submission: 18 August 2014.
- 5th Bid Submission: To be confirmed.

NOTE: It is the intention that the Postmasburg Solar PV Energy Facility 2 will submit their Bid for the 5th bidding window.

1.2 STATEGIC INFRASTRUCTURE PROJECTS (SIPS)

Eighteen years into it's democracy, South Africa still experiences major challenges related to poverty, unemployment and inequality. A New Growth Path / Plan which sets a goal of five million new jobs by 2020, identifies structural problems in the economy and points to opportunities in specific sectors and markets, or "jobs drivers". Development of infrastructure has been identified as a priority job-driver: laying the basis for higher growth, inclusivity and job creation (A Summary of the South African National Infrastructure Plan Report, 2012).

In order to address the abovementioned challenges and goals, Cabinet established the Presidential Infrastructure Coordinating Committee (PICC) to:
- coordinate, integrate and accelerate implementation;
- develop a single common National Infrastructure Plan that will be monitored and centrally driven;
- identify who is responsible and hold them to account; and
- develop a 20-year planning framework beyond one administration to avoid a stop-start pattern to the infrastructure roll-out.

Under the guidance of the PICC, 18 Strategic Integrated / infrastructure Projects (SIPS) were developed, some region-based and others programme-based. The SIPs cover social and economic infrastructure across all nine provinces, with an emphasis on lagging regions.

The SIPs include catalytic projects that can fast-track development and growth, aligning human settlement planning and skills development. The SIPs comprise of five geographically-focused SIPs, three energy SIPs, three spatial SIPs, three social infrastructure SIPs, two knowledge SIPs, one regional integration SIP and one water and sanitation SIP.

This office is of the view that the Postmasburg Solar PV Energy Facility 2 potentially form part of the following two energy SIPs:

- **SIP 8: Green energy in support of the South African economy -** Support sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the Integrated Resource Plan (IRP2010) and support bio-fuel production facilities.
- **SIP 9: Electricity generation to support socioeconomic development -** Accelerate the construction of new electricity generation capacity in accordance with the IRP2010 to meet the needs of the economy and address historical imbalances.

The relevant SIP co-ordinators for theses specific SIPs have been registered as key stakeholders during the EIA phase of this project, and have confirmed the following:

- IPP projects only become a part of SIP8 once they are successful as bidders. At this time, the EIA reference number has been send it to DEA and the PICC Technical Task Team for tracking and unblocking if required (comment received from Annmarie Buck, IDC, on 30 January 2015).
- In terms of SIP9, this project has been dealt with to ensure Eskom's input (comment received from Dr. R.B. van Buuren, Strategic Projects Department, Group Capital Division, Eskom, on 29 January 2015).

1.3 STRATEGIC ENVIRONMENTAL ASSESSMENT (SEA) & RENEWABLE ENERGY DEVELOPMENT ZONES (REDZ)

As part of the rollout of renewable energy in the country, the Department of Energy (DoE) has entered into a bidding process for the procurement of 3725 MW of renewable energy from independent power producers (IPPs) by 2016. In order to submit a bid, a proponent/IPP is required to have obtained an Environmental Authorization (EA) in terms of the Environmental Impact Assessment (EIA) Regulations, as well as several other authorizations or consents. To date, the National Department of Environmental Affairs (DEA) has received in excess of 600 renewable energy EIA applications. Through the review process certain inefficiencies in the current authorization system have been identified.

In order to address these inefficiencies and the scattered and uncertain nature of renewable energy developments across South Africa (hindering strategy and proactive infrastructure development), in discussion with DoE, the DEA has been mandated by MinMec to undertake a **Strategic Environmental Assessment (SEA)**. The Council for Scientific and Industrial Research (CSIR) is managing the wind and solar PV SEA processes on behalf of the DEA in support of the Presidential Infrastructure Coordinating Commission (PICC) Strategic Integrated Project 8 (SIP8), which is the promotion of green energy in support of the South African economy (Infrastructure News, June 2014). The main purpose of the SEA processes is to identify geographical areas most suitable for the rollout of large wind and solar PV energy projects and the supporting electricity grid network (**Renewable Energy Development Zones (REDZ)**). The process will also provide a platform for co-ordination between the various Government Departments who have a mandate in terms of issuing environmental authorizations or consents to allow for a more streamlined authorization process (Overview of DEA National Wind & Solar PV SEAs, Jan 2012).

The CSIR SEA team has identified **eight focus areas** spanning a total of 78 000 km^2 the Northern Cape, Eastern Cape, North-West, Western Cape and Free State; based on preliminary assessments (socio-economic, biodiversity, agriculture, landscape, and heritage factors, with scoping level sensitivity mapping) which have shown the highest potential for development of large clusters of wind and solar PV energy facilities (CSIR Media Release, 28 May 2014).

The Postmasburg Solar PV Energy Facility 2 appears to fall in the centre of the area between three of abovementioned focus areas (Focus Areas 5, 6 & 7). However, it is highlighted by CSIR that that focus area are intended to provide focus and not limit or exclude current or future development outside of these areas (Wind and Solar PV Focus Area, undated).

2 LEGISLATIVE AND POLICY FRAMEWORK

The legislation that is relevant to this study is briefly outlined below. These environmental requirements are not intended to be definitive or exhaustive, but serve to highlight key environmental legislation and responsibilities only.

2.1 THE CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA

The Constitution of the Republic of South Africa (Act 108 of 1996) states that everyone has a right to a non-threatening environment and that reasonable measure are applied to protect the environment. This includes preventing pollution and promoting conservation and environmentally sustainable development, while promoting justifiable social and economic development.

2.2 NATIONAL ENVIRONMENTAL MANAGEMENT ACT (NEMA)

The current assessment is being undertaken in terms of the **National Environmental Management Act** (NEMA, Act 107 of 1998)[4] . This Act makes provision for the identification and assessment of activities that are potentially detrimental to the environment and which require authorisation from the competent authority (in this case, the national Department of Environmental Affairs, DEA) based on the findings of an Environmental Assessment.

The proposed scheme entails a number of listed activities, which require a **Scoping & Environmental Impact Reporting (S&EIR) process**, which must be conducted by an independent environmental assessment practitioner (EAP). Figure 2 depicts a summary of the S&EIR process.

[4] On 18 June 2010 the Minister of Water and Environmental Affairs promulgated new regulations in terms of Chapter 5 of the National Environmental Management Act (NEMA, Act 107 of 1998), viz, the Environmental Impact Assessment (EIA) Regulations 2010. These regulations came into effect on 02 August 2010 and replace the EIA regulations promulgated in 2006. New EIA Regulations were promulgated in Dec.2014, however this Application is being dealt with in terms of the 2010 Regulations.

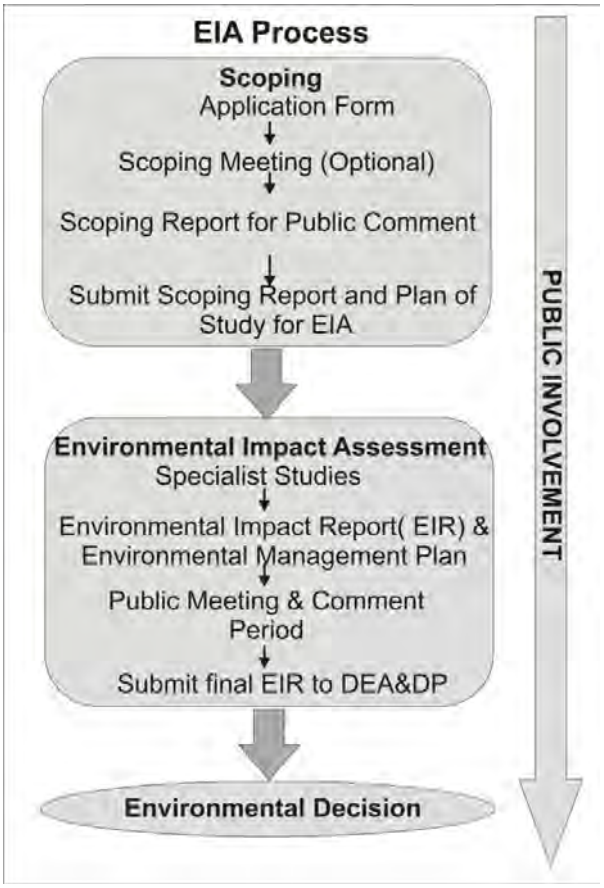


Figure 2: Summary of Scoping & EIR Process

The listed activities associated with the proposed development, as stipulation under 2010 Regulations 544, 545 & 546 are as follows:

Table 1: NEMA 2010 listed activities for the Postmasburg Solar PV Energy Facility 2

R544	Listed Activity	Activity Description
10(i)	The construction of facilities or infrastructure for the **transmission and distribution of electricity (i)** outside urban areas or industrial complexes with a capacity of more than 33kV, but less than 275kV.	**New 132kV overhead power line, of 800m-1km in length,** linking the proposed on-site substation to the existing Manganore Substation.
11(x)&(xi)	The construction of **(x)** buildings exceeding 50m² in size, or **(xi)** infrastructure or structures covering 50m² or more, where such construction occurs **within a watercourse or within 32m of a watercourse**, measured from the edge of the watercourse, excluding where such construction will occur behind the development line.	The widening of an existing access road from the south (Option 2) (to 6m), and associated stormwater culvert, over a run-off wash.
18(i)	The **infilling or depositing of any material** of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, pebbles or rock of more than 5 cubic metres from **(i) a watercourse.**	The widening of an existing access road (Option 2) (to 6m), and associated stormwater culvert, over a run-off wash.
R545	**Listed Activity**	**Activity Description**
1	The construction of facilities or infrastructure for the **generation of electricity** where the electricity output is **20MW or more**.	Solar facility will have a maximum generation capacity of **75MW$_{AC}$**.
15	**Physical alteration of undeveloped, vacant or derelict land** to **(ii)** residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is **20ha or more**.	Development of the Postmasburg Solar PV Energy Facility 2 of approximately **225ha** on vacant land, outside of the Postmasburg urban edge.

R546	Listed Activity	Activity Description
4(a)(ii)	The **construction of a road wider than 4m** with a reserve less than 13.5m. (a) In the Northern Cape. (ii) All areas outside urban areas.	Upgrade of existing **access road/s to 6m and construction of 5m-wide internal roads** for the construction and operation phases of the solar facility, outside the urban edge of Tsantsabane municipal area.
14(3)(a)(i)	The **clearance of an area of 5ha or more of vegetation** where 75% or more of the vegetative cover constitutes indigenous vegetation; (3) for a linear activity. (a) In the Northern Cape. (i) All areas outside urban areas.	**Vegetation clearing** for the Solar Panels and associated infrastructure: access roads, cable trenches and on-site substation & axillary buildings etc. **outside of the Postmasburg urban edge**. Solar Energy Plant to be constructed over an area approximately 225ha on private land. Low-growing intact vegetation will retained as far as possible.
16(iv) **(a)(ii)**	The construction of (iv) infrastructure covering 10m² or more where such construction occurs within a watercourse or within 32m of a watercourse, measured from the edge of a watercourse. (a) In the Northern Cape. (ii) Outside urban areas.	The widening of an existing access road (Option 2) (to 6m), and associated stormwater culvert, over a run-off wash.
19(a)(ii)	The widening of a road by more than 4 metres or the lengthening of a road by more than 1km. (a) In the Northern Cape. (ii) All areas outside urban areas.	Upgrade of existing **access road/s to 6m and construction of 5m-wide internal roads** for the construction and operation phases of the solar facility, outside the urban edge of Tsantsabane municipal area.

The 2014 EIA Regulations (GN R982, R983, R984 & R985) came into effect on the 8th December 2014. Although this environmental process has been undertaken under the 2010 EIA Regulations, in terms of the transitional arrangements, the following 2014 activities are similarly listed:

Table 2: NEMA 2014 similarly listed activities for the Postmasburg Solar PV Energy Facility 2

R983	Listed Activity	Activity Description
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 33kV, but less than 275kV.	**New 132kV overhead power line, of 800m-1km in length,** linking the proposed on-site substation to the existing Manganore Substation.
19(i)	The **infilling or depositing of any material** of more than 5m³ into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5m³ from – (i) **a watercourse**;	The widening of an existing access road (Option 2) (to 6m), and associated stormwater culvert, over a run-off wash.
R984	**Listed Activity**	**Activity Description**
1	The development of facilities or infrastructure for the **generation of electricity** from a renewable resource where the electricity output is **20MW or more,** excluding where such development or infrastructure is for photovoltaic installations and occurs within an urban area.	The development of facilities or infrastructure associated with a Solar facility will have a maximum generation capacity of **75MW$_{AC}$**.
2	The development and related operation of facilities or infrastructure for the **generation of electricity** from a renewable resource where the electricity output is **20MW or more.**	Development and related operation of a Solar facility will have a maximum generation capacity of **75MW$_{AC}$**.
15	The **clearance of an area of 20ha or more of indigenous vegetation**, excluding where such	Clearance of vegetation for the development of the Postmasburg

	clearance of vegetation is required for – (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	Solar PV Energy Facility 2 of approximately **225ha** on vacant land, outside of the Postmasburg urban edge.
R985	**Listed Activity**	**Activity Description**
4 (a)(i)(aa)	The **development of a road wider than 4m** with a reserve less than 13.5m – (a) In the Northern Cape, (i) Areas outside urban areas: (aa) Areas containing indigenous vegetation.	Upgrade of existing **access road/s to 6m and construction of 5m-wide internal roads** for the construction and operation phases of the solar facility, outside the urban edge of Tsantsabane municipal area.
18 (a)(i)(aa)	The **widening of a road by more than 4 metres** or the lengthening of a road by more than 1km – (a) In the Northern Cape: (i) all areas outside urban areas: (aa) areas containing indigenous vegetation.	Upgrade of existing **access road/s to 6m and construction of 5m-wide internal roads** for the construction and operation phases of the solar facility, outside the urban edge of Tsantsabane municipal area.

Before any of the above mentioned listed activities can be undertaken, authorisation must be obtained from the relevant authority, in this case the National Department of Environmental Affairs (DEA). Should the Department approve the proposed activity, the Environmental Authorisation does not exclude the need for obtaining relevant approvals from other Authorities who has a legal mandate.

2.2.1 Exemptions and Deviations

The following deviations from the public participation process were applied for in terms of Regulation 54(5) of GN R. 543.

GN R.543 Item 54 (2)(a)(i&ii):

The person conducting a public participation process must take into account any guidelines applicable to public participation as contemplated in section 24J of the Act and must give notice to all potential interested and affected parties of the application which is subjected to public participation by – (a) Fixing a notice board at a place conspicuous to the public at the boundary or on the fence of (i) the site where the activity to which the application relates is or is to be undertaken, (ii) any alternative site mentioned in the application. The boundary fence of RE/436 is set back from the R325 highway and thus will be inconspicuous to the public traveling at high speed past it. Site Notices have been placed at the entrance to Portion 2 and Portion 5 of Farm 436 (off the R325) which provides access to RE/436 from the south via an existing farm road. Notices were also placed at local public venues (see attached photos of Site Notices & Venue Notices in Annexure E6). No alternative properties / sites are to be considered for this application.

GN R.543 Item 54 (1)(b)(ii)&(iii):

Giving written notice to – (ii) the occupiers of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken, or (iii) occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken. Potentially affected landowners and adjacent landowners have been requested (via notification) to inform any labourers / tenants / occupiers residing on their properties of the proposal and their right to register as I&APs.

GN R. 543.10 (2)(d)

Advertising the environmental decision in a newspaper. Registered I&APs will be directly notified of the environmental decision.

2.3 NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY (ACT 10 OF 2004)

This Act controls the management and conservation of South African biodiversity within the framework of NEMA. Amongst others, it deals with the protection of species and ecosystems that warrant national protection, as well as the sustainable use of indigenous biological resources. Sections 52 & 53 of this Act specifically make provision for the protection of critically endangered, endangered, vulnerable and protected ecosystems that have undergone, or have a risk of undergoing significant degradation of ecological structure, function or composition as a result of human intervention through threatening processes.

Unfortunately, **no broad- or fine-scale spatial biodiversity planning have been conducted for the region,** thus no Critical Biodiversity Areas or Ecological Support Areas have been defined for the study area. This is major limitation as without a systematic conservation plan for the region, evaluating the significance of the development site within the broader context and broad-scale impacts, are difficult.

In terms of other broad-scale planning studies, the site does not fall within a National Protected Areas Expansion Strategy Focus Area (NPAES), indicating that the area has not been identified as an area of exceptional biodiversity or of significance for the long-term maintenance of broad-scale ecological processes and climate change buffering within the region (Todd, 2014).

In terms of the National Spatial Biodiversity Assessment (NSBA), the Terrestrial Ecosystem Status of the entire development area is classified as **Least Threatened** (see **Appendix A** for biodiversity maps).

2.3.1 National Protected Area Expansion Strategy (NPAES) for S.A. 2008 (2010)

Considering that South Africa's protected area network currently falls far short of sustaining biodiversity and ecological processes, the NPEAS aims to achieve cost-effective protected area expansion for ecological sustainability and increased resilience to Climate Change. Protected areas, recognised by the National Environmental Management: Protected Areas Act (Act 57 of 2003), are considered formal protected areas in the NPAES. The NPAES sets targets for expansion of these protected areas, provides maps of the most important protected area expansion, and makes recommendations on mechanisms for protected area expansion. The NPAES has set a 20-year protected area target for each vegetation type in each biome, adding up to the overall land-based 20-year protected area target of 12% of South Africa's total land area.

The NPAES identifies 42 focus areas for land-based protected area expansion in South Africa. These are large intact and unfragmented areas suitable for the creation or expansion of large protected areas. Focus Area Number **10: Eastern Kalahari Bushveld**, falls within the Savanna biome and is located approximately 5km north-west of the proposed solar site (see Location, Topographical, Biodiversity & Sensitivity Maps in **Appendix A**).

The NPAES does not deal with the site-scale planning on exactly which sites should be included in the protected area network, nor with detailed implementation planning for expanding protected areas. This responsibility lies with protected area agencies, such as provincial conservation authorities, South African National Parks (SANParks) and World Heritage Site Authorities.

The South African Heritage Resource Agency (SAHRA) and the Northern Cape Heritage Resource Agency are registered as key stakeholders for this environmental process and have been provided with the opportunity to provide comment on this solar energy development is relation to the NPAES for the Postmasburg area. South African National Parks (SANParks) head office confirmed that they had no interest in this area. **No issues** in this regard have been raised to date.

2.3.2 Municipal Biodiversity Summary Project (SANBI BGIS)

According to the information provided by the South African National Biodiversity Institute (SANBI) through their Biodiversity GIS (BGIS) system, the environment in Tsantsabane Local Municipality is mostly untransformed (99% natural areas remaining), none of which is formally protected within land-based protected areas. Two biomes occur within the municipality, the Nama-Karoo (+/- 26526.6ha) and the Savanna (562187.6ha), which support ten (10) vegetation types, none of which are classified as critically endangered, endangered or vulnerable. The proposed solar development site falls within the Kuruman Thornveld vegetation type, which has an ecosystem status of Least Threatened, and covers approximately 19% of the municipality. The municipality falls with two Water Management Areas: the Lower Orange and the Lower Vaal. Only three rivers traverse the Tsantsabane Municipality, the Ga-Mogara, the Skeifonteinspruit and Unknown, none of which traverse the proposed Postmasburg Solar PV Energy Facility 2 Solar site. Approximately 1852 wetlands have been identified to occur within the Municipality, none of which have Ramsar Wetland status, and none are located in proximity to the proposed solar site.

2.4 NATIONAL FORESTS ACT (NO. 84 OF 1998):

The National Forests Act provides for the protection of forests as well as specific tree species, quoting directly from the Act: "*no person may cut, disturb, damage or destroy any protected tree or 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 licence or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated".*

Of the nationally protected tree species known to occur in the area only *Acacia erioloba* was confirmed to be present and occurs at a relatively high density on the deeper sands within the north-eastern part of the study site. Under the layout assessed, it is estimated that about **20-30 *Acacia erioloba* trees would be affected by the development**, which is not considered highly significant given the abundance of this species in the area. Please refer to Sections 4 & 8 of this report and in full in the Ecological Impact Assessment Report in Appendix D, Annexure D1 for further description of the plant species found to occur in the area.

2.5 CONSERVATION OF AGRICULTURAL RESOURCES ACT – CARA (ACT 43 OF 1983):

CARA provides for the regulation of control over the utilisation of the natural agricultural resources in order to promote the conservation of soil, water and vegetation and provides for combating weeds and invader plant species. The Conservation of Agricultural Resources Act defines different categories of alien plants:

- Category 1 - prohibited and must be controlled;
- Category 2 – must be grown within a demarcated area under permit; and
- Category 3 - ornamental plants that may no longer be planted, but existing plants may remain provided that all reasonable steps are taken to prevent the spreading thereof, except within the floodlines of water courses and wetlands.

As highlighted by N.J Toerien, of the Northern Cape Department of Agriculture, Land Reform & Rural Development: Sub-directorate: Sustainable Resource Management (see Appendix E for comment), the developer of the proposed Postmasburg Solar PV Energy Facility 2 Photovoltaic Solar 75MW Facility must comply with Act 43 of 1983 and also take care of the following:

Article 7.(3)b of Regulation 9238 of CARA: Utilisation and protection of vlies, marshes, water sponges and watercourses: **7.(1)** "…no land user shall utilize the vegetation in a vlei, march or water sponge or within the flood area of a watercourse or within 10 meters horizontally outside such flood area in a manner that causes or may cause the deterioration to the natural agriculture

resources"; and **Article 3(b) of CARA**: ""…no land user cultivate any land on his farm unit within the flood area of a watercourse or within 10 meters horizontally outside the flood area of a watercourse."

The ecological specialist confirmed that **no watercourses or wetlands** occur on the site. A small wash, associated with stormwater run-off from the existing access road along the site southern boundary has been avoided by the PV layout, and will be affected only in so far as to potentially widen this road associated stormwater culvert. Refer to letter from Ecological Specialist regarding the on-site hydrological features attached in Annexure G3.

As part of the Agricultural Potential study undertaken, it has been confirmed that the **soils present on the proposed development site are highly prone to both water and wind erosion**. Measures in terms of avoidance of sensitive areas, erosion and stormwater control and management and facility technological / layout design have been considered in this report and the attached EMPr.

2.6 NORTHERN CAPE NATURECONSERVATION ACT (NO. 9 OF 2009):

The Northern Cape Nature Conservation Act provides inter alia for the sustainable utilisation of wild animals, aquatic biota and plants as well as permitting and trade regulations regarding wild fauna and flora within the province. In terms of this act the following section may be relevant with regards to any security fencing the solar development may require.

Manipulation of boundary fences: *19. No Person may –*

(a) erect, alter, remove or partly remove or cause to be erected, altered, removed or partly removed, any fence, whether on a common boundary or on such person's own property, in such a manner that any wild animal which as a result thereof gains access or may gain access to the property or a camp on the property, cannot escape or is likely not to be able to escape therefrom.

The parameter fencing of the Postmasburg Solar PV Energy Facility 2 Site will be constructed in a manner which allows for the passage of small and medium sized mammals: i.e. steel palisade fencing of max. 2.5m in height (20 cm gaps min), alternatively the lowest strand or bottom of the fence will be elevated to 15 cm above the ground at least at strategic places to allow for fauna to pass under the fence. The most appropriate method will be confirmed during the final design phase in collaboration with the biodiversity specialist. Electrified strands may only be placed above 20 cm off the ground and may only be installed on the inside of the fence – to allow free movement of tortoises and reptiles in particular. During operation, all gates will be kept closed to ensure that no larger fauna enter and become trapped within the fenced-off area.

The Act also lists protected fauna and flora under 3 schedules ranging from Endangered (Schedule 1), Protected (Schedule 2) to Common (Schedule 3). The majority of mammals, reptiles and amphibians are listed under Schedule 2 (common), except for listed species which are under Schedule 1. A permit is required for any activities which involve species listed under schedule 1 or 2.

The following listed plant species are known to occur in the broad vicinity of the proposed Postmasburg Solar PV Energy Facility 2 study area (Todd, Dec. 2015):

Table 3: Listed plant species known from the broad area.

Family	Species	Status
AMARYLLIDACEAE	*Boophone disticha*	Declining
ASPARAGACEAE	*Asparagus stipulaceus*	NT
ASTERACEAE	*Gnaphalium declinatum*	NT
FABACEAE	*Acacia erioloba*	Declining

MESEMBRYANTHEMACEAE	*Antimima lawsonii*	Rare

At least one of these, *Asparagus stipulaceus,* does not actually occur in the area and is on the list as a result of the outdated taxonomy of historical species lists for the area. Of the remaining species, only *Acacia erioloba* can be confirmed present and occurs at a relatively high density on the deeper sands within the north-eastern part of the study site. Under the layout assessed, it is estimated that about **20-30 *Acacia erioloba* trees would be affected by the development**, which is not considered highly significant given the abundance of this species in the area. It is possible that *Boophone disticha* is present within the rocky hills, but it was not observed during the site visit. It is unlikely that the other species are present as they have not been observed in the area by the consultant on other sites near the current study (Todd, 2015).

In terms of protected species, the provincially protected tree species *Olea europea subsp. africana* and nationally protected *Acacia haematoxylon* were confirmed present, but neither of these species will be affected by the preferred development layout.

Five listed terrestrial mammal species potentially occur in the area; these are: the Brown Hyaena *Hyaena brunnea* (Near Threatened), Honey Badger *Mellivora capensis* (IUCN LC and SARDB Endangered), Black-footed Cat *Felis nigripes* (Vulnerable), Ground Pangolin *Smutsia temminckii* (Vulnerable) and South African Hedgehog *Atelerix frontalis*. There are also **four Near Threatened bat species present in the area**. Given the extensive national ranges of these species, the impact of the development on habitat loss for these species would be minimal and a long-term impact on these species would be unlikely (Todd, 2014 & 2015).

Of the 217 bird species recorded for the area, **eleven listed bird species are known from the area**, all of which are classified as Vulnerable or Near Threatened. The **site does not fall within or near any of the Important Bird Areas** defined by Birdlife South Africa. Direct habitat loss is not likely to be a highly significant impact for most species and the major potential source of impact would come from electrocution and collisions with the power lines. Given the proximity of the site to the Eskom Manganore Substation, these impacts are likely to be very low and a significant impact would be highly unlikely (Todd, 2014 & 2015).

No reptile species of conservation concern are known to occur in the area. The only species of potential conservation concern which may occur at the site is the **Namaqua Plated Lizard** *Gerrhosaurus typicus* which was classified as Near Threatened (IUCN 2009), but has since been downgraded to Least Concern by SARCA (Bates *et al*.). The rocky hills, the most important habitat for this species, have been avoided by the preferred layout.

The only amphibian species of conservation concern which may occur at the site is the **Giant Bullfrog** *Pyxicephalus adspersus*. The site lies at the margin of the known distribution of this species and it has not been recorded from any of the quarter degree squares around the site, suggesting that it is unlikely to occur at the site (Todd, 2015).

2.7 NATURE & ENVIRONMENTAL CONSERVATION ORDINANCE (19 OF 1974)

This legislation was developed to protect both animal and plant species within the various provinces of the country which warrant protection. These may be species which are under threat or which are already considered to be endangered. The provincial environmental authorities are responsible for implementing the provisions of this legislation, which includes the issuing of permits etc. In the Northern Cape, the Department of Environment and Nature Conservation fulfils this mandate.

Several protected / listed flora and fauna species are known to occur in the broad area of the proposed solar development site. The occurrence of these species, as well as the potential impact on their habitats and populations have been confirmed by the ecological specialist as part

of the impact assessment (see Sections 4 & 8 below and Flora, Fauna & Avifauna EIA Report in Appendix D, Annexure D1 attached).

2.8 NATIONAL HERITAGE RESOURCES ACT

The protection and management of South Africa's heritage resources are controlled by the National Heritage Resources Act (NHRA)(Act No. 25 of 1999). South African National Heritage Resources Agency (SAHRA) is the enforcing authority in the Northern Cape, and is registered as a Stakeholder for this environmental process.

In terms of Section 38 of the National Heritage Resources Act, SAHRA will comment on the detailed Integrated Heritage Impact Assessment (HIA) where certain categories of development are proposed. Section 38(8) also makes provision for the assessment of heritage impacts as part of an EIA process.

The National Heritage Resources Act requires relevant authorities to be notified regarding this proposed development, as the following activities are relevant:

- *the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;*
- *any development or other activity which will change the character of a site exceeding 5 000 m² in extent;*
- *the re-zoning of a site exceeding 10 000m² in extent.*

The NHRA provides protection for the following categories of heritage resources:

- Landscapes, cultural or natural (Section 3 (3))
- Buildings or structures older than 60 years (Section 34);
- Archaeological Sites, palaeontological material and meteorites (Section 35);
- Burial grounds and graves (Section 36);
- Public monuments and memorials (Section 37);
- Living heritage (defined in the Act as including cultural tradition, oral history, performance, ritual, popular memory, skills and techniques, indigenous knowledge systems and the holistic approach to nature, society and social relationships).

Refer Section 9 below and Annexures D3 & D4 for the Heritage / Archaeological Assessment Report.

In terms of Section 34(1), no person may alter or demolish any structure or part of a structure, which is older than 60 years without a permit issued by the SAHRA, or the responsible resources authority**. Remnants of a 20th century kraal complex, including the base for a wire fence and various concrete platforms. The farmhouse of Kapstewel does not appear to be older than 60 years. There was no evidence of any historic middens or ruins on the property. The remains of a kraal complex appear to be more recent than 60 years. It is not anticipated that there will be any impacts to historical archaeology. (Webley, 2014).**

Nor may anyone destroy, damage, alter, exhume or remove from its original position, or otherwise disturb, any grave or burial ground older than 60 years, which is situated outside a formal cemetery administered by a local authority, without a permit issued by the SAHRA, or a provincial heritage authority, in terms of Section 36 (3). **One grave and two stone cairns (which might represent graves) were found to occur in the area to be avoided by PV infrastructure (Webley, 2014).**

In terms of Section 35 (4), no person may destroy, damage, excavate, alter or remove from its original position, or collect, any archaeological material or object, without a permit issued by the SAHRA, or the responsible resources authority. **Virtually no pre-colonial archaeological**

remains were identified during the survey. A single stone artefact (of indeterminate age) was recovered, and of low significance (Webley, 2014).

The proposed preferred solar PV development layout has been informed by inputs from heritage, archaeological and palaeontological specialists. The grave and stone cairn sites, considered to be sensitive, have been mapped with appropriate buffers and avoided by the preferred layout alternative.
The Integrated Heritage Impact Assessment (including the above studies) were submitted to SAHRA for further input, comment and decision-making. The Final Comment / Decision from SAHRA was still awaited at the time of compiling this report.

2.9 NATIONAL WATER ACT, NO 36 OF 1998

Section 21(c)&(i) of the National Water Act (NWA) requires that authorisation be applied for from the Department of Water and Sanitation (DWS) for any water use / activity in, or on the banks, of any watercourse. Water use activities listed in Section 21 are as follows:
(c) impeding or diverting the flow of water in a watercourse;
(i) altering the bed, banks, course or characteristics of a watercourse.

The EAP identified a possible watercourse / stormwater drainage line traversing the proposed solar development site, during an initial site visit. However, this feature was confirmed by the ecological specialist to be a small wash, across the south-eastern boundary and associated with stormwater run-off from the existing access road along the southern boundary of site (see letter from Simon Todd regarding the hydrological features on site, attached in Annexure G3). Although this stormwater was confirmed by the specialist to have low sensitivity, has been avoided by the preferred PV layout. This wash is directed under the existing access road within an existing stormwater culvert, which may need to be widened, along with the road, to 6m, should it be used as an access road to the facility (Access Road Option 2). Erosion and stormwater control and management will apply.

This Act also controls / regulates the utilization of natural water resources and provides provisions to safe-guard the integrity of these water resources. The proposed Postmasburg Solar PV Energy Facility 2 is likely to require approximately 10 000m³ of water during the +/- 18 month construction period, as well as approximately 5 000m³ per annum for the +/- 20 year operational lifespan of the solar energy facility.

Water required for the construction and operation of the Postmasburg Solar PV Energy Facility 2 is to be sourced via **three possible options**, listed in order of preference:

- Trucked in from the Local Municipality (via water-tanker), or made available in Postmasburg or surrounds via a metered standpipe. Confirmation of availability and specific arrangements in this regard will be sought from the Tsantsabane Municipality and recorded in a Service Level Agreement (SLA);
- Sedibeng Water (Northern Cape) – from a metered supply point off the nearby water pipeline operated by Sedibeng Water (a registered Water Services Provider); and
- Borehole collection on site.

A rainwater collection and storage system (off the on-site substation and axillary building roofs), will be installed to supplement that abovementioned water source option/s.

The Tsantsabane Local Municipality, as a Registered Water Services Provider, has confirmed that they have sufficient unallocated capacity to provide potable water during the construction and operation of the solar facility. A Binding Service Level Agreement will be entered into with the Applicant should the project receive preferred bidder status. See municipal service capacity confirmation letter attached in Annexure G4).

Should the option to install on-site boreholes be selected, an Application will be submitted to the Northern Cape Department of Water and Sanitation (DWS) for the registration of such boreholes, as well as a Water Use Licence Application (WULA) for the use of the borehole water for the purposes of the solar facility, along with confirmation that sufficient water is available. Abstraction of water from a borehole may trigger Section 21(a) of the NWA depending on whether the site falls within a General Authorisation are or not. If a General Authorisation applies, then a WULA will only apply to use of borehole water for the operational phase of the solar facility, as the General Authorisation will cater for construction phase provided the daily General Authorisation limit is not exceeded.

Fluvius Water Consultants have been appointed to ascertain WULA / GA requirements and to submit the necessary application (see letter from Fluvius Consultants and associated proof of receipt of WULA from the Northern Cape Department of Water & Sanitation, in Annexure G3).

In terms of the National Freshwater Ecosystem Priority Area (NFEPA) mapping no rivers or wetlands occur on or in proximity to the solar development property.

DWS and the Department of Agriculture have been registered as key stakeholders and requested to provide input in this regard.

2.10 ASTRONOMY GEOGRAPHIC ADVANTAGE ACT, 2007 (ACT NO 21 OF 2007)

The purpose of the Act is to preserve the geographic advantage areas that attract investment in astronomy. The entire Northern Cape Province, excluding the Tsantsabane Municipality, has been declared an astronomy advantage area. The Northern Cape optical and radio telescope sites were declared core astronomy advantage areas. The Act allowed for the declaration of the Southern Africa Large Telescope (SALT), Meerkat and Square Kilometre Array (SKA) as astronomy and related scientific endeavours that has to be protected.

A high level risk assessment has been conducted at the **South African SKA Project Office** to determine the potential impact of the Postmasburg Solar PV Energy Facility 2 (RE Capital 10) on the Square Kilometre Array. This assessment confirmed that the nearest SKA station has been identified as Rem-Opt-08, at approximately 98km from the proposed installation. Therefore, based on the distance to the nearest SKA station, this facility poses a **low risk of detrimental impact on the SKA**, and **no mitigation measures would be required** at this stage.

2.11 SUSTAINBILITY IMPERATIVE

The norm implicit to our environmental law is the notion of sustainable development ("SD"). SD and sustainable use and exploitation of natural resources are at the core of the protection of the environment. SD is generally accepted to mean development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. The evolving elements of the concept of SD *inter alia* include the right to develop; the pursuit of equity in the use and allocation of natural resources (the principle of intra-generational equity) and the need to preserve natural resources for the benefit of present and future generations. Economic development, social development and the protection of the environment are considered the pillars of SD (the triple bottom line).

"*Man-land relationships require a holistic perspective, an ability to appreciate the many aspects that make up the real problems. Sustainable planning has to confront the physical, social, environmental and economic challenges and conflicting aspirations of local communities. The imperative of sustainable planning translates into notions of striking a balance between the many competing interests in the ecological, economic and social fields in a planned manner. The 'triple*

bottom line' objectives of sustainable planning and development should be understood in terms of economic efficiency (employment and economic growth), social equity (human needs) and ecological integrity (ecological capital)."

As was pointed out by the Constitutional Court, SD does not require the cessation of socio-economic development but seeks to regulate the manner in which it takes place. The idea that developmental and environmental protection must be reconciled is central to the concept of SD - it implies the accommodation, reconciliation and (in some instances) integration between economic development, social development and environmental protection. It is regarded as providing a "conceptual bridge" between the right to social and economic development, and the need to protect the environment.

Our Constitutional Court has pointed out that the requirement that environmental authorities must place people and their needs at the forefront of their concern so that environmental management can serve their developmental, cultural and social interests, can be achieved if a development is sustainable. "*The very idea of sustainability implies continuity. It reflects the concern for social and developmental equity between generations, a concern that must logically be extended to equity within each generation. This concern is reflected in the principles of inter-generational and intra-generational equity which are embodied in both section 24 of the Constitution and the principles of environmental management contained in NEMA.*" [Emphasis added.]

In terms of NEMA sustainable development requires the integration of the relevant factors, the purpose of which is *to ensure that development serves present and future generations.*[5]

It is believed that the proposed 75MW Postmasburg Solar PV Energy Facility 2 supports the notion of sustainable development by presenting a reasonable and feasible alternative to the existing vacant land use type, which has limited agricultural potential due the poor soil properties, extreme climatic conditions and low grazing capacity. Furthermore the proposed alternative energy project (reliant on a natural renewable resource – solar energy) is in line with the national and global goal of reducing reliance on fossil fuels, thereby providing long-term benefits to future generations in a sustainable manner.

5 See definition of "sustainable development" in section 1 of NEMA.

3 ACTIVITY

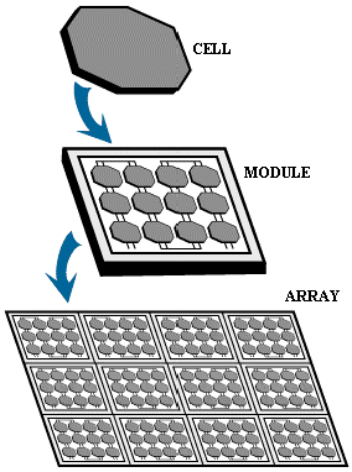
The Applicant, Postmasburg Solar PV Energy Facility 2 (Pty) Ltd., intends to develop a **solar energy facility** on the northern portion of the Remainder of the Farm 436 Kapstewel, Postmasburg, Northern Cape.

The proposed **photovoltaic (PV) solar energy facility** will have a **net generation capacity of 75 MW_{AC}** (up to 86.25 MW_{DC} installed capacity / name plate capacity) and the **development footprint will be approximately 225ha**. The solar technology will be PV with fixed-tilt, single- or double- axis tracking mounting structures. The infrastructure associated with this solar PV development will include the following:

- **Solar field** of PV modules/panel arrays (fixed / tracking technology) with a **maximum structure height of ± 3.5 metres**;
- Mounting structures foundations to comprise of driven / rammed piles, earth-screws or rock anchors.
- Up to a maximum of ± **60 inverter / transformer stations**, including medium voltage (MV) distribution transformers, at a height of ± 3m;
- **On-site Substation** of ± 120m x 70m in size (including a power transformer/s to allow the generated power to be connected to Eskom's electricity grid via the Manganore Substation);
- **Overhead 132kV transmission power line** to distribute the generated electricity from the on-site substation to the existing Eskom Manganore Distribution Substation (located directly adjacent to & south east of the site). The transmission line will be a single circuit line, ± **500m to 1km in length**, with a **maximum height of ± 32m**, within a **servitude width of between 31m – 40m**;
- **Auxiliary buildings**, including:
    - Control Building / Centre (± 31m x 8m);
    - Office (± 22m x 11m);
    - Warehouses (x2) (± 50m x 20m)
    - Canteen & Visitors Centre (± 30m x 10m)
    - Staff Lockers & Ablution (± 22m x 11m); and
    - Gate house / security offices (± 6m x 6m),
- **Internal electrical reticulation network** (to be lain ± 2 – 4m underground as far as practical);
- **Access road (**± 6m) and **internal road /** track (± 5m wide) network;
- **Laydown areas**, required for material & equipment (± 200m x 150m);
- **Rainwater tanks;** and
- **Perimeter fencing** & lighting around the solar facility.

3.1 TECHNOLOGICAL OVERVIEW

Photovoltaic (PV) solar power technology has been identified as the preferred technology to generate electricity in this project.



A solar *'array / rack'* consists of a number of *'panels / modules'* that in turn are made up of hundreds of small individual *'cells'*. Individual arrays / racks are then grouped into various rows that make up most of what one sees as a solar plant / field. Arrays are mounted on aluminium frames that are rammed into the soil to keep them in an upright and stable position.

Figure 3: Diagrammatic representation of typical PV panel array

Photovoltaic (PV) panels convert the energy delivered by the sun into direct current (DC) electric energy. The PV arrays are connected to inverters by means of a network of underground cables, which in turn invert the direct current (DC) to alternating current (AC). The power generated is then stepped-up to the required voltage and frequency of the national grid, by using the transformer within the on-site switching station / substation. The generated electricity is then distributed from the on-site power transformer/s via an overhead transmission / distribution power line to the nearest Eskom Substation (Manganore in this case). From the Eskom substation, the electricity is fed into the national Eskom grid.

Several alternatives / options in terms of the photovoltaic solar technology will be considered. These include layout, technological and operational alternatives. The following section provides an overview of the technological options to be considered.

3.1.1 Fixed & Tracking Options

Fixed-tilt / stationary solar technology comprises the PV modules being fixed to the ground in a specific north facing angle and consist of no moving parts. .

Single axis tracking systems are designed to follow the path of the sun across the sky every day, allowing the modules to be exposed to typically 20 - 25% more irradiation than fixed PV systems. Single-axis tracking systems contain only a few moving parts and have more or less the same footprint and infrastructure requirements than that of fixed-tilt designs.

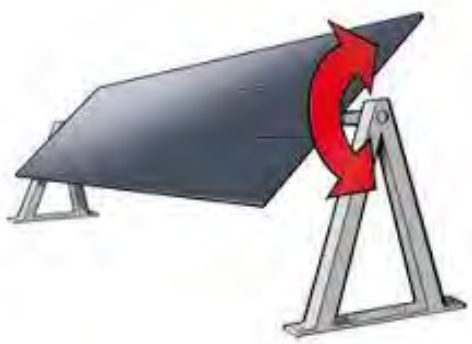


Figure 4: Examples of single / horizontal axis PV tracking systems.

Double / dual axis tracking systems are very effective as they track the sun in more than one axis. This allows for maximum irradiation over the entire solar module.

Figure 5: Examples of double axis PV tracking systems.

3.1.2 Founding / Mounting Options

The most common foundation used for anchoring PV solar frames in South Africa is concrete cast foundations. This type of foundation requires a foundation trench, shuttered aboveground, filled with concrete and reinforcing steel. Once the concrete has cured, the solar frame is then welded or bolted to protruding reinforcing steel (or could have been left to cure within the concrete). This mounting technology is much more suited to European conditions and not for the extremely hard surfaces of the proposed site, unless the concrete is cast onto the surface using shutters.

Figure 6: Examples single axis & fixed solar cast foundations.

Another alternative considered for the mounting of the solar frames is a pre-cast concrete footing. A pre-cast concrete foot can be manufactured off site, reducing the risk of concrete spillages and the need for increased amounts of water during the construction phase of the project. Drawbacks associated with a pre-cast footing include the large physical footprint required to keep the structures stable, in addition to the possible need for them to be bolted or grouted to the ground surface for stability.

Considering the above, is has been recommended that the Postmasburg Solar PV Energy Facility 2 be installed by means of driven / rammed piles, earth-screws or rock anchors, as these will have a significantly reduced impact on the environment. Grouted / concrete foundations may be required in limited instances should detailed geotechnical studies necessitate such. The figures below show the equipment required for the ramming process.

This installation technology eliminates the need for the use of cement or polymeric products, and as a result of the very small mounting footprint, has minimal disturbance of the ground cover, substrate or natural stormwater run-off / flow (which could have significant long term effects on the ecology of the surrounding area).

Figure 7: Typical rammed or screwed method of installation.

3.1.3 Cell / Film Options

There are a multitude of different Photovoltaic (PV) film technologies available today. These include concentrated PV cells, thin-film (amorphous silicon or cadmium telluride) or multi-crystalline (thick-film) cells, selected depending on the space and irradiance conditions, with the electricity yield and application being the deciding factors. Concentrated photovoltaic (CPV) technology uses optics - lenses or curved mirrors to concentrate a large amount of sunlight onto a small area of solar photovoltaic (PV) cells to generate electricity.

Figure 8: Examples of Concentrated PV cells.

With ambient temperatures regularly exceeding 40°C in the area, thin-film technology may not suited to the conditions of the Northern Cape Province, due to its inferior performance at high temperatures. **CPV or Multi-crystalline or thick-film technology** may be better suited to the climatic conditions of the site.

3.2 SOLAR LAYOUT ALTERNATIVES

A number of solar PV development layouts have been considered from the start of this environmental process. These have been revised and adjusted in an iterative manner to incorporate / accommodate the site sensitivities identified by the various specialists, taking their recommendations into account.

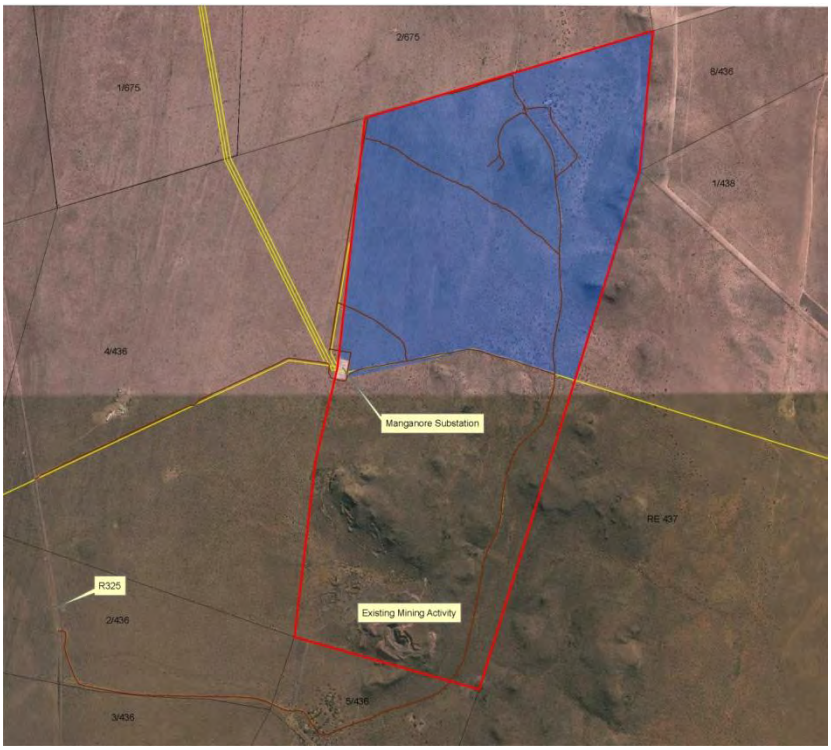
Please refer to the Technical Layout Development Report (Atlantic Energy Partners, (2014), attached as Annexure D6, for details regarding the layout alternatives and technological design details of the proposed Postmasburg Solar PV Energy Facility 2.

3.2.1 Alternative 1 – Uniform Layout (*discarded)*

A conceptual / uniform layout was initially designed to make use of the entire ± 450ha study area identified for the Postmasburg Solar PV Energy Facility 2 (the northern portion of cadastral unit RE/436, north of the Manganore Substation).

As this initial uniform layout did not consider any of the existing infrastructure located on- and adjacent to- the site (existing access / internal roads, transmission lines, dwelling & reservoirs

etc.), nor any site constraints / environmental sensitive areas (identified by the various specialist studies), it has been **excluded from the on-going environmental process and will therefore not be assessed further**.



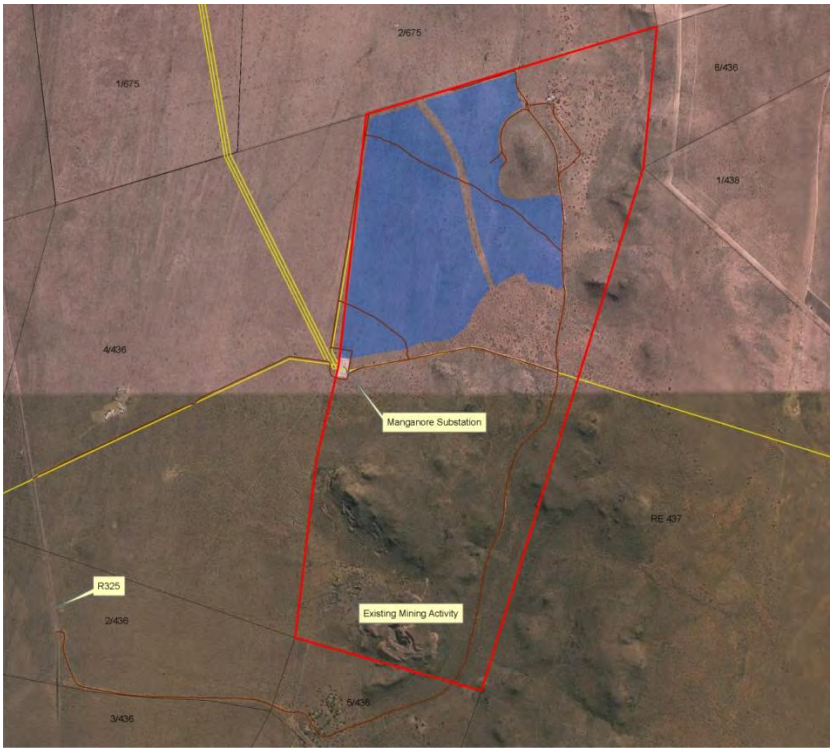
Initial Uniform / Conceptual Layout highlighted in blue, over the entire extent of the ± 450ha study area. Property boundary / cadastral unit of RE/436 indicated as red line. Yellow lines indicate existing powerlines to the Manganore Substation, while brown lines indicate existing access & farm roads / tracks.

Figure 9: Alternative 1 - Uniform Layout

3.2.2 Alternative 2 – Preliminary Layout (*discarded)*

Alternative 2 is concentrated to the western portion of the abovementioned 450ha study site, close to the Manganore Substation. This preliminary layout considered the existing infrastructure on- and adjacent to- the site, as well as potential preliminary site constraints identified during the scoping / desktop investigations.

Since the scoping phase, the extent and significance of potential sensitive areas on the site were confirmed via detailed site assessments undertaken by various specialists, and the solar layout adjusted to take these confirmed sensitive features into account. Therefore **this Preliminary Alternative 2 layout has been discarded from the on-going environmental process.**



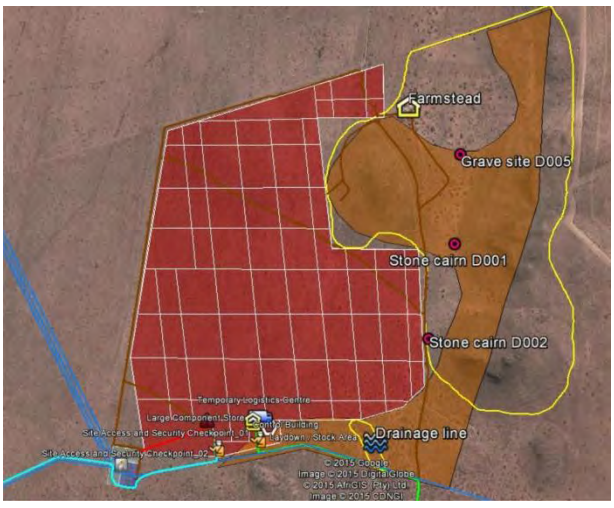
Discarded Preliminary Layout highlighted in blue, designed to avoid hills, potential drainage line and potential wooded areas. Property boundary / cadastral unit of RE/436 indicated as red line. Yellow lines indicate existing powerlines to the Manganore Substation, while brown lines indicate existing access & farm roads / tracks.

Figure 10: Alternative 2 - Preliminary Layout

The refined layout is presented as Alternative 3 – Preferred Alternative, discussed below, which has taken the avoidance / mitigation / management measures recommended in relation to identified sensitive areas into account.

3.2.3 Alternative 3 – PREFERRED / Mitigated Layout

The preferred Alternative 3 layout is ± 225ha is size and concentrated to the western portion of the abovementioned 450ha study site, close to the Manganore Substation. This layout has taken **the existing infrastructure on- and adjacent to- the site into account,** as well as sensitive **ecological, visual and heritage/archaeological features** confirmed to occur on the site. These features are centred predominantly on- and between- the hills located across the eastern portion of the site, as well as a small stormwater run-off wash, associated with the southern access road, aligned across the south-eastern site boundary. A large no-go area has been excluded from the PV layout to prevent encroachment onto sensitive features. This no-go area has been accommodated in this preferred solar layout alternative.



Preferred layout Alternative 3 avoids the following identified sensitive areas / features:

- Hills / koppies and intervening plains, that contain deep sands & numerous protected tree species (large yellow outline);
- Historical farmstead complex;
- Sensitive stone cairn & grave sites, D001, D002 & D005;
- Visually sensitive areas (brown area); and
- Small wash on south-eastern boundary.

Figure 11: Preferred layout showing sensitive features on site.

These adjustments aim to achieve the least possible environmental impact, while maintaining the economic viability of the project. The potential impacts (negative and positive) associated with this layout, as well as recommendations / measures focused on the pre-construction, construction, operation and decommissioning phases of the development, are detailed in this impact assessment report and included in the Environmental Management Programme (EMPr) for implementation.

3.2.4 NO-GO / Status Quo Alternative

The **Status Quo Alternative** proposes that the Postmasburg Solar PV Energy Facility 2 not go ahead and that the area in proximity to the Manganore Substation and R325 remain undeveloped as it is currently. The land on which the solar development is proposed is currently vacant, used for limited cattle grazing activities. However, the area in question is considered too small to generate noteworthy financial benefit from agricultural activities (due to its low carrying capacity), and a combination of poor soil quality, water scarcity and extreme climatic conditions, creates a context with no potential for irrigated crop cultivation.

The solar PV generation potential of the Postmasburg area, particularly in proximity to the Manganore Substation, is significant and will persist should the no-go option be taken. The 'No-go/Status Quo' alternative will limit the potential associated with the land and the area as a whole for ensuring energy security locally, as well as the meeting of renewable energy targets on a provincial and national scale. Should the 'do-nothing' alternative be considered, the positive impacts associated with the solar facility (increased revenue for the farmer, local employment and generation of electricity from a renewable resource) will not be realised.

The **no-go alternative is thus not considered a favourable option in light of the benefits associated with the proposed solar facility development, however it has been used as a baseline from which to determine the level and significance of potential impacts associated with the proposed solar development.**

3.3 ASSOCIATED INFRASTRUCTURE & DESIGN OPTIONS

Please refer to the Technical Layout Development Report (Atlantic Energy Partners, (2014), attached as Annexure D6, for details regarding the layout alternatives and technological design and details of the proposed Postmasburg Solar PV Energy Facility 2. In addition, refer to the Transport & Traffic Management Plan (Aurecon, 2014) and the Stormwater Management Plan (Aurecon, 2014) attached as Annexures F5 & F6 for further technical details.

3.3.1 Electrical Infrastructure

Up to a maximum of ± **60 invertor stations** will convert the power generated by the PV panel arrays into a form that can be fed into the step-up on-site substation. These invertor stations will typically be about 3m in height and preferably built into transportable containers. The PV arrays will be connected to the inverter-stations, and the inverter-stations connected to the on-site facility substation, via **underground electrical** cabling, that will be aligned alongside / within the internal service roads and pathways between the arrays as far as possible to allow for quick and easy access.

The interconnecting cables will be trenched where practically possible, but in areas of high sensitivity (if any), or where deemed more practical, cables will be mounted onto the mounting structures to avoid excessive excavation works and clearing of vegetation.

The **step-up on-site facility substation** and its associated infrastructure (transformer etc.) will have a footprint of ± 0.84ha (120m x 70m). The electric current generated by the solar panels is inverted and then stepped up via the power transformer/s and ancillary equipment to the required voltage and frequency of the national grid.

Electricity from the on-site facility substation will be transmitted via a **132kV overhead power line,** of approximately 500 - 1km in length, to the existing Eskom Manganore Substation, located on the south-western corner of the site. This powerline will be supported by pylons of ± 32m in height, within a servitude of between 31m – 40m wide.

3.3.2 Auxiliary Buildings

The total foot print of the auxiliary buildings (including gate/security house/s, offices, control centre, warehouse, canteen, visitor centre & staff lockers) is likely to occupy ± 3068m² or 0.3068ha (excluding the facility substation). Please refer to the description of the activity at the beginning of Section 3 for the approximate dimensions of these buildings.

The Facility Substation, auxiliary buildings and the temporary laydown area will be located in the south-western corner of the PV solar PV layout, close to the existing Manganore Substation. These auxiliary buildings and temporary laydown area mentioned above are typical of solar PV projects, however may deviate due to engineering requirements, new technologies and regulatory changes from the government's tender process.

3.3.3 Access & Internal Road Network

Two possible access routes, from the R325 to the development, are under consideration. Both these road access options are **aligned along existing farm / servitude access roads**:

Road access Option 1: crosses Portion 4 of Farm 436 parallel to the 132kV powerline from the west (± 3200m in length to the PV facility security checkpoint);

Road Access Option 2: crosses Portions 2 and 5 of Farm 436 (the old mine land), entering the property from the south (± 6980m in length to the PV facility security checkpoint). Refer to Section 4.1 below for images.

Both the abovementioned access road options are considered to be viable, from environmental and technical viewpoints, and the selection of the preferred alignment will largely be subject to consent from the relevant landowners / caretakers.

The required access road would be gravel and approximately 6m in width.

Figure 12: Proposed access road options along existing farm roads. Option 1 indicated by bright blue line, while Option 2 indicated by bright green line.

The **internal road network** of the solar facility will be gravelled roads (less than 5m wide around the solar array periphery) and un-surfaced tracks (in-between the solar modules) to be used for maintenance and cleaning of solar cells.

3.3.4 Water Requirements

A typical solar development of this size is likely to require **approximately 10 000m³ of water during the ± 18 month construction period**, as well as **approximately 5 000m³ per annum for the 20 year operational lifespan** of the solar energy facility to clean the PV panels. The volume required during operation to clean the panels may need to be increased in the case of the

Postmasburg Solar PV Energy Facility 2 site, due to the proximity of numerous mining activities in the surrounding area generating dust. This will be confirmed later during the detailed design phase when final technology suppliers have been appointed to the project as well as more accurate wind data is acquired. Preliminary findings show north-north-easterly to be the dominant wind direction, suggesting that mining activity in the south should not pose a significant dust threat to the project.

Weather conditions, traffic and general dustiness of the site play a role in the exact amount of ground water required to wash the Solar PV panels. At present, it is assumed that each panel should be washed a maximum of four times a year, however more detailed maintenance schedules will be defined as the project progresses and technology suppliers are appointed to the project.

Possible water sources identified include the following, listed in order of preference:

- ***Tsantsabane Municipality –*** Water will be trucked in from the Local Municipality (via a water-tanker), or made available in Postmasburg or surrounds via a metered standpipe. Confirmation of availability and specific arrangements in this regard will be sought from the Tsantsabane Municipality and recorded in a Service Level Agreement (SLA) to be negotiated with the Municipality;
- **Sedibeng Water** (Northern Cape) – from a metered supply point off the nearby water pipeline operated by Sedibeng Water (a registered Water Services Provider); and
- **Borehole** water collection on-site (subject to National Water Act requirement for a Water Use Licence Authorisation (WULA) or General Authorisation (GA).

A **rainwater collection** and storage system (off the on-site substation and axillary building roofs), will be installed to supplement the abovementioned water source option/s.

The Tsantsabane Local Municipality, as a Registered Water Services Provider, has confirmed that they have sufficient unallocated capacity to provide potable water during the construction and operation of the solar facility. A Binding Service Level Agreement will be entered into with the Applicant should the project receive preferred bidder status. See municipal service capacity confirmation letter attached in Annexure G4).

3.3.5 Transportation of Solar Equipment

All solar plant components and equipment are to be transported to the solar development site by road via container trucks. Construction is likely to extend over a period of ± 18 months, during which time the majority of the solar PV panels and construction components will be transported by utilising **container trucks**.

Less than 30 containers are required per installed MW, which typically includes all solar PV components and additional construction equipment. **Over the period of 18 months, approximately 2200 containers may therefore be transported to the proposed site**.

The Transport / Traffic Report states that it is estimated that the number of heavy vehicles per 7MW installation would be between 300 and 400 heavy vehicle trips depending on the site condition and founding requirements. The total trips for the 75MW would be in the region of 3000 to 4000 heavy vehicle trips, over an estimated period of 9 to 12 months. In the worst case scenario, the number of heavy vehicle trips required per day for the Postmasburg Solar PV Energy Facility 2 would be in the order of 15 - 20 trips. The impact of this on the general traffic would therefore be negligible as the additional peak hour traffic would be at most 2 trips. Therefore, the construction traffic and the post construction traffic would be low without any significant impact on the existing traffic (Aurecon, 2014).

The usual civil engineering construction equipment will need to be transported to the site (e.g. excavators, trucks, graders, compaction equipment, cement trucks, etc.), as well as components

required for the establishment of the on-site substation and power line. Some of the substation equipment (e.g. transformer) may be defined as abnormal loads in terms of the Road Traffic Act (Act No.29 of 1989). Input and approval have been sought from the relevant road authorities in this regard.

Transport to the site will be along appropriate national, provincial and local roads. The most practical road route to the site will be from the Port Elizabeth / Coega port via the N2, N10, N12 and R31/R325 (± 1010km) (Aurecon, 2014). These are tarred national and provincial roads and no alterations should be necessary to handle construction traffic, or traffic involved in the operation phase.

Maintenance and possible upgrades will likely be necessary for the two access road options to the site off the R325.

Refer to Annexure F6 for the full Transport & Traffic Management Plan (Aurecon, 2014).

3.3.6 Temporary Layout Area

A temporary laydown area, of ± 200m x 150m, will be required for the **temporary placement / storage and assembly of the PV panels and associated equipment** during construction. The siting of the proposed laydown area for the construction period may encroach slightly into the no-go area recommended by the visual specialist. Since this laydown area is temporary by nature (during construction), with no permanent structures or buildings (during operation), impact on visual features will be temporary and therefore of low significance.

3.3.7 Waste / Effluent Management

Solid Waste

During the construction phase, an estimated amount of **less than 5m^3 non-hazardous solid construction waste will be produced per month**, for the expected 18 month construction period. All construction waste will be safely stored in containers and be removed from site on an ad-hoc basis by the appointed construction contractor, as and when deemed necessary. The construction waste will be **disposed of at an appropriately licenced Municipal landfill site**. Management measures for the appropriate storage of all construction-related waste is included in the Environmental Management Programme (EMPr).

No solid wastes will be generated during the operational phase.

Sewerage

Chemical toilets will be used by construction staff during the 18-month construction phase. This sewage will be collected by sealed containers / tank trucks (honey-suckers), removed from site and treated by a service provider (the Tsantsabane Local Municipality) at an approved facility off site.

During operation, sewage generated from the on-site ablution facility is to be dealt with via one of the following options:

- An **'Enviro Loo' system**;
- A **septic tank system; or**
- Should the Local Municipality not permit the use of sceptic tanks, sewage will be stored in an **underground conservancy tank**, to be emptied (via a honey-sucker) by a service provider (likely the Municipality) and treated at an approved facility off-site.

The Local Municipality has been engaged on the project and confirmation of service capacity will be provided in due course. The **'Enviro Loo' option is considered preferable**, as it requires no water or electricity, there is no risk of contamination of the environment.

3.3.8 Construction, Operation & Decommissioning Phases

- ***Construction Phase***

The construction phase typically follows the following stages:

- Site clearance;
- Layout determination and pegging;
- Trenching for cabling;
- Ground screws, hammered / piled foundations or concrete (unlikely) foundations;
- Erection of PV structures;
- Installation of PV modules;
- Connection of modules to the string boxes;
- Erection of invertors;
- Medium voltage infrastructure connection; and
- Switching station erection.

This process is likely to take 15 to 18 months to complete, during which time **± 400 construction employment opportunities** will be created at peak, with **± 65 direct employment opportunities** created. It is recommended that local labour be used as far as possible during the construction phase.

Any infilling material that may be required for project development (roads, levelling etc.) will be obtained from:

- Option 1: Cut and fill material from construction activities on the site (i.e. from the Remainder Farm 436 Kapstewel).
- Option 2: Material from existing borrow pits on site (i.e. from the Remainder Farm 436 Kapstewel). Should this option be considered further, the Contractor will be required to ascertain the lawfulness of these borrow pits and ensure that the use of the material complies with all relevant legislation. Note: this environmental process does not include the establishment of new borrow pits.
- Option 3: Contractor to source suitable grade material from an approved/registered borrow pit in the broader Postmasburg region.

Any excess/spoil material will be disposed of to a licensed landfill site.

- ***Operation Phase***

The solar facility will be operational during daylight hours, except during maintenance, poor weather conditions or breakdowns. Regular maintenance will typically include periodic cleaning, greasing of bearings and inspection. The solar panels will be cleaned with water or compressed air.

An estimated total of **six full-time staff members** will typically be required during the operation phase of the project, which includes technicians, maintenance and security personnel. Approximately **three unskilled labourers will be needed for maintenance purposes and two security personnel will be deployed on a shift basis**. **One skilled staff member will be needed to manage and oversee the operations**. From time to time additional contract staff may be required for ad-hoc ground cleaning or special panel cleaning. Staff can be transported around the site using utility vehicles and a typical mini-bus will transport staff to and from nearby towns of Postmasburg and surrounding community/ies.

- ***Project Decommissioning / Upgrade***

The proposed solar energy facility is expected to have a **lifespan of approximately 20 years** if the specified periodic maintenance is performed. Once the facility has reached the end of its economic life, the infrastructure is to be disassembled and replaced with appropriate or more advanced technology. Should replacement not be deemed necessary, then the facility would be completely decommissioned i.e. all infrastructure will be disassembled and removed from site.

Site decommissioning activities will ensure integrity of access to the site, as well as rehabilitation of natural vegetation as necessary.

The components would be disassembled, reused and recycled where possible, or disposed of in accordance with regulatory requirements. Functional components could be donated to and installed at facilities to benefit the local community.

4 SITE DESCRIPTION AND ATTRIBUTES

The following sections provide a description of the environmental and built context of Remainder of Farm 426 Kapstewel, with particular focus of the proposed Postmasburg Solar PV Energy Facility 2 site.

4.1 LOCATION & BUILT ENVIRONMENT

The target property, the **Remaining Extent of Farm 436 Kapstewel (RE/436)**, is located within the ZF Mcgawu District (old 'Hay' District) of the Northern Cape Province, within the jurisdiction area of the Tsantsabane Local Municipality. The property is approximately 1070ha is size and is located approximately 21km north of the nearest town of Postmasburg, and south of Kathu. RE/436 is located approx. 2.5km inland and east of the R325 provincial highway.

The existing Eskom 132/11kV Manganore Substation is located at the mid-way point of, and within, the western property boundary. A number of 132kV overhead powerlines connect to this Substation. Three applicable lines and associated services roads / tracks, include:

- The Manganore–Silverstreams 132kV line - A wooden lattice line which crosses the property from the east (and forms the southern boundary of the development site);
- The Manganore-Palingpan 132kV line - A steel lattice line which crosses the R325 highway and the neighbouring property (4/436) from the west; and
- A small wooden lattice line which extends from the old open-cast mine, south of the property, along the property western boundary to the Manganore Substation.

Three addition powerlines link to the Manganore Substation from the north-west (outside of the site): the PMGMine-Manganore 132kV line, the Manganore-Lohatla 132kV line and Manganore-Bulskop 132kV line. These powerline align parallel to one another.

Figure 14: Manganore Substation

Figure 13: 132kV wooden-lattice power line from west, forming the southern boundary of the proposed solar site. A section of this service road (along the southern boundary) forms part of the Option 2 access road from the south.

Figure 15: Steel-lattice powerline extending from east, across 4/436. The service road associated with in this line may be upgrade to serve as the access road to the solar facility from the R325 (Option 1 access road).
Figure 16: Wooden-lattice powerline extending from south of site.

The proposed Postmasburg Solar PV Energy Facility 2 study-site was approximately 450ha in size and forms the northern portion of the property (north-east of the Manganore Substation). Besides the Manganore substation, the only other buildings on proposed study-site are located in the north-eastern corner of property among low hills. These structures include an unoccupied house and outbuilding, as well as handling and watering facilities for cattle. Internal fencing for cattle only occurs close to the house, while old fences have been removed. Water reservoirs and troughs connected to a borehole and solar pump are located in close proximity to the abovementioned vacant buildings, for use by the cattle.

The archaeological specialist confirmed the following to also be present:

- A single stone-packed grave was identified about 400 m to the southeast of the Kapstewel house (Site D005);
- A further two stone cairns (D001 and D002) were recorded at the foot on two hills; and
- The rectangular stone base of a wire kraal, enclosing at least 3 concrete slabs, was identified (Site D006-D009). Two of the smaller concrete slabs may have functioned as bases for wind pumps while the third may have supported a small structure such as a herder's house. The concrete slabs and the top of a rusted metal petrol container probably date to the second half of the 20th century (Webley, 2014).

Figure 17: Vacant house in north-eastern portion of property & development property.
Figure 18: Back of vacant house on site.

Figure 19: One of two water reservoirs connected to borehole / solar pump.

Figure 20: Solar pump and borehole.

An old opencast iron and manganese ore mine is located against the southern boundary of the farm property, for which Autumn Skies 128 CC has prospecting rights. The 'manganese' railway

line, associated with the mining activities on the property and surrounding area, is located directly to the south-west aligned between the farms Portions 2 & 3 of Farm 436 and ends at the 'Manganore' load-out station on Portion 5 of Farm 436. Besides the surrounding mining activities, the development site is isolated by cattle farms to the west, north and east.

Vehicular access to the site from the R325 is via two existing gravel roads, associated with the maintenance of the existing electrical powerlines, the mining activities and livestock farming activities on the property and surrounding the farm properties. One of these roads is aligned parallel to the 132kV powerline traversing the neighbouring property to the west (Portion 4 of 436), from the R325 to the Manganore Substation (considered as Option 1 access road to the solar facility), while the other aligns from the R325, parallel to the abovementioned railway line onto 5/436, entering the target property on its southern boundary before traversing the entire extent of the property (past the mine and proposed solar site) to exit on the northern property boundary. The portion of this road from the R325 to the site southern boundary is being considered as a viable access road to the facility (Option 2). The proposed Option 2 access road will align along this road then link to the existing servitude / farm road aligned beneath the powerline (from the west), along the southern site boundary.

Figure 21: Access off R325 onto Portion 4 of Farm 436 Kapstewel (previously Vaalkop). Note access road aligned parallel to the steel-lattice powerline to Manganore Substation.

Figure 22: Access off R325 onto Portion 2 of Farm 436. Note old open-cast mine on hills in background.
Figure 23: Access road from southern portion of RE/436 onto solar study site.

4.2 GEOLOGY & TOPOGRAPHY

A range of north-south striking hills extend from and onto the south of the property towards the north-east. The majority of these hills are located on the southern portion of the property towards the south (south of the solar development site). One small hill / koppie is located in the north-

eastern sector of the proposed solar development site, while a further three are location across or just outside of the property eastern border.

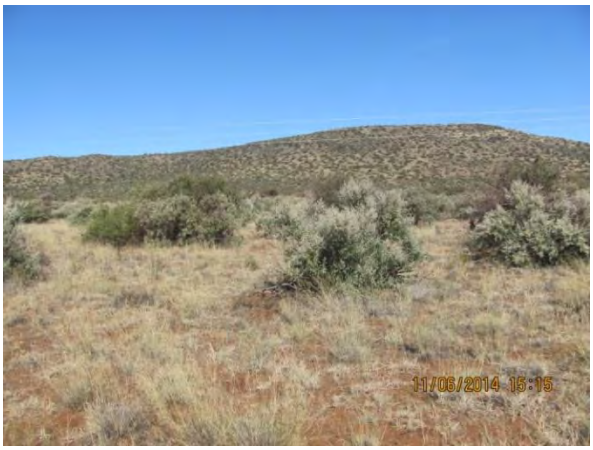


Figure 24: View north-east across proposed solar development site towards hills along eastern boundary.
Figure 25: View south onto southern boundary of proposed solar site (note overhead powerline cables) and hills covering the majority of the area to the south.

The solar development site and surrounding plains are flat at an average height of ±1450masl, while the abovementioned hills / koppies to the south rise to a maximum height of 1587masl (see topographical maps attached in Appendix A).

The hills and koppies on the southern portion of target property, as well as those of the surrounding Kapstewel properties, have been subject to extensive historical mining activities. Evidence of these historical mining activities is still highly visible on the southern portion of the property in the form of tailings dumps and open excavations (both in the valley areas, as well as on the ridges).

Figure 26: Old open-cast manganese / iron ore mine in hills on southern portion of RE/436.

The geology of the area falls within the Kaapvaal Craton, although close to its western margin. The rocks are Palaeoproterozoic metasediments of the Transvaal Supergroup. Postmasburg lies at the southern end of a domal structure termed the Maremane Anticline in which dolomites of the Campbell Rand Group are exposed. These are overlain by the Kuruman Banded Iron Formation - the Kuruman Member of the Asbesheuwel formation. The dolomite palaeosurface is karsted, leading to collapse structures where iron and manganese formation has fallen into karst cavities. The iron of this area can be subdivided into an eastern and western belt that extends from Postmasburg northwards for 65km to Sishen. The area lies near the eastern Klipheuwel belt. The targeted ore bodies of this belt are in-situ banded ironstone with bands of amphibolite and lenses of flat pebble conglomerate, ferruginised brecciated banded ironstone (Blinkklip breccia) and detrital iron ore, which have been derived from pre-existing iron ore (thick- or thinly laminated or breccia) by processes of weathering and/or erosion (Sehunelo, undated).

Two soil forms were identified to occur on site, **Hutton** (red, sandy, structureless, limited by rock) and **Clovelly** (strong brown, sandy, structureless, limited by rock) (Lubbe, 2014).

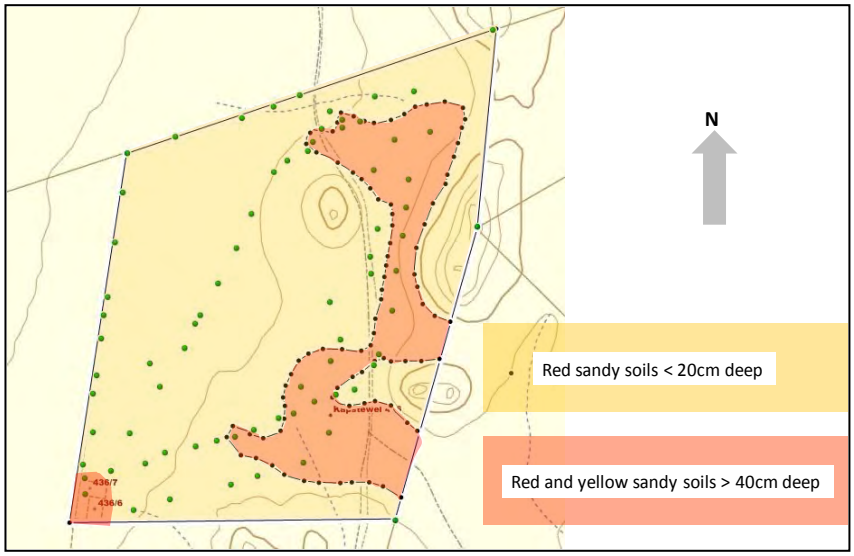


Figure 27: Location / extent of soil types on study site.

4.3 HYDROLOGICAL FEATURES

A small wash exists across existing southern access road (Road Access Option 2), across the south-eastern boundary of the solar development site. The ecological specialist has confirmed that this feature is associated with stormwater run-off from the existing access road. See letter from Simon Todd (2015) regarding the hydrological features on site, attached in Annexure G3.

4.4 VEGETATION

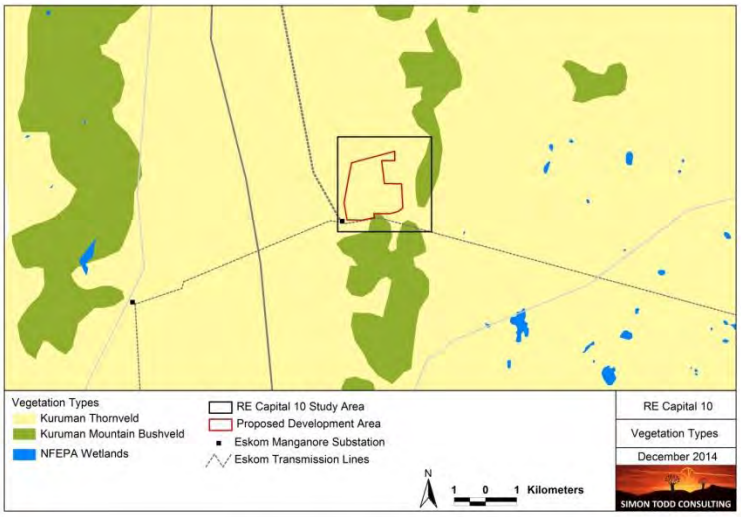
Mr. Simon Todd, of Simon Todd Consulting, conducted a field assessment of the 450ha study site and compiled a Fauna & Flora Impact Assessment of the proposed Postmasburg Solar PV Energy Facility 2 site (Todd, 2015) (see **Appendix D, Annexure D1** for full ecological report), from which the following is drawn.

4.4.1 Broad-Scale Vegetation Patterns

According to the national vegetation map (Mucina & Rutherford 2006), two vegetation types, **Kuruman Thornveld and Kuruman Mountain Bushveld** occur within the site. The rocky hills at the site consist of Kuruman Mountain Bushveld, but the vegetation map does not reflect this very well as the Vegmap has not been mapped at a very fine scale. Kuruman Mountain Bushveld is not widely distributed and has a total mapped extent of 4360 km^2 which is a narrow range for an arid vegetation type. It is distributed in the Northern Cape and North-West Provinces from Asbestos Mountains southwest and northwest of Griekwastad, along the Kuruman Hills north of Danielskuil, passing west of Kuruman and re-emerging as isolated hills at Makhubung and around Pomfret. This vegetation unit is associated with rolling hills with gentle to moderate slopes and hill pediment areas and typically consists of an open shrubveld. Soils are shallow sandy soils of the Hutton form and the most common land type is Ib with lesser amounts of Ae, Ic and Ag. Kuruman Mountain Bushveld has been little impacted by transformation and is classified as Least Threatened, but is not currently conserved within any formal conservation areas. One vegetation-type endemic species *Euphorbia planiceps* is known from Kuruman Mountain Bushveld (see description of this species associated with this vegetation unit as observed at the site, in next section).

The plains of the site are mapped by Mucina & Rutherford as **Kuruman Thornveld**. This is also a restricted vegetation type which occupies 5794 km^2 of the Northern Cape and North West Provinces from the vicinity of Postmasburg and Danielskuil in the south, extending via Kuruman to Tsineng and Dewar in the North. It has been little impacted by transformation and **more than 98% of the original extent is still intact** and it is classified as Least Threatened. This vegetation unit **occupies flat rocky plains and sloping hills** with a very well developed, **closed**

shrub layer and **well-developed tree stratum** usually consisting of *Acacia erioloba*. The most important land types are Ae, Ai, Ag and Ah with Hutton soil form. The only endemic taxon known from this vegetation type is *Gnaphalium englerianum*. Within the site two distinct forms of this vegetation type are visible, **Kuruman Thornveld dominated by *Tarchonanthus camphoratus* on the shallow stony soils** of the site and **Kuruman Thornveld on deeper aeolian sands between the hills, characterised by *Acacia erioloba*** with a less well developed shrub layer (Todd, 2015).



The vegetation map is an extract of the national vegetation map as produced by Mucina & Rutherford (2006), and also includes wetlands delineated by the National Freshwater Ecosystem Priority Areas assessment (Nel et al. 2011). There are no drainage lines within the site. A small wash, associated with stormwater run-off from the existing road, crosses the southern boundary of the site, and is directed by existing stormwater culvert/s (Todd, 2015).

Figure 28: Broad-scale overview of the vegetation in and around the Postmasburg Solar PV Energy Facility 2 site.

4.4.2 Fine-Scale Vegetation Patterns

Rocky Hills & Slopes

There are several hills, ridges and isolated rocky outcrops within the study area. The vegetation of these hills is fairly well differentiated from the surrounding plains, especially with regards to woody species. This habitat type corresponds with the Kuruman Mountain Bushveld vegetation type. Characteristic species observed in this habitat at the site include *Croton gratissimus* var *gratissimus*, *Vangueria infausta*, *Searsia burchellii*, *Euclea crispa* subsp. *crispa*, *Euclea undulata*, *Searsia ciliata*, *Grewia flava*, *Ehretia alba*, *Lantana rugosa*, *Acacia mellifera* and *Lebeckia macrantha* (Todd, 2015).

As this is the only rocky habitat at the site, it is important habitat for fauna which rely on such areas for habitat or shelter including a variety of skinks, geckos and snakes, as well as a number of small mammals such as rodents and Smith's Red Rock Hare *Pronolagus rupestris*. Due to the high biodiversity and habitat value of these areas, they are considered sensitive and should be avoided as much as possible.

Figure 29: Example of the rocky hills from the site, which contain a number of fauna and flora species not found on the adjacent plains.

Acacia erioloba Kuruman Thornveld on deep sands

The north-eastern part of the site, consisting of the broad flat-bottomed valley between the hills, has deep red aeolian Kalahari sand soils dominated by *Acacia erioloba* with perennial grasses in

between. Species typical and characteristic of this area include the protected species *Acacia erioloba* and *Acacia haematoxylon,* as well as non-protected tree and low shrub species such as *Zizyphus mucronata*, *Acacia hebeclada*, *Diospyros lycioides* and *Lebeckia macrantha*, while the ground layer is dominated by *Stipagrostis uniplumis*, *Aristida stipitata* subsp. *stipitata, Elephantorrhiza elephantina*, *Hermannnia tomentosa* and *Gnidia polycephala*. Due to the relatively high density of *Acacia erioloba,* as well as the loose sands, which are vulnerable to disturbance, this habitat type is considered to be of relatively high sensitivity within the context of the site and is not considered suitable for development (Todd, 2015).

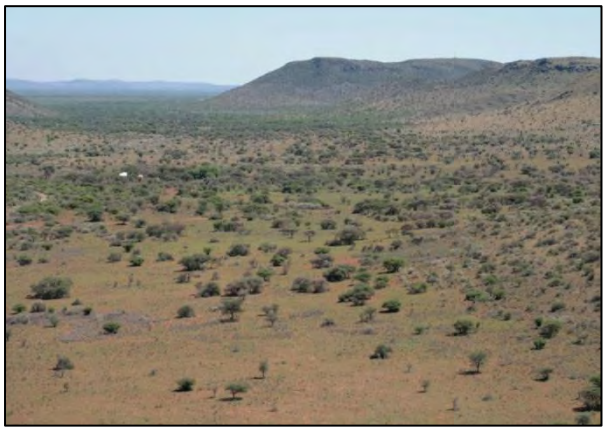



Figure 30: North-east corner of the site which has deeper Kalahari sands dominated by *Acacia erioloba* in an open savannah vegetation.

Tarchonanthus camphoratus kuruman thornveld on rocky soil

The majority of the site consists of relatively shallow soils, often with exposed sheets of bedrock. This habitat type is typical of the area in general and the Kuruman Thornveld vegetation type as well. It is typically dominated by *Tarchonanthus camphoratus*, *Grewia flava* and *Acacia mellifera*, with occasional other trees such as *Olea europea* subsp*. africana*, *Searsia tridactyla*, *Searsia burchellii*, *Gymnosporia buxifolia* and *Ziziphus mucronata* subsp. *mucronata*. The ground layer consists of a mix of shrubs, forbs and grasses with typical species including *Stipagrostis uniplumis*, *Schmidtia pappophoroides*, *Chrysocoma ciliata*, *Pegolettia retrofracta*, *Geigeria filifolia*, *Leucas capensis*, *Senna italica* subsp. *arachoides, Elephantorrhiza elephantina*, *Felicia muricata* subsp. *muricata*, *Melolobium candicans*, *Asparagus retrofractus* and *Gazania krebsiana* subsp. *krebsiana*. In general, this is not considered a highly sensitive habitat type. The density of protected species is generally low with occasional *Acacia erioloba* and *Olea europea* subsp. *africana* present. As this is a widespread community type in the broader area, it is not considered highly sensitive and represents the most favourable area for development at the site.


Figure 31: Open plains which comprise the majority of the site, dominated by *Tarchonanthus camphoratus*.

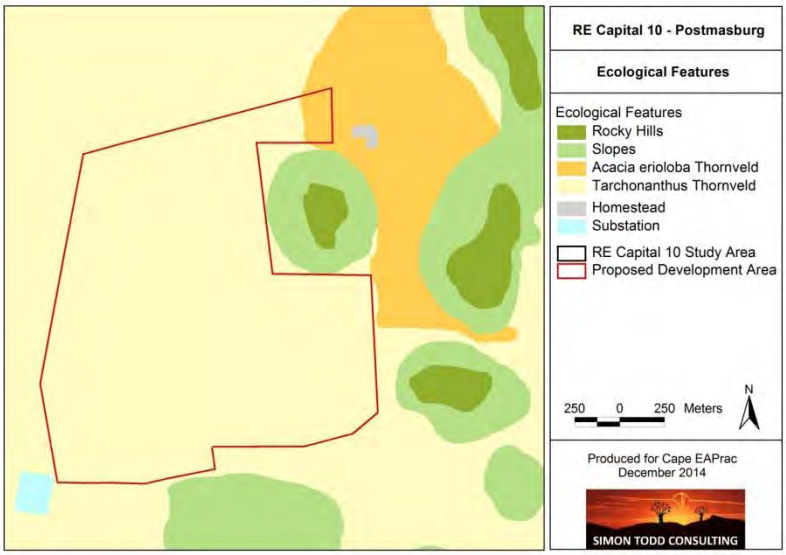


Figure 32: Fine-scale map of the different habitat features observed at the Postmasburg Solar PV Energy Facility 2 site.

4.4.3 Plant Species of Conservation Concern

According to the SANBI SIBIS database only five listed species are known from the area, and at least one of these, *Asparagus stipulaceus,* does not actually occur in the area and is on the list as a result of the outdated taxonomy of historical species lists for the area. Of the remaining species, only *Acacia erioloba* can be confirmed present and occurs at a relatively high density on the deeper sands within the north-eastern part of the study site. Under the layout assessed, it is estimated that about **20-30 *Acacia erioloba* trees would be affected by the development**, which is **not considered highly significant given the abundance of this species** in the area. It is possible that *Boophone disticha* is present within the rocky hills, but it was not observed during the site visit. It is unlikely that the other species are present as they have not been observed in the area by the consultant on other sites near the current study.

In terms of protected species, the provincially protected tree species *Olea europea subsp. africana* and nationally protected *Acacia haematoxylon* are confirmed present, but only *Olea europea* subsp. *africana* would be affected if the sandy north-eastern part of the site can be avoided, as is the case under the assessed development proposal. The density of protected species is however low across most of the site and as the sandy north-eastern part of the site will be avoided this significantly reduces the impact of the development on protected species (Todd, 2015).

4.4.4 Critical Biodiversity Areas & Broad-scale Ecological Processes

No fine-scale conservation planning has been conducted for the region and as a result**, no Critical Biodiversity Areas** have been defined for the study area. In terms of other broad-scale planning studies, the **site does not fall within a National Protected Areas Expansion Strategy Focus Area (NPAES)**, indicating that the area has not been identified as an area of exceptional biodiversity or of significance for the long-term maintenance of broad-scale ecological processes and climate change buffering within the region. The development would however contribute to cumulative habitat loss and the disruption of the broad-scale landscape connectivity in the area, with open-pit iron and manganese ore mining being the other main driver of transformation in the area. The total extent of habitat loss is however low with both vegetation types present still more than 98% intact, suggesting that the current extent of habitat loss within these vegetation types is low and currently likely to be having a local impact only. As such, the development of the site is also likely to **generate a local rather than regional impact** as the surrounding area is still largely intact and there are still extensive tracts of intact habitat remaining in the area. Although there are several other renewable energy projects in the broader area, these are concentrated to the area east of Postmasburg and there is **no other renewable energy development within 20km**

of the site, indicating that **cumulative impacts in the vicinity of the site are currently quite low** (Todd, 2015) (see map of the current DEA-registered renewable energy projects for the area is illustrated in Section 14 below).

4.5 FAUNA

Mr. Simon Todd, of Simon Todd Consulting, conducted a field assessment of the 450ha study site and compiled a Fauna & Flora Impact Assessment of the proposed Postmasburg Solar PV Energy Facility 2 site (Todd, 2015) (see **Appendix D, Annexure D1** for full ecological report), from which the following is drawn.

4.5.1 Mammals

The mammalian community at the site is likely to be of moderate diversity, as many as 44 terrestrial mammals and 9 bat species potentially occur in the area. As there is a variety of habitats present within the study area, it is likely that a high proportion of these species occur within the study area. Species observed at or in the vicinity of the site include Aardvark, Cape Porcupine, Springhare, Steenbok, South African Ground Squirrel, Yellow Mongoose, Slender Mongoose, Kudu, Common Duiker, Small Spotted Genet, Rock Dassie, Black-backed Jackal, Vervet Monkey, Baboon, Smith's Red Rock Hare, Namaqua Rock Mouse, Southern Multimammate Mouse, Desert Pygmy Mouse, Bushveld Gerbil and South African Pouched Mouse, as well as a variety of introduced game which are not free ranging.

Five listed terrestrial mammal species potentially occur in the area; these are the Brown Hyaena *Hyaena brunnea* (Near Threatened), Honey Badger *Mellivora capensis* (IUCN LC and SARDB Endangered), Black-footed Cat *Felis nigripes* (Vulnerable), Ground Pangolin *Smutsia temminckii* (Vulnerable) and South African Hedgehog *Atelerix frontalis*. The Brown Hyaena is not likely to occur in the area on account of the agricultural land-use in the area which is not usually conducive to the persistence of large carnivores. The Black-footed Cat is a secretive species which would probably also occur at the site given that it occurs within arid, open country. Similarly, the Honey Badger may also occur at the site, while the Ground Pangolin may also occur in the area at typically low density. Given the extensive national ranges of these species, the impact of the development on habitat loss for these species would be minimal and a long-term impact on these species would be unlikely. There are also four Near Threatened bat species present in the area. The listed bat species are also unlikely to be affected as no roost areas or important foraging areas are likely to be impacted by the development.

The large number of fauna confirmed present in the area, indicates that **mammalian species richness** and activity in the area is relatively high and that precautions to limit the potential impact of the development on local fauna are warranted. The **rocky hills are likely to contain the highest species richness of mammals**, but there plains are also likely to be used by a variety of species. Specific impacts that would need to be avoided include the **threat of poaching** during construction and the potential negative impact of fencing the facility off from the surrounding landscape (Todd, 2015).

4.5.2 Reptiles

The Postmasburg Solar PV Energy Facility 2 site lies in or near the distribution range of at least 37 reptile species. This is a comparatively low total suggesting that the site has relatively low reptile species richness. Based on distribution maps and habitat requirements, the composition of the reptile fauna is likely to comprise 1 terrapin, 2 tortoises, 15 snakes, 13 lizards and skinks and 5 geckos. No species of conservation concern are known to occur in the area. The habitat diversity for reptiles in the study area is relatively high and includes rocky hills, sandy savanna as well as relatively dense bushveld on harder substrates. Species observed in the area in the past include Striped Skaapsteker *Psammophylax tritaeniatus*, Boomslang *Dispholidus typus typus* and

Namaqua Sand Lizard *Pedioplanis namaquensis*. The only species of potential conservation concern which may occur at the site is the Namaqua Plated Lizard *Gerrhosaurus typicus* which was classified as Near Threatened (IUCN 2009), but has since been downgraded to Least Concern by SARCA (Bates *et al*.). The **rocky hills would clearly be the most important habitat for reptiles at the site**. Provided that these can be avoided as is currently the case, impacts on reptiles are likely to be relatively low and would represent some habitat loss of local significance only. Provided that some ground cover of vegetation is allowed to remain within the facility, then many reptile species would be likely to continue to use the area and the open ground within the facility is likely to favour a small proportion of species (Todd, 2015).

4.5.3 Amphibians

The site lies within or near the range of 11 amphibian species, indicating that the site potentially has a moderately diverse frog community for an arid area. **No natural permanent water or artificial earth dams within the site** were observed that would represent suitable breeding habitat for most of these species. As a result, only those species which are relatively independent of water are likely to occur in the area. The only species of conservation concern which may occur at the site is the Giant Bullfrog *Pyxicephalus adspersus*. The site lies at the margin of the known distribution of this species and it has not been recorded from any of the quarter degree squares around the site, suggesting that it is not likely to occur at the site. Impacts on amphibians are however likely to be low and restricted largely to habitat loss during construction (Todd, 2015).

4.5.4 Birds

According to the SABAP 1 and 2 databases, 217 bird species have been recorded from the area. This total results from 135 species recorded from 39 cards from SABAP 2 and 164 species from 76 cards from SABAP 1. This suggests that the area has been reasonably well sampled and that the species list is likely to be fairly comprehensive. **Eleven listed bird species are known from the area**, all of which are classified as Vulnerable or Near Threatened (Table 2 below). The site does not fall within or near any of the Important Bird Areas defined by Birdlife South Africa. A number of the listed species are associated with water and are not likely to be resident at the site but may occasionally pass over the site, but are unlikely to be directly impacted by any habitat loss. The remaining species are likely to experience some habitat loss as a result of the development (Todd, 2015).

In terms of avifaunal habitats at the site, three distinct areas can be recognised which correspond with the different vegetation units already described. As the rocky hills and *Acacia erioloba* savannah will not be directly affected by the development, habitat loss would be restricted to the *Tarchonanthus*-dominated plains of the site. As this is the dominant habitat type in area and is the typical vegetation type within the triangle from Postmasburg, to Kathu and Olifantshoek as well as beyond Kathu to the north, the **development would not constitute a significant loss that would compromise the available habitat for any bird species**.

Apart from habitat loss, another potential impact source would come from electrocution and collisions with the power lines. Although not all species are vulnerable to these impacts, **flamingos, bustards and storks are highly vulnerable to collisions with power lines, while many of the raptors are susceptible to electrocution as well as collision.** Given the proximity of the site to the Eskom Manganore Substation which is on the site, these **impacts are likely to be very low** and a significant impact would be highly unlikely from the 800m grid connection.

Table 2. Listed bird species known from the vicinity of the proposed corridors (SABAP 1 & 2).

Species Name	Common Name	Status	Frequency	Potential Impact
Charadrius pallidus	Chestnut-banded Plover	NT	V.Low	Low

Ciconia nigra	Black Stork	NT	Medium-Low	Low
Mycteria ibis	Yellow-billed Stork	NT	V.Low	Low
Falco biarmicus	Lanner Falcon	NT	Low	Moderate
Falco naumanni	Lesser Kestrel	VU	Medium	Moderate
Phoenicopterus minor	Lesser Flamingo	NT	Medium-Low	Low
Phoenicopterus ruber	Greater Flamingo	NT	High	Low
Sagittarius serpentarius	Secretary Bird	NT	Low	Moderate
Aquila rapax	Tawny Eagle	VU	Low	Moderate
Circus ranivorus	African Marsh-harrier	VU	V.Low	Low
Polemaetus bellicosus	Martial Eagle	VU	Low	Moderate

5 PLANNING CONTEXT

A Town and Regional Planner within Werksmans Attorneys' Environmental Law firm has been appointed to facilitate the necessary Planning Application processes for the proposed Postmasburg Solar PV Energy Facility 2. See letter from Werksmans Attorneys attached in Annexure G2, along with the title deed for RE/436.

The target property, Remainder of Farm 436 Kapstewel, is currently zoned Agriculture 1, with limited cattle grazing activities taking place.

A **land use change application** for the rezoning of at least 225ha, from **Agricultural Zone I to Special Zone**, will be lodged at the Tsantsabane Local Municipality, in accordance with the Northern Cape Planning and Development Act (Act 7 of 1998).

Where applicable, the consent of SANRAL, Civil Aviation Authority (CAA) and the bondholder will be obtained as part of the rezoning application.

If there are restrictive Title Deed conditions burdening the proposed development, an application for the removal thereof will be lodged at the Government of the Northern Cape Province, Department: Corporate Governance and Traditional Affairs, in accordance with the Removal of Title Deed Restriction Act (Act 84 of 1967).

Parallel to the rezoning application, a **long term lease application will be lodged at the National Department of Agriculture**, in accordance with the Subdivision of Agricultural Land Act (Act 70 of 1970).

Relevant planning documents, on all spheres of Government, will be evaluated before any land use change application is launched. These documents include, but are not limited to the following: **NSDP** (National Spatial Development Perspective); **PGDS NC** (Provincial Growth and Development Strategy), Northern Cape Province; and the Tsantsabane Municipal **IDP** (Integrated Development Plan) and **SDF** (Spatial Development Framework).

Werksmans Attorneys have been appointed to facilitate the required planning processes.

According to Part B of the Department of Energy RFP criteria, clause 2.3.2 states:

"From the Fourth Bid Submission Date Bidders will no longer be required to provide proof that all necessary applications, including but not limited to land use change, subdivision, removal of restrictive conditions and zoning applications have been made by the Project Company to secure the right to lawfully use the Project Site for the intended purpose of constructing and operating the Facility at the Bid Submission Date but will be required to provide this post-appointment, if appointed, as a Preferred Bidder."

The following sections discuss the criteria for the assessment of impacts, the site context and potential impact associated with the proposed Postmasburg Solar PV Energy Facility 2.

6 CRITERIA FOR THE ASSESSMENT OF IMPACTS

The assessment criteria used in the assessment are described below and are drawn from the EIA Regulations, published by the Department of Environmental Affairs and Tourism (April 1998) in terms of the Environmental Conservation Act No. 73 of 1989 as well as Brownlie (2005).

For each of the potentiall identified significant impacts the following are described:

6.1 NATURE OF THE IMPACT

A description of positive or negative effect of the project on the affected environment, or vice versa. The description includes who or what would be affected, and how.

6.2 EXTENT OF THE IMPACT

This includes assessing the spatial scale of the impact, i.e. is it local (within the boundaries of the study site), regional, national or international.

6.3 DURATION OF THE IMPACT

The lifespan of the impact is assessed, i.e. is it short term (0 - 5 years) Medium term (6 - 15 years) long term (where the impact will cease after the operational life of the proposed project) or permanent (the impact will persist beyond the operational life of the proposed project). Certain impacts can also be discontinuous or intermittent (where the impact may only occur during specific climatic conditions or during a particular season of the year).

6.4 INTENSITY OR MAGNITUDE OF THE IMPACT

The intensity or severity of the impact would be indicated as either Low (where the impact affects the environment in such a way that functioning and processes are not affected), Medium (i.e. where the affected environment is altered but functioning and processes continue albeit in a modified way) or High (i.e. where functioning and processes are altered to the extent that they will temporarily or permanently cease).

6.5 PROBABILITY OF OCCURRENCE

The likelihood of the impact actually occurring would be indicated as either Improbable (the possibility of the impact materialising is very low as a result of design or historic experience), Probable (there is a distinct possibility that the impact will occur), Highly probable (it is most likely that the impact will occur), or Definite (the impact will occur regardless of the implementation of any prevention measures).

6.6 SIGNIFICANCE OF THE IMPACT

Based on a synthesis of the information contained in the criteria above, the potential impact would then be described according to following significance criteria:

No significance: the impacts do not influence the proposed development and/or environment in any way.

Low significance: the impacts will have a minor influence on the proposed development and/or environment. These impacts require some attention to modification of the project design where possible, or alternative mitigation.

Moderate significance: the impacts will have a moderate influence on the proposed development and/or environment. The impact can be ameliorated by a modification in the project design or implementation of effective mitigation measures.

High significance: the impacts will have a major influence on the proposed development and/or environment and will result in the "no-go" option on the development or portions of the development regardless of any mitigation measures that could be implemented. This level of significance must be well motivated.

6.7 CONFIDENCE

The level of confidence in predicting the impact can be described as low, where there is little confidence in the prediction, due to inherent uncertainty about the likely response of the receiving ecosystem, or inadequate information; medium, where there is a moderate level of confidence in the prediction; or high, where the impact can be predicted with a high level of confidence.

6.8 CUMULATIVE IMPACT

Consideration is given to the extent of any accumulative impact that may occur due to the proposed development. Such impacts are evaluated with an assessment of similar developments already in the environment. Such impacts will be either positive or negative, and will be graded as being of negligible, low, medium or high impact.

6.9 MITIGATION

The objective of mitigation is to firstly avoid and minimise impacts where possible and where these cannot be completely avoided, to compensate for the negative impacts of the development on vegetation and animal habitats and to maximise re-vegetation and rehabilitation of disturbed areas. For each impact identified, appropriate mitigation measures to reduce or otherwise avoid the potential impacts are suggested. All impacts are assessed without mitigation and with the mitigation measures as suggested appropriately implemented.

7 AGRICULTURAL POTENTIAL STATEMENT

Mr. Christo Lubbe, an agricultural specialist, compiled an Agricultural Potential report for the proposed Postmasburg Solar PV Energy Facility 2 (RE Capital 10) Development site, based on a site investigation, as well as his knowledge and experience of farming in the Northern Cape (see **Appendix D, Annexure D2** for full report), from which the following is drawn:

7.1 AGRICULTURAL POTENTIAL CONTEXT

Structures on the site include an unoccupied house and handling facilities for cattle. Internal fencing for cattle only occurs close to the house, while old fences have been removed. There are two small water reservoirs and troughs connected to a borehole and solar pump, in the north-eastern sector of the development site, used to water livestock.

Figure 333: Cattle camp adjacent to existing house on study site.
Figure 344: View south along farm access road to existing house and cattle camps. Note hill to the east.

The geology is that of the Transvaal sequence. Sedimentary and Volcanic rocks of this sequence include dolomite, limestone and chert. More than 75% of the area can be classified as lithosols (shallow stony soils), where the surface is mainly dolomite outcrop or very shallow soil on rock. The hills are included in this group. **Cultivation on this portion is prevented by the lack of soil**.

Soil characteristics on the remainder of the area:

- Effective depth: 40cm to 120cm,
- Texture of the top and subsoil : sandy
- Sand grade : very fine
- Colour : red
- Water holding capacity: <20mm/m
- Carbon content: low natural fertility
- Consistency : loose to very loose

In terms of climate, the region is classified as a **semi-arid zone**. The following specific parameters are applicable:

Table 4: Climatic Parameters for Site

Annual rainfall	201-400 mm
Mean maximum temperature	31 to 33ºC
Mean minimum temperature	Minus 2ºC
First frost expected	11 to 20 May
Last frost expected	01 to 10 September
Hours of sunshine	>80%
Evaporation	2200 - 2400 mm

The site falls in the Savanna-type Bushveld biome within the Kuruman Thornveld vegetation type.

The Bushveld region consists of open plains with trees such as Camel thorn, Umbrella Acacia and Campher bush in scattered stands with sweet veld grasses like *Themeda triandra*, *Cymbopogon plurinodus* and *Digitaria eriantha*.

The **grazing capacity is low at 16 to 25 hectares per large stock unit (LSU)**. The Normalised Difference Vegetation Index (NDVI) is moderate.[6]

The site is utilised for limited cattle farming, and there is no evidence of past or current cultivation (Lubbe, 2014).

7.2 VELD CONDITION, LAND CAPACITY & SUITABILITY FOR AGRICULTURE

Although the veld was heavily grazed, climax grasses could still be identified. The Camphor bush tends to be invasive. A medium to light invasion of Black-thorn (*Acacia mellifera*) was noted. The basal cover of the grass is low, on both the deeper and the shallow soils.

The plant cover is very sparse with some bare areas, with grasses of moderate and poor gazing value mixed. There are moderate levels of topsoil loss and medium to light bush encroachment present.

The land surveyed falls in capability Class VI, generally not suited for cultivation. Very severe limitations restrict land use to grazing, woodlands or wildlife.

Limiting factors for crop production:

- Soil with low water holding capacity, shallow rooting zone and severe erosion potential; and

[6] *NDVI refers to a mathematical formula applied to satellite imagery to provide information on plant activity or vigour. It is an indicator of active vegetation cover.*

- Severe climate.

These factors indicate a suitability rate of ***Very-low*** *(77% of study area)* **to** ***Low*** *(23% of study area).*

Factors limiting land capacity and suitability for grazing:

- Soils with very shallow rooting depth and low clay content;
- Low rainfall; and
- Low carrying capacity area (16-25ha/LSU).

These factors indicate a suitability rate of ***Low*** *(100% of 480ha study area).*

In addition to the above, it is confirmed that the erosion potential of the soils present of the development site is considered to be **highly susceptible to both wind and water erosion** (Lubbe, 2014).

7.3 AGRICULTURAL POTENTIAL FINDINGS & CONCLUSION

The combination of extreme climatic conditions and poor soil properties combination makes the site largely **unsuitable for cultivation**. Although the area could be utilised as grazing, the **grazing potential is very low**. Due to the low agricultural potential there are **few possible impacts** on agricultural activities during construction and operation of the proposed PV power plant. The loss of the small area of grazing land is negligible.

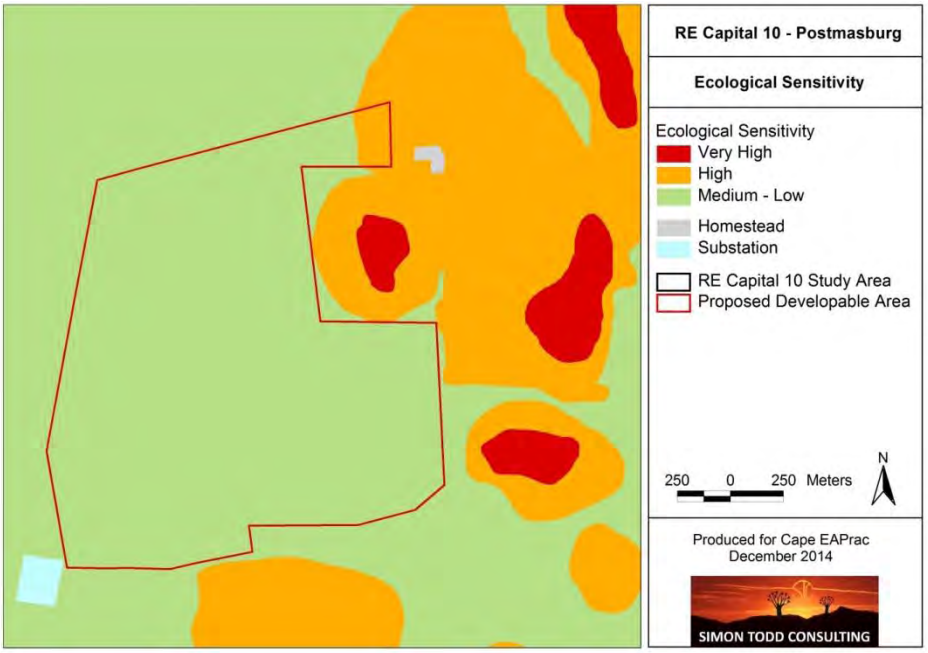
The method of anchoring the structures with **hammered piled foundations**, avoids the use of blasting which would have large impact on the area identified as lithosols. On the deeper soils, normal foundations would have no effect after rehabilitation.

The proposed solar power plant will have minimal impacts on agriculture, locally and on site, and will have **very little influence on the current commercial farming of the area** (Lubbe, 2014).

8 ECOLOGICAL SENSITIVITY ASSESSMENT

Mr. Simon Todd, of Simon Todd Consulting, conducted an Ecological Assessment of the proposed Postmasburg Solar PV Energy Facility 2 site (see **Appendix D, Annexure D1** for full report), from which the following is drawn:

The rocky hills are considered sensitive on account of their greater plant species richness, differentiation from the plains and their faunal significance. These areas have already been largely excluded from the development footprint under the final layout provided for the assessment. The deeper sands in the north-east of the site, between the hills is not considered suitable for development on account of the high density of the protected tree *Acacia erioloba,* as well as occasional *Acacia haematoxylon* and the sensitivity of the loose sands to disturbance. In addition, this area is also important in providing a linkage between the different hills at the site and development within this area would have a greater impact on landscape connectivity. This area is marginally impacted in the north and it is estimated that between 20 and 30 *Acacia erioloba* would be affected. The remaining open plains of the site are dominated by *Tarchonanthus camphoratus* and are not considered highly sensitive and development within this area could occur with low impact on plant species of conservation concern and low impact on broad-scale ecological processes. The location of the substation and other infrastructure is located towards the Eskom substation and is deemed to be within the most appropriate location within the context of the site (Todd, 2015).



Ecological sensitivity map of the RE Capital 10 site, with the hills and deep sandy plains being the main sensitive features present within the site.

Figure 35: Ecological sensitivity map of the RE Capital 10 PV site (Todd, 2015).

8.1 NATURE OF ECOLOGICAL IMPACTS

The development will result in a variety of impacts, associated largely with the disturbance, loss and transformation of intact vegetation and faunal habitat to hard infrastructure such as roads, PV areas, operations buildings etc. The following impacts are identified as those most likely to be associated with the development and which are assessed for the different phases of the project as appropriate.

8.1.1 Impacts on vegetation and protected plant species

There are a number of listed and protected species present at the site (like *Acacia erioloba*) and it is highly likely that some of these would be impacted by the development. Vegetation clearing during construction will lead to the loss of currently intact habitat within the development footprint and is an inevitable consequence of the development. As this impact is certain to occur it is assessed for the construction phase as this is when clearing will take place.

8.1.2 Soil erosion and associated degradation of ecosystems

The large amount of disturbance created during construction would potentially leave the site vulnerable to soil erosion. The affected plains of site are fairly flat, but there are some more sloping areas towards the hills in the north and it is likely that these would generate significant amounts of runoff if developed. In addition, disturbance leading to the loss of plant cover over large parts of the site will certainly increase the risk of wind and water erosion at the site, even on the plains. In addition, the panels will generate increased runoff, and therefore soil erosion is considered a likely impact.

8.1.3 Direct Faunal Impacts

Increased levels of noise, pollution, disturbance and human presence during construction will be detrimental to fauna. Sensitive and shy fauna would move away from the area during the construction phase as a result, while some slow-moving species would not be able to avoid the construction activities and might be killed. Some impact on fauna is highly likely to occur during construction, as well as operation and this impact is therefore assessed for the construction phase and operational phase.

8.1.4 Alien Plant Invasion

The disturbance created during construction is highly likely to encourage the invasion of the disturbed areas by alien species. Although there are not a lot of alien species present within the undisturbed parts of the site, there were some aliens present in disturbed areas such as around watering points. This includes woody invaders such as *Prosopis glandulosa*, which will rapidly increase in abundance and expand into the disturbed areas if given the opportunity.

8.1.5 Avifaunal Impacts Due to Power Lines

Large raptors and many larger bird species (cranes and bustards) are vulnerable to collisions with or electrocution from power line infrastructure. This can be a particular problem if the power line lies within the movement or migration pathway of the birds. As many of the vulnerable species are long-lived slow-breeding species, collisions with power lines can be a major source of mortality for such species and may threaten the viability of local or regional populations. Insulating electrical components and fitting bird flight diverters can provide some mitigation against such impacts and is recommended as standard practice for new power line infrastructure. It important to note with regards to power line impacts that even if the impact at any one moment in time is low, it is the cumulative long-term impact which can generate significant impact. This impact is associated with the grid connection only and is assessed separately for that component of the development. This is a long-term operational impact potentially associated with the development.

8.1.6 Avifaunal Impacts Due to Habitat Loss

The development will result in the loss of habitat for resident avifauna. The majority of species present will no longer be able to utilise the area within the footprint of the facility once it has been built. This would have negative consequences for any narrow endemics or if there are any specialised avifaunal habitats present within the site that are not widely available in the surrounding landscape. In addition, if there are any breeding raptors within the site, their nest site might be destroyed or they might be frightened from the area by the construction activity. This impact would occur at the construction phase, but would be a long-term impact associated with the development.

8.1.7 Reduced ability to meet conservation obligations & targets

The loss of unprotected vegetation types on a cumulative basis from the broad area may impact the countries' ability to meet its conservation targets. The receiving vegetation types in the study area are classified as Least Threatened and are still more than 98% intact. However, these are relatively confined vegetation types with a limited extent, making them more vulnerable to cumulative impacts and there is already a relatively high level of impact in the area due to mining activity and other solar energy development.

8.1.8 Impact on broad-scale ecological processes

Transformation of intact habitat on a cumulative basis would contribute to the fragmentation of the landscape and would potentially disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations. Due to the large amount of development in the area, this is a likely cumulative impact of the development that is assessed (Todd, 2015).

8.2 ASSESSMENT OF ECOLOGICAL IMPACTS

The following assessed impacts are those for the solar facility itself, for the planning and construction and operational phases of the development.

8.2.1 Planning & Construction Phase

Table 5: Planning & construction phase ecological impacts of solar PV development

Nature of impact	Spatial Extent	Duration	Intensity	Probability	Reversibility	Significance and Status		Confidence level
						Without Mitigation	With Mitigation	
Impacts on vegetation and listed or protected plant species resulting from construction activities	Local	Long-Term	High	Definite	Low	Medium Negative	Medium-Low Negative	High
Mitigation/Management Actions • Preconstruction walk-through of the facility in order to locate species of conservation concern that can be translocated as well as comply with the Northern Cape Nature Conservation Act and DENC/DAFF permit conditions. • Vegetation clearing to commence only after walk through has been conducted and necessary permits obtained. • Preconstruction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness as to no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimizing wildlife interactions, remaining within demarcated construction areas etc. • Eco to provide supervision and oversight of vegetation clearing activities within sensitive areas such as near drainage areas. • Vegetation clearing to be kept to a minimum. No unnecessary vegetation to be cleared. • All construction vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed outside of the construction area. • Temporary lay-down areas should be located within previously transformed areas or areas that have been identified as being of low sensitivity. These areas should be rehabilitated after use.								
Direct Faunal Impacts During Construction	Local	Short- Term	Medium	High	High	Medium Negative	Medium-Low Negative	High
Mitigation/Management Actions • All personnel should undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises and owls which are often persecuted out of superstition. • Any fauna threatened by the construction activities should be removed to safety by the ECO or appropriately qualified environmental officer. • All construction vehicles should adhere to a low speed limit to avoid collisions with susceptible species such as snakes and tortoises. • All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill. • If trenches need to be dug for water pipelines or electrical cabling, these should not be left open for extended periods of time as fauna may fall in and become trapped in them. Trenches which are standing open should have places where there are soil ramps allowing fauna to escape the trench.								

Nature of impact	Spatial Extent	Duration	Intensity	Probability	Reversibility	Significance and Status		Confidence level
						Without Mitigation	With Mitigation	
Avifaunal impacts due to habitat loss and construction activities	Local	Long-term	Medium-High	High	Low	Medium Negative	Medium-Low Negative	High
Mitigation/Management Actions • Any raptor or other species of conservation concern which may be nesting within or in the immediate vicinity of the facility should be identified before construction commences. This can occur during the preconstruction walk-through of the facility for other fauna and flora related issues. If any significant finds are made, then some adjustment of the timing or location of certain activities may be required to allow breeding to be completed. • Precautions should be taken to ensure that staff do not wander from the construction site and do not disturb any nesting species in the vicinity of the site. • There should also be environmental induction required for all construction staff to ensure that avifauna are not harmed during construction and that species such as owls are not persecuted out of superstition or other reason. • All litter generated at the site should be handled in an environmentally sensitive manner to ensure that there is not organic litter at the site which might attract avifauna and that plastic and other materials are not allowed to blow about the site, as some types of litter such as string can become entangled around birds legs. • All overhead power lines should be fitted with bird flight-diverters and pylons and connections should be appropriately insulated and of a bird-friendly design.								
Soil Erosion Risk During Construction	Local	Medium-term	Medium-High	High	Low	Medium Negative	Low Negative	High
Mitigation/Management Actions • Dust suppression and erosion management should be an integrated component of the construction approach. • Disturbance near to drainage lines should be avoided and sensitive drainage areas near to the construction activities should demarcated as no-go areas. • Regular monitoring for erosion problems along the access roads and other cleared areas. • Erosion problems should be rectified on a regular basis. • Sediment traps may be necessary to prevent erosion and soil movement if there are topsoil or other waste heaps present during the wet season. • A low cover of vegetation should be left wherever possible within the construction footprint to bind the soil, prevent erosion and promote post-disturbance recovery of an indigenous ground cover.								

8.2.2 Operation Phase

Table 6: Operation phase ecological impacts associated with solar PV development

Nature of impact	Spatial Extent	Duration	Intensity	Probability	Reversibility	Significance and Status		Confidence level
						Without Mitigation	With Mitigation	
Alien Plant Invasion Risk During Operation	Local	Long-term	Medium	High	Medium	Medium Negative	Low Negative	High
Mitigation/Management Actions • Wherever excavation is necessary, topsoil should be set aside and replaced after construction to encourage natural regeneration of the local indigenous species. • The recovery of the indigenous vegetation should be encouraged through leaving some areas intact through the construction phase to create a seed source for adjacent cleared areas. • Due to the disturbance at the site as well as the increased runoff generated by the hard infrastructure, alien plant species are likely to be a long-term problem at the site and a long-term control plan will need to be implemented. • Regular monitoring for alien plants within the development footprint as well as adjacent areas which receive runoff from the facility as there are also likely to be prone to invasion problems. • Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible.								
Soil Erosion Risk During Operation	Local	Long-term	Medium	High	Medium	Medium Negative	Low Negative	High
Mitigation/Management Actions • All roads and other hardened surfaces should have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk. • Regular monitoring for erosion after construction to ensure that no erosion problems have developed as result of the disturbance. • All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques. • All cleared areas should be revegetated with indigenous perennial grasses from the local area. These can be cut when dry and placed on the cleared areas if natural recovery is slow.								
Faunal impacts during operation:	Low	Long-term	Medium	Moderate	High	Medium-Low Negative	Low-Negative	High
Mitigation/Management Actions • No unauthorized persons should be allowed onto the site. • Any potentially dangerous fauna such snakes or fauna threatened by the maintenance and operational activities should be removed to a safe location. • The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. • If the site must be lit at night for security purposes, this should be done with downward-directed low-UV type lights (such as most LEDs), which do not attract insects. • All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill. • All vehicles accessing the site should adhere to a low speed limit (30km/h max) to avoid collisions with susceptible species such as snakes and tortoises. • If the facility is to be fenced, then the electrified strands should be on the inside of the fence as some species such as tortoises are susceptible to electrocution from electric fences as they do not move away								

when electrocuted but rather adopt defensive behaviour by retreating into their shells and are killed by repeated shocks.								
Avifaunal impacts due to power lines and operational activities	Local	Long-term	Medium-Low	Moderate	Low	Medium-Low Negative	Low Negative	High
Mitigation/Management Actions • Birds nesting within the support frames of the panels or other infrastructure should be tolerated unless they form a safety hazard, in which case, they should either be preventing from accessing these areas with mesh or similar exclusion, or allowed to persist until breeding has been completed and then remove the nests and prevent future access. • In the case of any mortalities resulting from birds flying into the power line, panels or trackers, these should be recorded including the date of the observation and the species affected and any other relevant information. If the birds cannot be identified, then photographs should be taken for documentation purposes so that an avifaunal expert can identify the bird. If repeated collisions occur then an avifaunal specialist should be consulted for additional measures to reduce avifaunal collisions.								

8.2.3 Cumulative Impacts

Table 7: Cumulative ecological impacts associated with solar PV development

Nature of impact	Spatial Extent	Duration	Intensity	Probability	Reversibility	Significance and Status		Confidence level
						Without Mitigation	With Mitigation	
Impact on broad-scale ecological processes due to cumulative loss and fragmentation of habitat	Regional	Long-Term	Medium	Moderate	Low	Medium-Low Negative	Low Negative	Moderate-High
Mitigation/Management Actions • Minimise the development footprint as far as possible and allow the retention of some natural vegetation between the rows of panels or trackers. • The facility should be fenced off in a manner which allows fauna to pass by the facility as easily as possible. This implies not fencing-in large areas of intact vegetation into the facility and only the developed area should be fenced. • The presence of smaller fauna should be tolerated within the facility.								

8.3 ECOLOGICAL CONCLUSION & RECOMMENDATIONS

The broader Postmasburg Solar PV Energy Facility 2 site consists of a variety of landscape and habitat features, of which the rocky hills and sandy plains dominated by *Acacia erioloba* are identified as being sensitive and unsuitable for development. The majority of the site however consists of *Tarchonanthus camphoratus* thornveld on shallow calcrete soils and is not considered highly sensitive. The proposed development area is largely restricted to this veld type and within these areas impacts on vegetation and fauna are likely to be relatively low after mitigation. A small proportion of the proposed development area in the north, lies within the *Acacia erioloba* savannah and approximately 20-30 *Acacia erioloba* trees are likely to be affected by the development. This is however not considered highly significant given the abundance of this species in the area (Todd, 2015).

Although there are likely to be a number of listed fauna and avifauna present at the site, the surrounding landscape is still overwhelmingly intact and it is not likely that the development of the site would lead to significant habitat loss or regional declines in these species. As faunal abundance in the area is quite high, mitigation measures to reduce the potential impact of the development on fauna, particularly during construction, are important to ensure a low faunal impact. A contributing factor to the low assessed impact on avifauna is the proximity of the site to the Eskom substation which would require a grid connection of approximately 800m. Apart from *Acacia erioloba*, which is not rare, there were few other plant species of concern within the development footprint and the overall impact of the development on plant species of conservation concern is considered low. Construction-phase impacts are moderate and to a large extent unavoidable as vegetation clearing and habitat loss are an inevitable consequence of the development. Operational phase impacts are however likely to be low and there are no impacts associated with the development that cannot be mitigated to a low level (Todd, 2015).

9 HERITAGE ANALYSIS

Stefan de Kock, of Perception Planning, compiled an Heritage Integrated Impact Assessment Report for the proposed Postmasburg Solar PV Energy Facility 2 site (see **Appendix D, Annexure D3** for full report), from which the following is drawn.

9.1 HISTORICAL BACKGROUND

9.1.1 Basic Pre-Colonial Perspectives (Late Stone Age)

There is archaeological evidence that specularite deposits in this part of the Northern Cape were mined during the Later Stone Age. Beaumont and Boshier (1974) excavated a prehistoric pigment (specularite) mine four (4) kilometers to the west of Bleskop at Jonas Vlakte on Doornfontein 446. The Doornfontein site represents a number of chambers which have been dug into a hillside. Archaeological excavations resulted in the discovery of large numbers of stone artefacts comprising mainly stone choppers and hammerstones which had been used to mine the specularite. In addition, the archaeologists discovered pottery, decorated ostrich eggshell pieces, beads and bone implements as well as faunal (bone) remains which provide information on the diet of the pre-colonial miners (Beaumont & Boshier 1974). Radiocarbon dates place the mining activities at about 1200 BP (00 AD). Fragmentary human remains from the Blinkklipkop mine which is 5km to the north-east of Postmasburg suggest that the early miners were of Khoisan physical type rather than representing Iron Age settlement.

During his survey Morris (2005a) found a Later Stone Age shelter site on Wolhaarkop. Small specularite workings were pointed out on Wolhaarkop. Beaumont and Boshier (1974) also refer to some engraving sites nearby at Paling which is located on Driehoekspan 435 as well as on

Beeshoek to the west of Postmasburg. These roughly pecked engravings occur on shale outcrops.

According to Humphreys and Thackeray, Iron Age farmers only settled in the Northern Cape after A.D. 1600. The main area of Iron Age settlement and the only area, in which there is direct archaeological evidence for such settlement in the form of stone walling, are to the north-east of Kuruman. By the time the first European travellers arrived in this area they met only Iron Age Tswana-speaking people such as the Tlhaping. The Tswana settlement of Dithakong was located to the north-east of Kuruman in an area with many large springs. During the Webley et al (2010) survey, a site on the farm Gaston (to the west of MaCarthy) was discovered with pottery and stone tools. The remains could relate to the Koranna, a Khoekhoen group who were active along the Orange River in the 18th century, or conversely the Iron Age Tswana – although they are believed to have settled more to the north-east.

9.1.2 Colonial Perspectives

Morris (1990) points out that numerous early travellers, such as Lichtenstein, Campbell, Burchell, Backhouse and others visited and described the site of Blinkklipkop (ancient specularite mine which were mined by indigenous peoples in pre-colonial times) to the north of Postmasburg. However, European missionaries and farmers only began to settle in the Northern Cape during the 19th century. Their numbers were relatively small until the use of borehole water for farming.

The area known as Griqualand West was first 'roughly' surveyed by F. Orpen and W. Stow in 1872. During the Webley et al (2010) survey of 20 farms to the west of MaCarthy it was discovered that they were all surveyed and beaconed between the years 1904 – 1911. This is very late when compared to the rest of the country. Many of the farmsteads contained buildings of calcrete blocks and a high percentage also had family graveyards in close proximity to the farmhouses.

The farm Kapstewel was first surveyed in 1881 and included a surface area of 4,243 morgen and 313 square roods (±3,589 ha) and granted by quitrent to Benjamin Peiser during January 1895.

While early mapping (1906-1914) shows the location of a number of early farmsteads (e.g. Klipfontein, Beauplace, Mohumapella, Thakweneng) within close proximity of the proposed development site none of these seem to have been location within said site boundaries. At the time, vegetation west of the site is describes as 12ft high "dense bush", while vegetation further east (beyond low hills along the eastern site boundary) is described as being 8-10ft high "thick bush".

Basic historic background research did not identify or highlight any significant historic or other heritage-related themes, which may be negatively impacted through the proposed development.

9.2 HERITAGE RESOURCES & ISSUES

9.2.1 Landscape Character

The term "cultural landscape" refers to the imprint created on a natural landscape through human habitation and cultivation over an extended period of time. While the Cape has been inhabited for many hundreds of thousands of years (pre-colonial history) prior to Western settlement (colonial history), the nomadic lifestyles of early inhabitants are not always as evident within the landscape as the significant imprints made by humans during the last two – three hundred years and more. Unlike ancient landscapes in parts of the world where environmental conditions allowed more intensive cultivation over periods much longer than locally have allowed natural and cultural components of the landscape to become interwoven, landscape components Northern Cape have not yet developed in such a manner. The fact that natural and cultural landscape components in

the region is therefore more distinguished means that the cultural landscape is likely to be very vulnerable to the cumulative impact of inappropriate large-scale development.

Ultimately, definition of a cultural landscape can be informed by the following elements, weighed through professional opinion, public values and statutory (legal) framework:

- Natural Landscape
- Public Memory
- Social History
- Historical Architecture
- Palaeontology
- Archaeology

The site forms part of an arid rural landscape defined by a myriad of mining activities - particularly between Olifantshoek and Postmasburg. While relatively flat, the landscape is interspersed with low koppies, most of which have been scarred through mining activities. The Lohatla military base is just north of the proposed development site, while the Blinkklipkop specularite mine, (ancient specularite mine which were mined by indigenous peoples in pre-colonial time), is just south of Postmasburg.

From a broad, regional perspective the cultural landscape is considered highly complex and potentially significant in terms of pre-colonial as well as pre-modern (traditional) landscape patterns. Given the cumulative impact of mining activities and more recent development patterns, it is therefore recommended that the relevant authority commission a broad-scale mapping, as meant within the context of this paragraph, as required in terms of Section 30(5) of the National Heritage Resources Act, 1999 (Act 25 of 1999).

Without the benefit of the above research and mapping and given the pattern of existing development on and within the direct proximity of the site, it is therefore our contention that from a cultural landscape perspective, the **proposed development site is of no local cultural significance**.

9.3 ECOTOURISM

One of the goals of ecotourism is to offer tourists insight into the impact of human beings on the environment, and to foster a greater appreciation of our natural habitats and from an economic perspective, heritage resources may prove to be valuable resources when used in sustainable manner through eco-tourism. This may for example include investment in adaptive reuse of historic buildings so as to conserve and enhance the unique character and historic themes pertinent to this area. Heritage tourism can therefore serve as a driver for economic development, including infrastructure development and poverty alleviation through job creation. The broader region's rich archaeological, palaeontological, historical and natural heritage has the potential to provide unique tourism opportunities when developed and used in responsible and sustainable ways.

Given the location as well as pattern of existing land use within the proximity of the site and furthermore, the relative **low density of heritage resources** considered of cultural significance noted as part of this assessment, we do **not consider that the proposed development would offer significant heritage-related eco-tourism opportunities associated with the development site.**

10 ARCHAEOLOGICAL IMPACT ASSESSMENT

Lita Webley, of ACO Associates CC, compiled an Archaeological Impact Assessment Report for the proposed Postmasburg Solar PV Energy Facility 2 site (see **Appendix D, Annexure D4** for full report), from which the following is drawn.

10.1 ARCHAEOLOGICAL FINDINGS

Virtually no pre-colonial archaeological remains were identified during the survey. A single stone artefact (of indeterminate age) was recovered (Site D003). It was lying near an exposure of banded ironstone in an outcrop of iron-rich rock.

Figure 36: Single notched flake (Webley, 2014)

A single stone-packed grave was identified about 400 m to the southeast of the Kapstewel house (Site D005). It is clearly a grave as indicated by the presence of a glass vase and an informal headstone.

Figure 37: Grave site found approx. 400m from homestead.

A further two stone cairns (D001 and D002) were recorded at the foot on two hills which lie on the edge of the less preferable area. D001 is described as a cairn slightly ovoid in shape (1.5 m x 2.5 – 3.0 m) with no associated artefacts, lying in an approximately north-south orientation. D002 is similarly an ovoid cairn covered with iron-rich rocks with dimensions of around 1 m x 1.5 m. It too has no associated artefactual material and lies in a north-south orientation.

Both cairns are located in soft red soils and this, together with the size of the cairns, suggests that there is a strong likelihood that they are both cover graves.

Figure 38: Stone cairn found in soft red sand at foot of koppie.

The rectangular stone base of a wire kraal, enclosing at least 3 concrete slabs, was identified (Site D006-D009). Two of the smaller concrete slabs may have functioned as bases for wind pumps while the third may have supported a small structure such as a herder's house. The concrete slabs and the top of a rusted metal petrol container probably date to the second half of the 20th century (Webley, 2014).

Figure 39: The western edge of the rectangular stone kraal.
Figure 40: One of three cement bases located within the perimeter of the kraal.

10.2 ARCHAEOLOGICAL IMPACT ASSESSMENT

During the construction of the solar facility, large areas of the landscape will be cleared and levelled for the installation of the PV units. Any heritage resources lying on the surface will be moved to one side or destroyed. Heritage resources are non-renewable and once destroyed cannot be recovered. For this reason, it is important that heritage resources are identified and if they are significant, they must be conserved and fenced off during the construction phase. If conservation is not possible, then mitigation in the form of archaeological excavations or recording may be recommended (Webley, 2014).

10.2.1 Impact on Pre-Colonial Archaeology

Since heritage sites, including archaeological sites, are non-renewable, it is important that they are identified and their significance assessed prior to development. The main cause of impacts to archaeological sites is direct, physical disturbance of the material itself and its context. The significance of an archaeological site is highly dependent on its geological and spatial context. This means that even though, for example a **deep excavation may expose buried archaeological sites and artefacts**, the artefacts are relatively meaningless once removed from the area in which they were found. The impacts are likely to be most severe during the construction period although indirect impacts may occur during the operational phase of the project.

Our survey confirmed the findings of Morris (2005b) elsewhere in the area. There are very low densities of artefacts on the plains. In view of the almost total absence of archaeological material, it is anticipated that the impact of the proposed development on pre-colonial archaeology will be very low.

Table 8: Potential impact on Pre-colonial Archaeology

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	1 Local	1 Local	3 Irreversible	5 Low	Improbable	Very Low	Negative	High
Essential Mitigation Measures: • If any significant concentrations of archaeological material area uncovered, then work in that area should stop, and SAHRA (Telephone: 021 462 4502) should be contacted. Best Practice Mitigation Measures: • Archaeological remains are best left *in situ*, and conserved for the future. If this is not possible then mitigation in the form								

of excavation with a permit will be required.								
With mitigation	1 Low	1 Low	3 Irreversible	5 Low	Improbable	Very Low	Neutral	High

10.2.2 Impacts on Colonial Archaeology

The farms between Olifantshoek and Postmasburg generally date to the late 19th century. The farmhouse of Kapstewel does not appear to be older than 60 years. There was no evidence of any historic middens or ruins on the property. The remains of a kraal complex appear to be more recent than 60 years. It is not anticipated that there will be any impacts to historical archaeology.

10.2.3 Impacts to Graves

The landowner was interviewed with respect to graveyards on the property and confirmed that none were present. However, our survey identified at least **one grave** (probably that of a farm worker), outside of a formal graveyard, in the veld some 400m from the farmhouse (Site D005). It is possible that other graves may occur in proximity to the farmhouse. A further **two stone cairns** were found at the foot of one of the koppies (Sites D001 and D002) and it is possible that these are graves as well.

The graves are situated in the area of lower suitability for the development of the solar facility. It is recommended that a **buffer of around 5m** be implemented around them and they should be declared off limits.

Table 9: Potential impacts on Graves

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	1 Local	1 High	3 Irreversible	5 Low	Probable	High	Negative	High
Essential Mitigation Measures: • Graves/stone cairns should be protected with a buffer of at least 5 m and they should be declared off limits for development; • If any human remains are uncovered during construction, then work in that area should stop immediately, and SAHRA (Telephone: 021 462 4502) should be contacted. Best Practice Mitigation Measures: • Human remains are best left in situ. If it becomes necessary to exhume human remains, then application must be made to SAHRA.								
With mitigation	1 Low	1 Low	3 Irreversible	5 Low	Improbable	High	Neutral	High

Human remains are the most complicated aspects of heritage to mitigate since they require their own public participation process (See Section 36 of the NHRA) before they can be exhumed. Human remains are protected by a plethora of legislation including the Human Tissues Act (Act No 65 of 1983), the Exhumation Ordinance of 1980 and the National Heritage Resources Act (Act No 25 of 1999). In the event of human bones being found on site, SAHRA must be informed immediately and the remains removed by an archaeologist under an emergency permit. This process will incur some expense as removal of human remains is at the cost of the developer. Time delays may result while application is made to the authorities and an archaeologist is appointed to do the work.

10.2.4 Impacts to Powerline and Access Roads

Potential impacts caused by a 132 kV power line and the power line access roads are likely to be **limited and local**. Since the proposed solar facility is located in close proximity to the Manganore substation, the powerlines will be very short. In the case of Postmasburg Solar PV Energy Facility 2 (RE Capital 10), the access roads will **follow an existing farm roads**.

10.3 ARCHAEOLOGICAL CONCLUSION & RECOMMENDATIONS

Indications are that in terms of archaeological heritage the proposed activity is viable; impacts are expected to be very limited and controllable.

Construction of the proposed solar facility may proceed according to the layout assessed in this report. The following recommendations should be enforced:

- The ECO should ensure that the **graves/stone cairns** at D001, D002 and D005 have a **buffer of approximately 5 m around them** and they should be declared off limits;
- If any human remains are uncovered elsewhere on the site during construction, the ECO should have the area fenced off and contact SAHRA (Tel: 021 462 4502) immediately.

If there are any significant changes to the layout of the facility, the new design should be assessed by a heritage practitioner.

11 PALAEONTOLOGICAL STATEMENT

Dr. John Almond, of *Natura Vita CC*, compiled a Palaeontological Statement for the proposed Postmasburg Solar PV Energy Facility 2 site (see **Appendix D, Annexure D5** for full report), from which the following is drawn:

11.1 PALAEONTOLOGICAL OVERVIEW

The 2.6 to 2.5 billion-year-old shallow shelf and intertidal carbonate sediments within the lower part of the Ghaap Group (i.e. Schmidtsdrif and Campbell Rand Subgroups) are well known for their rich fossil biota of stromatolites or microbially-generated, finely-laminated sheets, mounds and branching structures. Some stromatolite occurrences on the Ghaap Plateau of the Northern Cape are spectacularly well-preserved (e.g. Boetsap locality northeast of Daniëlskuil figured by McCarthy & Rubidge 2005, Eriksson et al. 2006). Some of the oldest known (2.6 Ga) fossil microbial assemblages with filaments and coccoids have been recorded from stromatolitic cherty limestones of the Lime Acres Member, Kogelbeen Formation at Lime Acres.

The **fossil record of the Kalahari Group is generally sparse and low in diversity**. The Gordonia Formation dune sands were mainly active during cold, drier intervals of the Pleistocene Epoch that were inimical to most forms of life, apart from hardy, desert-adapted species. Porous dune sands are not generally conducive to fossil preservation. However, mummification of soft tissues may play a role here and migrating lime-rich groundwaters derived from the underlying bedrocks (including, for example, dolerite) may lead to the rapid calcretisation of organic structures such as burrows and root casts. Occasional terrestrial fossil remains that might be expected within this unit include calcretized rhizoliths (root casts) and termitaria (e.g. Hodotermes, the harvester termite), ostrich egg shells (Struthio) and shells of land snails (e.g. Trigonephrus) (Almond 2008, Almond & Pether 2008). Other fossil groups such as freshwater bivalves and gastropods (e.g. Corbula, Unio) and snails, ostracods (seed shrimps), charophytes (stonewort algae), diatoms (microscopic algae within siliceous shells) and stromatolites (laminated microbial limestones) are associated with local watercourses and pans. Microfossils such as diatoms may be blown by wind into nearby dune sands. These Kalahari fossils (or subfossils) can be expected to occur sporadically but widely, and the overall palaeontological sensitivity of the Gordonia Formation is therefore considered to be low. Underlying calcretes of the Mokolanen Formation might also contain **trace fossils** such as rhizoliths, termite and other insect burrows, or even mammalian trackways. Mammalian bones, teeth and horn cores (also tortoise remains, and fish, amphibian or even crocodiles in wetter depositional settings such as pans) may be expected occasionally expected within Kalahari Group sediments and calcretes, notably those associated with ancient, Plio-Pleistocene alluvial gravels (Almond, 2014).

11.2 PALAEONTOLOGICAL CONCLUSION & RECOMMENDATIONS

The Precambrian marine limestones of the Campbell Rand Subgroup that underlie the study area at depth may contain well-preserved stromatolites (fossil microbial domes). However, these readily-weathered bedrocks are poorly exposed in the flat-lying study area, where they are extensively mantled by fossil-poor Late Caenozoic deposits such as Kalahari sands, calcretes and surface gravels. It is concluded that the proposed Postmasburg Solar PV Energy Facility 2, including the short associated transmission lines to Manganore Substation, are unlikely to have significant impacts on local palaeontological heritage resources.

It is therefore recommended that, pending the discovery of significant new fossils remains before or during construction, exemption from further specialist palaeontological studies and mitigation be granted for the proposed Postmasburg Solar PV Energy Facility 2 (Postmasburg Solar PV Energy Facility 2) on Farm Kapstwel 436 near Postmasburg.

Should any substantial fossil remains (e.g. well-preserved stromatolites, mammalian bones and teeth) be encountered during excavation, however, these should be safeguarded, preferably in situ, and reported by the ECO to SAHRA, i.e. The South African Heritage Resources Authority, as soon as possible (Contact details: Mrs Colette Scheermeyer, P.O. Box 4637, Cape Town 8000. Tel: 021 462 4502. Email: cscheermeyer@sahra.org.za) so that appropriate action can be taken by a professional palaeontologist, at the developer's expense. Mitigation would normally involve the scientific recording and judicious sampling or collection of fossil material as well as associated geological data (e.g. stratigraphy, sedimentology, taphonomy) by a professional palaeontologist (Almond, 2014).

12 VISUAL IMPACT ASSESSMENT

Stephen Stead, of Visual Resource Management Africa CC (VRM), compiled a Visual Impact Assessment for the proposed Postmasburg Solar PV Energy Facility 2 site (see **Appendix D, Annexure D7** for full report), from which the following is drawn:

Please refer to the full specialist report for detail on methodology etc.

12.1 REGIONAL LANDSCAPE CHARACTER

Landscape character is defined by the U.K. Institute of Environmental Management and Assessment (IEMA) as the 'distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape, and how this is perceived by people. It reflects particular combinations of geology, land form, soils, vegetation, land use and human settlement'. It creates the specific sense of place or essential character and 'spirit of the place'. (IEMA, 2002) The following landmarks defining the surrounding area's characteristic landscape were identified during the field survey and their significance quantified:

Table 10: Regional Landmark Significance

Landmark	Significance
R325 National Road	Medium
Low Hills	Medium to High
Powerlines	Low
Abandoned Mine, Haul Road Disused Railroad	Low
Overall Regional Significance	**Medium**

12.1.1 R325 National Road

Figure 401: Photograph of the R325 northbound towards Kathu

The R325 is a tarred road linking the towns of Postmasburg in the south with Kathu in the north. Kathu is the town servicing the large Sishen Iron Ore mine. The road context is strongly associated with large mining related trucks. The road is aligned north-south and follows a wide valley with low hills on either side. As depicted in the photograph above, telephone poles run along the road east of the route. Even though parts of the route are degraded, the route is an important regional access route, and hence was rated as having a medium visual significance. Precautionary measures should be applied to protect the remaining visual resources.

12.1.2 Low Hills

Figure 412: Low hills to the east of the proposed site (Stead, 2015)

Located to the east and the west of the R325 and aligned in a north-south direction, low hills are a prominent feature in the landscape. The hills are rounded and often covered with medium sized trees which add to the scenic quality of the area. However, detracting from the scenic quality, evidence of past mining is apparent on many of the hills. Even though certain areas are degraded, the hills are a key regional feature in the greater landscape. This feature was rated as having a medium to high visual significance and precautionary measure should be applied to protect the remaining visual resources.

12.1.3 Powerlines

Figure 42: Existing Eskom 132kv powerline and the small substation located to the east of the project site (Stead, 2015).

The small Manganore Eskom substation is located on the proposed site (indicated on the right of the photograph), and three powerlines converge at the substation, with a 132kv line crossing the site and dominating the attention of the casual observer. The powerlines and the substation do degrade the surrounding landscape.

12.1.4 Abandoned Mine, Haul Road and Disused Railroad

Figure 43: Abandoned iron ore mine to south of property (Stead, 2015)

Figure 44: Abandoned iron ore mine haul road (Stead, 2015)

An old opencast iron and manganese ore mine is located against the southern boundary of the farm property, for which Autumn Skies 128 CC has prospecting rights. The 'manganese' railway line, associated with the mining activities on the property and surrounding area, is located directly to the south-west aligned between the farms Portions 2 and 3 and ends at the 'Manganore' load-out station on Portion 5 of Farm 436.

Following the north-south alignment of the valley, the main railway is routed parallel to the R325 but at a distance so as not to dominate the landscape character. To the south a small railroad diverges to the east to service the now disused mine. The railroad is currently not utilised.

The abandoned mine, haul road and disused railway line are not key features adding to the scenic quality of the area and have low significance. However, it must be noted that these features significantly degrade the landscape and should be rehabilitated where possible.

12.2 SITE LANDSCAPE CHARACTER

Landscape character is derived from a combination of scenic quality, receptor sensitivity to landscape change, and distance of the proposed landscape modification from key receptor points. In order to better understand the visual resources of the site, regional vegetation and terrain influences are described at a broad brush level. Refer to the full report in Annexure D7 for methodology to determine scenic quality, and details of how vegetation topography influences this.

12.2.1 Visibility and Exposure

Dry land agricultural:

The site is located on shallow gradients, predominantly on NE facing dry grasslands. The viewshed from this location would be moderated by the adjacent hills. The nearest receptor is the R325 which is located approximately 3km to the west and as such the visual exposure is rated **low**. The VAC level was rated medium due to the adjacent Eskom powerlines and substation. The ZVI would be experienced mainly in the **foreground** area due to the higher VAC levels and lower levels of visual exposure.

Substation and Powerlines:

Similar in prominence and exposure to the above for the same reasons. The VAC level is higher due to the close proximity to the existing medium sized substation and the convergence of three 132kv powerlines which dominate the local visual context. The ZVI would be experienced mainly in the **foreground** area due to the higher VAC levels and lower levels of visual exposure.

Prominent Hill:

Elevated above the surrounding valley, the site is strongly prominent and landscape modifications at the site would be visible up to the **background** distance zone (approx. 12km). The nearest receptor is located 3.5km to the west and exposure is rated Low. There are no man-made modification on the small hill which is pinnacle shaped, and the VAC was rated **Low**. The experienced ZVI for landscape modification taking place in close proximity to this location would extend to the **Background** area as the unique shape and province would be clearly noticeable to the casual observer from some distance.

12.2.2 Scenic Quality

Dry land agricultural:

Landform, vegetation, water, colour and scarcity were all rated one due to the limited undulation of the land, uniformity of the grassland vegetation, no visual presence of water and a landscape similar to that of the surrounding landscapes. Adjacent scenery was rated **moderate to low**, with the undulation of the hills in the valley landscapes increasing value. The associated mining landscapes and activities degrade the landscape. Other cultural modifications were limited to those associated with farming, as well as the adjacent power lines. The VRM scenic quality for this feature was defined as C (**low**) due to the total score of 6.

Substation and Powerlines:

The scenic quality for the substation and power lines location was rated the same as the dry land agricultural landscape, with the exception of the cultural modification category which is rated -2 due to the close proximity of the power station and the converging power lines which significantly detract from the local landscape character. The VRM scenic quality for this feature was defined as C (**low**) due to the total score of 5.

Prominent Hill:

Value from this landscape was derived from the landform, vegetation, and divergence colours from the fault Grasses and greens of the smaller trees and shrubs located on the low hills. There is no presence of water and scarcity was rated low as the landscape is fairly common in the area. No cultural modifications were identified on the site. The VRM scenic quality was defined as B (**medium**) due to the total score of 14.

12.2.3 Receptor Sensitivity to Landscape Change

Dry land agricultural / Substation and Powerlines:

Receptor sensitivity was rated **low** for all categories. The site is not prominent, set back from the main receptor paths. Adjacent land uses have become familiar with mining and industrial landscapes. Hence, the need to maintain visual quality would be **low**. The site is privately owned agriculture and is not formally protected in any way.

Prominent Hill:

The receptor sensitivity to landscape modifications taking place on the prominent hills located on the site was defined as **medium**. Although adjacent land uses sensitivity to landscape modifications would be low and due to the mining and industrial landscapes associated with that the areas, and no protective zoning for the site, amount of use as seen from the R3 to five is rated high and is this is an important regional road, it is likely that receptor sensitivity towards landscape change could be **Moderate**.

12.3 KEY OBSERVATION POINTS

Key Observation Points (KOPs) are defined by the Bureau of Land Management as the people (receptors) located in strategic locations surrounding the property that make consistent use of the views associated with the site where the landscape modifications are proposed. These locations are important in terms of the VRM methodology which requires that the degree of contrast that the proposed landscape modifications will make to the existing landscape is measured from these most critical locations, or receptors, surrounding the property.

To define the KOPs, potential receptor locations are identified in the viewshed analysis, which are screened, based on the following criteria:

- Angle of observation;
- Number of viewers;
- Length of time the project is in view;
- Relative project size;
- Season of use;
- Critical viewpoints, e.g. views from communities, road crossings;
- Distance from property.

Two locations were identified as having KOP status. The receptors at these points will have clear views of the proposed project which could result in a change to local visual resources. These KOP's are:

Table 11: Key Observation Points & Landscape

KOP	Landscape 1	Landscape 2
R325 Southbound	Class I Prominent Hills	Class III Dryland Agriculture
R325 Northbound	Class I Prominent Hill	Class III Dryland Agriculture

12.4 VISUAL IMPACT ASSESSMENT

In the VRM methodology, the magnitude is defined by means of a contrast rating. The assessment of the Degree of Contrast (DoC) is a systematic process undertaken from Key Observation Points (KOPs) surrounding the project site, and is used to evaluate the potential visual impacts associated with the proposed landscape modifications. The degree of contrast generated by the proposed landscape modifications are measured against the existing landscape context in terms of the elements of form, line, colour and texture. Each alternative activity is then assessed in terms of whether it meets the objectives of the established class category, and whether mitigation is possible (USA Bureau of Land Management, 2004).

The following criteria are utilised in defining the DoC:

- **None**: The element contrast is not visible or perceived.
- **Weak**: The element contrast can be seen but does not attract attention.
- **Moderate**: The element contrast begins to attract attention and begins to dominate the characteristic landscape.
- **Strong**: The element contrast demands attention, will not be overlooked, and is dominant in the landscape.

Figure 45: View of proposed PV site as seen from the R325 without mitigation (Stead, 2015)

Table 12: Key Observation Point Contrast Ratings (Stead, 2015)

KOP	Landscape	Distance (km)	Form	Line	Colour	Texture	DoC	Visual objectives met
R325 Southbound	Class III Dryland Agriculture	3.5km	None	Weak	Medium	Medium	Medium	Yes
R325 Southbound	Class I Hill	4km	Strong	Strong	Strong	Strong	Strong	No
R325 Northbound	Class III Dryland Agriculture	2.5km	No View					Yes
R325 Northbound	Class I Hill	3.5km	Strong	Strong	Strong	Strong	Strong	No

Table 13: Landscape Character Environment Impact Summary (Stead, 2015)

Impact Activity	Phase	Mitigation	Nature	Extent	Duration	Severity	Probability	Significance without	Significance with mitigation	Mitigation	Mitigation Map Ref No.
PV Solar Facility	Cons.	W/Out	-ve	R	ST	H	HP	H		Retain hills to the east as No-Go areas. Lights at night management.	**1**
		With	-ve	Lo	ST	L	Pr		L		
	Ops.	W/Out	-ve	R	LT	H	HP	H		As above.	
		With	-ve	Lo	LT	L	Pr		L		
	Close	W/Out	-ve	R	LT	H	HP	H		Remove all structures and buildings. Rip compacted surfaces, rehabilitate and restore to grass lands.	
		With	-ve	S	P	VL	Pr		VL		
Access road Option 1	Cons.	W/Out	-ve	Lo	ST	L	Pr	L		Erosion control, dust control with no dominant signage along the rural road.	
		With	-ve	Lo	ST	VL	Pr		VL		
	Ops.	W/Out	-ve	Lo	LT	L	Pr	L		Continued erosion and dust control.	
		With	-ve	Lo	LT	VL	Pr		VL		
	Close	W/Out	-ve	Lo	LT	L	Pr	L		Rip compacted surfaces, rehabilitate and restore to vegetation (unless the road can be incorporated into the subsequent landuse).	
		With	-ve	S	LT	VL	Pr		VL		
Access road Option 2	Cons.	W/Out	-ve	R	ST	M	Pr	MH		Erosion control, dust control with no dominant signage along the rural road.	
		With	-ve	Lo	ST	L	Pr		L		
	Ops.	W/Out	-ve	R	P	M	Pr	MH		Continued erosion and dust control.	
		With	-ve	Lo	LT	L	Pr		L		
	Close	W/Out	-ve	R	P	M	Pr	MH		Rip compacted surfaces, rehabilitate and restore to vegetation (unless the road can be incorporated into the subsequent landuse).	
		With	-ve	S	LT	VL	Pr		VL		

Key: +ve = Positive, -ve = Negative, S = Site, Lo = Local, R = Regional, N = National, ST = Short, LT = Long term, P = Permanent,

VL = Very Low, L = Low, M = Medium, H = High, I = Improbable, Pr = Probable, HP = Highly Probable, D = Definite

Impact Activity	Phase	Mitigation	Nature	Extent	Duration	Severity	Probability	Significance without	Significance with mitigation	Mitigation	Mitigation Map Ref No.
Powerline Option	Cons.	W/Out	-ve	Lo	ST	L	Pr	L		Erosion control, dust control	
		With	-ve	Lo	ST	L	Pr		L		
	Ops.	W/Out	-ve	Lo	LT	L	Pr	L		Erosion control	
		With	-ve	Lo	LT	L	Pr		L		
	Close	W/Out	-ve	Lo	LT	L	Pr	L		Remove all structures and buildings. Rip compacted surfaces, rehabilitate and restore to grass lands.	
		With	-ve	Lo	LT	L	Pr		L		
Substation	Cons.	W/Out	-ve	R	ST	M	Pr	MH		Erosion control, dust control with no dominant signage along the rural road.	
		With	-ve	Lo	ST	L	Pr		L		
	Ops.	W/Out	-ve	R	P	M	Pr	MH		Continued erosion and dust control.	
		With	-ve	Lo	LT	L	Pr		L		
	Close	W/Out	-ve	R	P	M	Pr	MH		Rip compacted surfaces, rehabilitate and restore to vegetation (unless the road can be incorporated into the subsequent landuse).	
		With	-ve	S	LT	VL	Pr		VL		
Cumulative Effects	Cons.	W/Out	-ve	Reg.	ST	H	Pr	H		Effective coordination at a municipal level to manage possible negative effects of landscape degradation.	
		With	+ve	Reg.	ST	M	Pr		M		
	Ops.	W/Out	-ve	Reg.	Perm	H	Pr	H		As above.	
		With	+ve	Reg.	Perm	M	Pr		M		
	Close	W/Out	-ve	Reg.	Perm	H	Pr	H		As above.	
		With	+ve	Reg.	Perm	M	Pr		M		

Key: +ve = Positive, -ve = Negative, S = Site, L = Local, R = Regional, N = National, ST = Short, LT = Long term, P = Permanent,

VL = Very Low, L = Low, M = Medium, H = High, I = Improbable, Pr = Probable, HP = Highly Probable, D = Definite

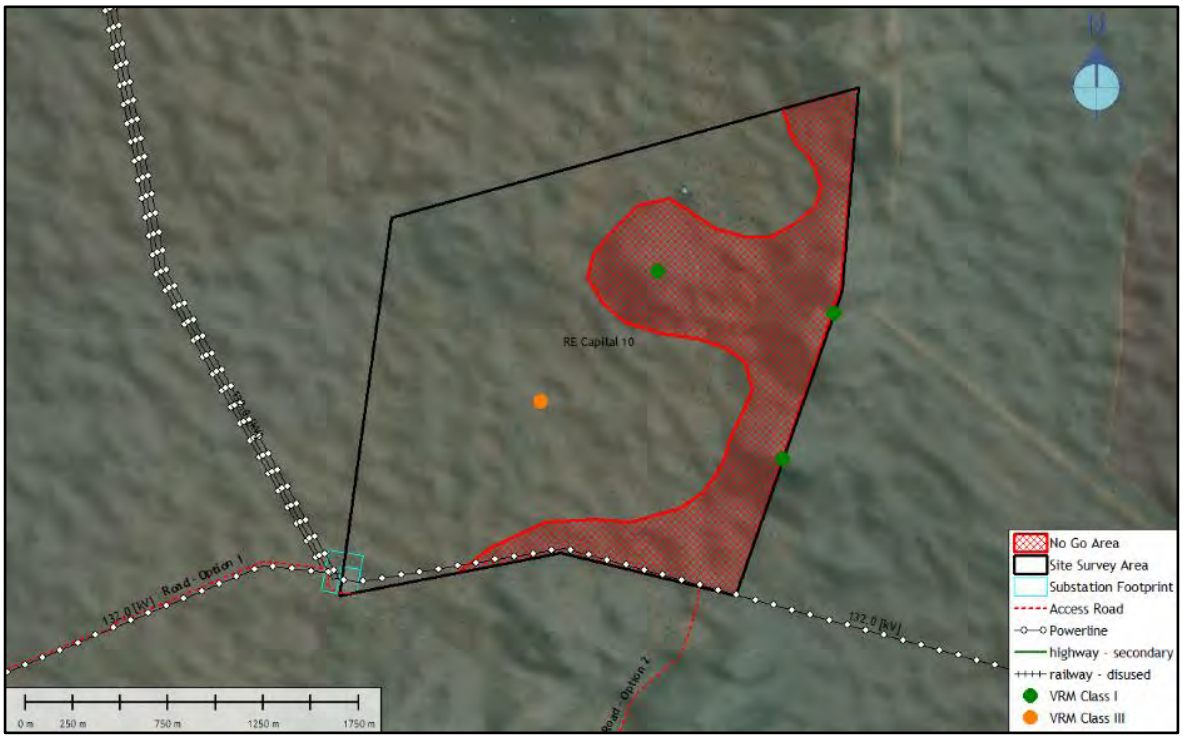


Figure 46: Visual Sensitivity / Mitigation Plan (Stead, 2015)

12.4.1 Visual Impact of PV Solar Facility

Without mitigation the proposed PV facility has a strong potential to generate Negative High visual impacts due to skyline intrusion on the elevated hills to the east of the site.

With mitigation the prominent areas would be excluded and the PV footprint placed on veld grasses of **low prominence and low receptor exposure**. With mitigation the visual significance would be reduced to **Negative Low** during the project life and Very Low once the project is removed and the area rehabilitated.

Once the project life is completed, all structures should be removed, the compact areas ripped and then rehabilitated and restored to indigenous, endemic vegetation. Lights at night have the potential to significantly increase the proposed project ZVI and light management is recommended (refer to generic light mitigations in the Visual Report)).

12.4.2 Visual Impact of Access Roads

Option 1: This routing is along the existing farm access adjacent the Eskom powerline. Without mitigation the impact would be Low as the route is already impacted. **With mitigation** which would include ripping (if not incorporated into a post PV landuse), the impact would be **Very Low**.

Option 1: Without mitigation the access road has the potential to generate Negative Moderate to High visual impacts due to the routing of the proposed road along an existing farm road through the hill range to the east of the proposed site which is subject to steeper ground and more sensitive vegetation. **Mitigation would reduce the impact to Negative Very Low** once the project is completed. Once the project life cycle is completed, the roads should be ripped and then rehabilitated and restored to indigenous, endemic vegetation (unless the road can be incorporated into a future land-usage). Due to the length of this access option, the cost of continued maintenance to ensure erosion does not take place on steeper slopes areas would become a liability. For this reason, this access route option is not recommended.

12.4.3 Visual Impacts of Substation

Without and with mitigation the proposed substation has the potential to generate Negative Low visual impacts due to low prominence and limited visibility. Once the project life cycle is completed, the structure should be removed and the site rehabilitated and restored to indigenous, endemic vegetation (unless the substation can be incorporated into future land-usage).

12.4.4 Powerlines

The short section of the powerline linkage along an existing farm cadastral line, in conjunction with the low visibility and exposure, significantly reduces the visual impact to Low, with and without mitigation.

12.4.5 Cumulative Effects

Without mitigation the potential for regional landscape degradation from ad hoc planning of new PV solar projects could result in Negative High cumulative impacts as landscape resources in the area become degraded from sprawling PV. This effect has the potential to significantly detract from the current agriculture. Effective planning at a municipal level is required to coordinate the expansion of the proposed solar energy projects so as not to detract from existing visual resources. Cumulative significance could then be reduced to a Moderate Positive effect by adding an interesting visual experience to the landscape.

12.5 VISUAL CONCLUSION

It is the recommendation of this study that the proposed project, with mitigation, would not significantly detract from the current visual resources which has important receptors which should be recognised. A development setback on the eastern prominent hills was recommended as a preferred No-Go area to ensure that the visual resources of the eastern hill range are not further compromised as seen from the R325 receptors. The proposed development area respects the proposed restricted area and as such, is suited for development (Stead, 2015).

13 SUMMARY OF OVERALL IMPACTS

The following table summarises the overall assessment of the potential impacts of the preferred layout alternative considered as part of this environmental process:

Impact	Without Mitigation	With Mitigation
Impacts on vegetation and listed or protected plant species resulting from construction activities	Medium Negative	Medium-Low Negative
Direct Faunal Impacts During Construction	Medium Negative	Medium-Low Negative
Avifaunal impacts due to habitat loss and construction activities	Medium Negative	Medium-Low Negative
Soil Erosion Risk During Construction	Medium Negative	Low Negative
Alien Plant Invasion Risk During Operation	Medium Negative	Low Negative
Soil Erosion Risk During Operation	Medium Negative	Low Negative
Faunal impacts during operation:	Medium-Low Negative	Low-Negative
Avifaunal impacts due to power lines and operational activities	Medium-Low Negative	Low Negative
Impact on broad-scale ecological processes due to cumulative loss and fragmentation of habitat	Medium-Low Negative	Low Negative
Potential impact on Pre-colonial Archaeology	Low Negative	Very-Low Negative
Potential impacts on Graves	Low Negative	Low Negative
Visual Impact of Solar Facility on Landscape Character / Environment	Regional Negative	Low Negative

Visual Impact of Road Access Option 1 on Landscape Character / Environment	Low Negative	Low Negative
Visual Impact of Road Access Option 2 on Landscape Character / Environment	Regional Negative	Low Negative
Visual Impact of Grid Connection Powerline on Landscape Character / Environment	Low Negative	Low Negative
Visual Impact of On-site Substation on Landscape Character / Environment	Regional Negative	Low Negative
Cumulative Visual Impact of on Landscape Character / Environment	Regional Negative	Regional Positive
As can be seen, the preferred layout has low potential impacts overall (as it followed a risk adverse approach) and as such, the preferred alternative can be considered for environmental authorisation.		

14 CONSIDERATION OF POTENTIAL CUMULATIVE IMPACTS

The purpose of assessing cumulative impacts is to ascertain the potential impact of the facility considering other development in the area. In the case of the Postmasburg Solar PV Energy Facility 2, the overall cumulative impacts can be viewed as generally positive, for the following reasons:

- The facility is proposed in the centre of a major identified renewable energy hub;
- There are at least 4 other renewable energy facilities (either in progress or under construction) in proximity to the site (see figure below);
- There is large-scale prospecting and mining activities in close proximity to the solar, which together with the proposed solar facility could be viewed a centralisation of disturbance and reduction of potential fragmentation of the landscape;
- The associated infrastructure in the form of grid connections will be minimal, as the Eskom Manganore Substation is located on the same property, directly adjacent to the solar site.

When considering South Africa's irradiation distribution, the Northern Cape Province, is known to be one of the most preferred areas for the generation of solar energy in South Africa, and even in the world. This can be ascribed to the advantageous sun radiation specifications and the flat planes, used predominantly for limited grazing. The global irradiation in the specific area is between 2400 and 2600 kWh/m2.

The DEA is in the process of identifying Renewable Energy Development zones (REDz) across South Africa, which are typically best suited for renewable energy generation. Upington and its surrounding area is one of the areas identified to be a Renewable Energy Development Zone.

Other solar projects that are already being developed or proposed some distance from the Postmasburg Solar PV Energy Facility 2, are illustrated in the figures below. Some of these projects have already been awarded preferred bidder status in the previous REIPPP rounds, while others are still in the planning phase:

- 50 MW Solar CSP, Ample Solar Groenwater (Pty) Limited (± 22km away);
- 300 MW Solar PV, Kyfontein Power Plant Project Company (± 36km away);
- 75 MW Solar PV, Intikon Energy Pty Ltd (LESEDI) (± 33km away);
- 3 MW Solar PV, AE-AMD Renewable Energy Pty Ltd (± 35km away).

These competitor projects neither impact on the layout design of the Postmasburg Solar PV Energy Facility 2, nor the proposed routing of the 132kV OH line to the Manganore Substation. The competitor projects are concentrated closer to the Olien MTS.

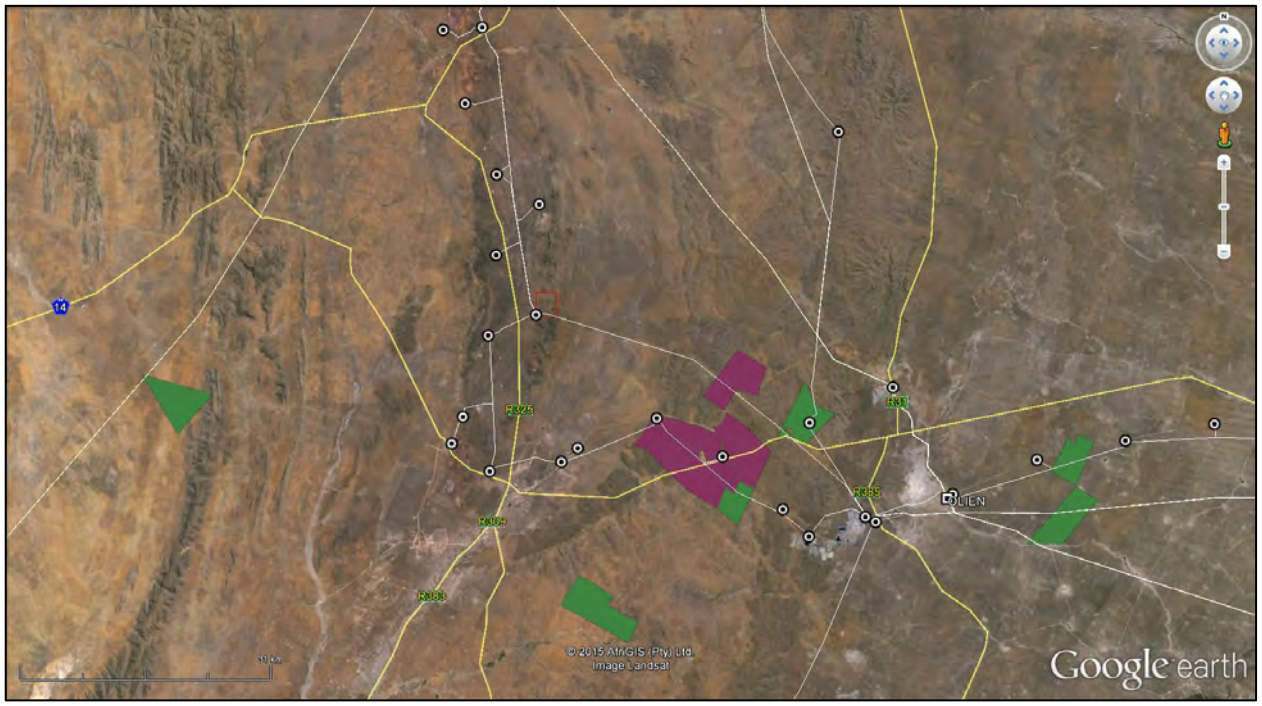


Figure 47: Map of DEA-registered projects for the area as at December 2013. The green highlighted projects are PV projects and the purple are CSP or mixed CSP/PV projects.

From a biodiversity perspective, no fine-scale conservation planning has been conducted for the region and as a result, no Critical Biodiversity Areas have been defined for the study area. In terms of other broad-scale planning studies, the site does not fall within a National Protected Areas Expansion Strategy Focus Area (NPAES), indicating that the area has not been identified as an area of exceptional biodiversity or of significance for the long-term maintenance of broad-scale ecological processes and climate change buffering within the region. The development would however contribute to cumulative habitat loss and the disruption of the broad-scale landscape connectivity in the area, with open-pit iron and manganese ore mining being the other main driver of transformation in the area. The total extent of habitat loss is however low with both vegetation types present still more than 98% intact, suggesting that the current extent of **habitat loss within these vegetation types is low and currently likely to be having a local impact only**. As such, the development of the site is also likely to **generate a local rather than regional impact** as the surrounding area is still largely intact and there are still extensive tracts of intact habitat remaining in the area. Although there are several other renewable energy projects in the broader area, these are concentrated to the area east of Postmasburg and there is no other renewable energy development within 20km of the site, indicating that cumulative impacts in the close vicinity of the site are currently quite low.

Although there are likely to be a number of listed fauna and avifauna present at the site, the surrounding landscape is still overwhelmingly intact and it is **not likely that the development of the site would lead to significant habitat loss or regional declines in these listed fauna and avifauna species**. As faunal abundance in the area is quite high, the implementation of the recommended mitigation measures to reduce the potential impact of the development in fauna, particularly during construction, will ensure a low faunal impact. A contributing factor to the **low assessed impact on avifauna** is the proximity of the site to the Eskom substation which would require a grid connection of approximately 500m. Apart from *Acacia erioloba*, which is not rare, there were **few other plant species of concern within the development footprint** and the **overall impact of the development on plant species of conservation concern is considered low**.

15 ASSUMPTIONS & LIMITATIONS

This section provides a brief overview of *specific assumptions and limitations* having an impact on this environmental application process:

15.1 GENERAL ASSUMPTIONS & LIMITATIONS

- It is assumed that the information on which this report is based (specialist studies and project information, as well as existing information) is **correct, factual and truthful.**
- The proposed development is **in line** with the statutory planning vision for the area (namely the local Spatial Development Plan), and thus it is assumed that issues such as the cumulative impact of development in terms of character of the area and its resources, have been taken into account during the strategic planning for the area.
- It is assumed that all the relevant **mitigation measures** and agreements specified in this report will be implemented in order to ensure minimal negative impacts and maximum environmental benefits.
- It is assumed that due consideration will be given to the **discrepancies in the digital mapping** (PV panel array layouts against possible constraints), caused by differing software programs, and that it is understood that the ultimate/final positioning of solar array will only be confirmed on-site with the relevant specialist/s.
- The Department of Water Affairs **may consider the submission of a water use application** necessary for allowing the use of water from the farm boreholes and possible the crossing of the on-site drainage lines by the infrastructure associated with the solar facility. The assumption is made that on review of this EIAr the Department of Water Affairs will provide prompt confirmation and recommendations in this regard.
- It is assumed that Stakeholders and Interested and Affected Parties notified during the initial public participation process will submit all relevant **comments within the designated** review and comment period, so that these can included in the Final Scoping Report can be timeously submitted to the delegated Authority, the Department Environmental Affairs for consideration.

15.2 SPECIALIST SPECIFIC ASSUMPTIONS & LIMITATIONS

The following specialists have listed the following specific assumptions & limitations as part of their Scoping and Impact Assessments:

AGRICULTURAL POTENTIAL:

A desktop-based study was undertaken as far as **regional** information is concerned: Climatic conditions, land uses, land type and terrain are readily available from literature, GIS information and satellite imagery. Notwithstanding these limitations, the **site-specific** field studies confirmed most of the desktop findings and the specialist is confident that the findings provide sufficient detail for the agricultural potential study reported in this document.

ECOLOGICAL / BIOPHYSICAL:

The major potential limitation associated with the sampling approach is the narrow temporal window of sampling. Ideally, a site should be visited several times during different seasons to ensure that the full complement of plant and animal species present are captured. However, this is rarely possible due to time and cost constraints and therefore, the **representivity of the species sampled at the time of the site visit** should be critically evaluated.

The site visit for the current study took place in early summer, following some recent good rainfall and although not all the grass and annuals present were in flower, there had been good growth of the vegetation and it was green and in favourable state for the assessment at the time of the site

visit. Consequently, the timing of the site visit is not considered to be a limiting factor which might compromise the results to any significant degree, as it is unlikely that there are any species of conservation concern that were not visible at the time of sampling.

The lists of avifauna, amphibians, reptiles and mammals for the site are based on those observed at the site as well as those likely to occur in the area based on their distribution and habitat preferences. This represents a sufficiently **conservative and cautious approach** which takes the study limitations into account.

HERITAGE:

This report is limited to the assessment of the potential impact of the proposed facility on heritage resources found on/ within the proximity of the development site as defined in this report;

There is a limitation in terms of understanding the cumulative impacts of the project when taken in conjunction with other similar future development projects in the surrounding area (de Kock, 2014).

ARCHAEOLOGICAL:

The owner of the Remainder of Kapstewel 436 does not reside on his farm but rather in the town of Postmasburg. We were provided with a key in order to access the farm from the south, but found that a gate just before the farm gate was locked. Although we were able to access the property from the Manganore substation, we were not able to travel along a small section of the farm road which, according to the shape files we received, was the southern access road to the site (Webley, 2014).

VISUAL:

- Information pertaining to the specific heights of activities proposed for the development was limited and, where required, generic heights will be used to define the visibility of the project.
- Although every effort to maintain accuracy was undertaken, as a result of the Digital Elevation Model (DEM) being generated from satellite imagery and not being a true representation of the earth's surface, the viewshed mapping is approximate and may not represent an exact visibility incidence.
- The use of open source satellite imagery was utilised for base maps in the report.
- The viewshed were generated using ASTER elevation data. (NASA, 2009)
- Some of the mapping in this document was created using Bing Maps (previously Live Search Maps, Windows Live Maps, Windows Live Local, and MSN Virtual Earth) and powered by the Enterprise framework.
- Determining visual resources is a subjective process where absolute terms are not achievable. Evaluating a landscape's visual quality is complex, as assessment of the visual landscape applies mainly qualitative standards. Therefore, subjectivity cannot be excluded in the assessment procedure (Lange, 1994). The project deliverables, including electronic copies of reports, maps, data, shape files and photographs are based on the author's professional knowledge, as well as available information. This study is based on assessment techniques and investigations that are limited by time and budgetary constraints applicable to the type and level of assessment undertaken. VRM Africa reserves the right to modify aspects of the project deliverables if and when new/additional information may become available from research or further work in the applicable field of practice, or pertaining to this study (Stead, 2015).

PLANNING:

Due to the fact that **no applicable zoning** currently exists for alternative / renewable energy facilities or their ancillary facilities in the Northern Cape Province, it was necessary to apply for rezoning from Agriculture 1 to Special zone, as well as for a long-term lease on Agricultural land for the purposes of the renewable energy facility.

This Scoping & Environmental Impact Assessment process was undertaken with full knowledge of the above assumptions and cognisance was taken of the limitations as specified.

16 RECOMMENDED CONDITIONS OF AUTHORISATION

Based on the findings of the EAP and participating specialists, the following section serves as a summary of the avoidance, mitigation and management measures / recommendations arising from the above environmental impact assessment. In order to guide the proposed solar development and ensure that the negative impacts associated with it are kept to a minimum, it is recommended that the following recommendations serve as conditions of the environmental authorisation:

16.1 PRE-CONSTRUCTION RECOMMENDATIONS / CONDITIONS

- Preconstruction walk-through of the facility in order to locate plant species of conservation concern that can be translocated prior to construction, as well as comply with the Northern Cape Nature Conservation Act and DENC/DAFF permit conditions. Vegetation clearing to commence only after walk through has been conducted and necessary permits obtained.
- Vegetation clearing to commence only after walk through has been conducted and necessary permits obtained.
- Vegetation clearing to be kept to a minimum. No unnecessary vegetation to be cleared.
- Preconstruction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness as to no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimizing wildlife interactions, remaining within demarcated construction areas etc. All personnel should undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises and owls which are often persecuted out of superstition.
- Ecological Control Officer (ECO) to provide supervision and oversight of vegetation clearing activities within sensitive areas such as near slopes and drainage areas.
- All construction vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed outside of the construction area.
- Temporary lay-down areas should be located within previously transformed areas or areas that have been identified as being of low sensitivity. These areas should be rehabilitated after use.
- Any raptor or other species of conservation concern which may be nesting within or in the immediate vicinity of the facility should be identified before construction commences. This can occur during the preconstruction walk-through of the facility for other fauna and flora related issues. If any significant finds are made, then some adjustment of the timing or location of certain activities may be required to allow breeding to be completed. Precautions should be taken to ensure that staff do not wander from the construction site and do not disturb any nesting species in the vicinity of the site.

16.2 CONSTRUCTION RECOMMENDATIONS / CONDITIONS

- Retain hills to the east as No-Go areas during construction.
- Wherever excavation is necessary, topsoil should be set aside and replaced after construction to encourage natural regeneration of the local indigenous species.
- The recovery of the indigenous vegetation should be encouraged through leaving some areas intact through the construction phase to create a seed source for adjacent cleared areas.

- All construction vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed outside of the construction area.
- All vehicles accessing the site should adhere to a low speed limit (30km/h max) to avoid collisions with susceptible species such as snakes and tortoises.
- Temporary lay-down areas should be located within previously transformed areas or areas that have been identified as being of low sensitivity. These areas should be rehabilitated after use.
- Any fauna threatened by the construction activities should be removed to safety by the ECO or appropriately qualified environmental officer.
- All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.
- If trenches to be dug for water pipelines or electrical cabling, should not be left open for extended periods of time as fauna may fall in and become trapped in them. Trenches which are standing open should have places where there are soil ramps allowing fauna to escape the trench.
- Precautions should be taken to ensure that staff do not wander from the construction site and do not disturb any nesting species in the vicinity of the site.
- There should also be environmental induction required for all construction staff to ensure that avifauna are not harmed during construction and that species such as owls are not persecuted out of superstition or other reason.
- All litter generated at the site should be handled in an environmentally sensitive manner to ensure that there is not organic litter at the site which might attract avifauna and that plastic and other materials are not allowed to blow about the site, as some types of litter such as string can become entangled around birds legs.
- All overhead power lines should be fitted with bird flight-diverters and pylons and connections should be appropriately insulated and of a bird-friendly design.
- Dust suppression and erosion management should be an integrated component of the construction approach.
- Disturbance near to drainage lines should be avoided and sensitive drainage areas near to the construction activities should demarcated as no-go areas.
- Regular monitoring for erosion problems along the access roads and other cleared areas.
- All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques.
- Sediment traps may be necessary to prevent erosion and soil movement if there are topsoil or other waste heaps present during the wet season.
- A low cover of vegetation should be left wherever possible within the construction footprint to bind the soil, prevent erosion and promote post-disturbance recovery of an indigenous ground cover.
- Wherever excavation is necessary, topsoil should be set aside and replaced after construction to encourage natural regeneration of the local indigenous species.
- The recovery of the indigenous vegetation should be encouraged through leaving some areas intact through the construction phase to create a seed source for adjacent cleared areas.
- Due to the disturbance at the site as well as the increased runoff generated by the hard infrastructure, alien plant species are likely to be a long-term problem at the site and a long-term control plan will need to be implemented.
- Regular monitoring for alien plants within the development footprint as well as adjacent areas which receive runoff from the facility as there are also likely to be prone to invasion problems.

- Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible. All roads and other hardened surfaces should have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk.
- All cleared areas should be revegetated with indigenous perennial grasses from the local area. These can be cut when dry and placed on the cleared areas if natural recovery is slow.
- No unauthorized persons should be allowed onto the site.
- The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden.
- If the facility is to be fenced, then the electrified strands should be on the inside of the fence as some species such as tortoises are susceptible to electrocution from electric fences as they do not move away when electrocuted but rather adopt defensive behaviour by retreating into their shells and are killed by repeated shocks.
- The facility should be fenced off in a manner which allows fauna to pass by the facility as easily as possible. This implies not fencing-in large areas of intact vegetation into the facility and only the developed area should be fenced. The parameter fencing of the Postmasburg Solar PV Energy Facility 2 Site will be have sufficient gap spacing (20cm min) or alternatively the lowest strand or bottom of the fence will be elevated to 15 cm above the ground at least at strategic places to allow for fauna to pass under the fence. Electrified strands may only be placed above 20 cm off the ground and may only be installed on the inside of the fence – to allow free movement of tortoises and reptiles in particular.
- The ECO should ensure that the stone cairns at D001 (Lat.:-28.11948999, Long.:23.12191903) and D002 (Lat.: -28.12423197, Long.: 23.12044004) and the grave at D005 (Lat.: -28.11500601, Long.: 23.12227098) have a buffer of approximately 5 m around them and they should be declared off limits.
- If any human remains are uncovered during construction, the ECO should have the area fenced off and contact SAHRA (Tel: 021 462 4502) immediately.
- If there are any significant changes to the layout of the facility, the new design should be assessed by a heritage practitioner.
- Should any substantial fossil remains (e.g. mammalian bones and teeth) be encountered during excavation, however, these should be safeguarded, preferably in situ, and reported by the ECO to SAHRA, i.e. The South African Heritage Resources Authority, as soon as possible (Contact details: Mrs Colette Scheermeyer, P.O. Box 4637, Cape Town 8000. Tel: 021 462 4502 (Email: cscheermeyer@sahra.org.za), so that appropriate action can be taken by a professional palaeontologist, at the developer's expense. Mitigation would normally involve the scientific recording and judicious sampling or collection of fossil material as well as associated geological data (e.g. stratigraphy, sedimentology, taphonomy) by a professional palaeontologist.

16.3 OPERATION RECOMMENDATIONS / CONDITIONS

- Due to the disturbance at the site as well as the increased runoff generated by the hard infrastructure, alien plant species are likely to be a long-term problem at the site and a long-term control plan will need to be implemented.
- Regular monitoring for alien plants within the development footprint as well as adjacent areas which receive runoff from the facility as there are also likely to be prone to invasion problems.
- Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible.
- All roads and other hardened surfaces should have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk.

- Regular monitoring for erosion after construction to ensure that no erosion problems have developed as result of the disturbance.
- All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques.
- All cleared areas should be revegetated with indigenous perennial grasses from the local area. These can be cut when dry and placed on the cleared areas if natural recovery is slow.
- No unauthorized persons should be allowed onto the site.
- All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.
- All vehicles accessing the site should adhere to a low speed limit (30km/h max) to avoid collisions with susceptible species such as snakes and tortoises.
- The electrified strands of the facility fencing should be on the inside of the fence as some species such as tortoises are susceptible to electrocution from electric fences as they do not move away
- Retain hills to the east as No-Go areas during operation.
- Any potentially dangerous fauna such snakes or fauna threatened by the maintenance and operational activities should be removed to a safe location.
- The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden.
- Birds nesting within the support frames of the panels or other infrastructure should be tolerated unless they form a safety hazard, in which case, they should either be preventing from accessing these areas with mesh or similar exclusion, or allowed to persist until breeding has been completed and then remove the nests and prevent future access.
- In the case of any mortalities resulting from birds flying into the power line, panels or trackers, these should be recorded including the date of the observation and the species affected and any other relevant information. If the birds cannot be identified, then photographs should be taken for documentation purposes so that an avifaunal expert can identify the bird. If repeated collisions occur then an avifaunal specialist should be consulted for additional measures to reduce avifaunal collisions.
- Minimise the development footprint as far as possible and allow the retention of some natural vegetation between the rows of panels or trackers.
- During operation, all gates will be kept closed to ensure that no larger fauna enter and become trapped within the fenced-off area.
- The presence of smaller fauna should be tolerated within the facility.
- Light management at night for security purposes: Effective light management needs to be incorporated into the design of the lighting to ensure that the visual influence is limited to the mine, without jeopardising mine operational safety and security. Lighting mitigation as follows:
  - utilise specific frequency LED lighting with a green hue on perimeter security fencing;
  - use directional lighting on the more exposed areas of operation, where point light source is an issue.
  - use downward-directed low-UV type lights (such as most LEDs), which do not attract insects.
  - limit use of overhead lighting and, if possible, locate the light source closer to the operation.
  - if possible, the existing overhead lighting method utilised at the mine should be phased out and replaced with an alternative lighting using closer to source, directed LED technology.
- No dominant signage along the rural road/s.

- Effective coordination at a municipal level to manage possible negative effects of landscape degradation by sprawling / scatter solar PV facilities across the landscape.

16.4 DECOMMISSIONING RECOMMENDATIONS / CONDITIONS

- During closure or decommissioning, remove all structures and buildings. Rip compacted surfaces, rehabilitate and restore to grass lands.

17 PUBLIC PARTICIPATION PROCESS

As part of the public participation process the following steps were taken to ensure compliance with the legislation and to allow ample opportunity for members of the public and key stakeholders to be involved and participate in the environmental process. Please see **Appendix E** for evidence of this Public Participation process. The Public Participation Process has been undertaken according to the requirements of the new NEMA EIA regulations. The following requirements i.t.o the Scoping & EIAr process have been undertaken and complied with in terms of Regulation 56:

Table 14: Summary of Public Participation Process to date.

CHRONOLOGY OF EVENTS	
DATE	**ACTION**
29 April 2014	**Notification** was sent to the Landowner of Remainder of Farm 436 Kapstewel informing him of the development proposal and the environmental process to be followed.
27 May 2014	Department of Environmental Affairs accepted the Application for Authorisation, confirming that the public participation process of the environmental process may proceed.
11 June 2014	**Site Notices** (English & Afrikaans) were placed on the boundary fence of Remainder of Farm 436 Kapstewel. **Notice Boards** (English & Afrikaans) were placed at the post office in Postmasburg.
30 June 2014	A **Stakeholder Register** was opened and the details of all registered stakeholders entered for future correspondence.
5 July 2014	**An Advertisement** were placed in a regional newspaper (*Kathu Gazette*), calling for stakeholders to register as Interested & Affected Parties
17 July 2014	**Background Information Documents (BID)** (English & Afrikaans) were placed at the Postmasburg Library and Tsantsabane Municipal offices in Postmasburg for public review.
25 July 2014	**Notifications** were sent to neighbouring landowners informing them of the development proposal and the environmental process, and inviting them to register as I&APs.
25 July 2014	The **ZF Mgcawu District Municipality and the Tsantsabane Local Municipality** (which have jurisdiction over the area), as well as **State Departments** and other **organs of state** (including SANParks, Northern Cape Nature Conservation, Department of Agriculture, Forestry & Fisheries, Department of Minerals and Energy, Department of Water Affairs, SAHRA, Eskom, Civil Aviation Authority etc.), were notified and registered as key stakeholders.
August 2014	Hard copies of the **Draft Scoping Report (DSR)** were placed at the Tsantsabane Municipality offices (Postmasburg) and the Postmasburg Library, for public review. The DSR was also made available on the *Cape EAPrac* website: www.cape-eaprac.co.za
August 2014	Registered Stakeholders and I&APs were sent notifications informing that of the availability of the DSR for a review and comment period of 40-days, extending from **Monday 25 August to Saturday 4 October 2014.**
October 2014	Hard copies of the **Final Scoping Report (FSR)** have been placed at the Tsantsabane Municipality offices (Postmasburg) and the Postmasburg Library, for public review. The FSR has also been made available on the *Cape EAPrac* website: www.cape-eaprac.co.za
October 2014	Registered Stakeholders and I&APs were sent notifications informing that of the availability of the FSR for a review and comment period of 21-days, extending from **Friday 10 October to Friday 31 October 2014.**

October 2014	Final Scoping Report (FSR) and Plan-of-Study for EIR submitted to the Department of Environmental Affairs.
12 Dec. 2014	National Department of Environmental Affairs accepted the FSR and Plan-of-Study for EIR with confirmation to proceed with the Environmental Impact Assessment (EIA) phase.
January 2015	Hard copies of the **Draft Environmental Impact Assessment Report (DEIAr)** were placed at the Tsantsabane Municipality offices (Postmasburg) and the Postmasburg Library, for public review. The DEIAr was also made available on the *Cape EAPrac* website: www.cape-eaprac.co.za
January 2015	Registered Stakeholders and I&APs were sent notifications informing that of the availability of the Draft EIA Report for a review and comment period of 30-days, extending from **Friday 30 January to Monday 2 March 2015.**
March 2015	A digital copy of the **FINAL Environmental Impact Assessment Report (FEIAr)** made available on the *Cape EAPrac* website: www.cape-eaprac.co.za
March 2015	Registered Stakeholders and I&APs were sent notifications informing that of the availability of the FINAL EIA Report for a review and comment period of 21-days, extending from **Friday 6 March to Friday 27 March 2015,** on the *Cape EAPrac* website.

NOTE: The environmental Regulations make provision that as there are no substantive changes between the *Draft* Environmental Impact Report (DEIR) and *Final* Environmental Impact Report (FEIR), the Final EIR can be submitted to the Department (DEA) without a further public review and comment period. This FEIR has however been available on the *Cape EAPrac* website for review. Approval for this course of action has been received from the delegated Authority.

17.1 SUMMARY OF ISSUES & CONCERNS RAISED BY I&APS & STAKEHOLDERS

I&AP / Stakeholder	Comment / Concern	Response
INITIAL / REGISTRATION PHASE		
SANRAL	SANRAL must be consulted before movement of loads on national roads. Please forward the Transport Traffic Plan.	Noted. Transport Traffic Plan provided & included in EMPr for implementation.
SKA	facility poses a low risk of detrimental impact on the SKA. no mitigation measures would be required	Noted.
ESKOM	Please note Eskom;s requirements for works at or near Eskom infrastructure	Noted & included in EMPr for implementation.
SANParks	SANParks has no interest in this area and need not be maintained on the stakeholder database.	De-registered.
Nicolas Loubser – adjacent landowner of 4/436	Your initial notification wrongly refers to affected as Farm Vaalkop – this is my property. Please refer to Farm Kapstewel.	Clarification noted.
Chris Victor of Autumn Skies 128cc	Autumn Skies 128cc holds prospecting rights of affected properties (RE/436). Please confirm location of proposed solar facility relative to mining activities.	Location provided – north of old mine.
SCOPING PHASE		
Department of Agriculture, LandReform & Rural Development: Sub-directorate: Sustainable Resource Management	Developer must comply with Article 7.(3)b of Regulation 9238: Conservation of Agriculture Resources Act (CARA, Act 43 of 1983). Who is the current landowner? Will it be a subdivision of land or a lease contract between the developer and the landowner? Rezoning will also be applicable because the land use will change from the current agricultural status.	The articles in terms of Act 43 of 1983, requiring the protection of any water body or watercourse & associated flood areas, adhered to in the design of solar facility. Developer sub-lease a portion of RE/436 Kapstewel from the landowner, Mr. Schalk Victor, for solar facility. A land use change application for the rezoning of at least 225ha, from Agricultural Zone I to Special Zone, to be lodged at

		Tsantsabane Local Municipality, in accordance with the NC Planning & Development Act (Act 7 of 1998).
National Department of Agriculture	Application has been captured in our electronic AgriLand tracking and management system: AgriLand reference number: 2014_11_0146	Noted.
Biotumelo David Mokgoro	Please de-register me as an I&AP.	De-registration confirmed.
EIA PHASE		
SIP 8 & 9 Co-ordinators	Already received and dealt with it to ensure Eskom inputs. IPP projects only become a part of SIP8 once they are successful as bidders. At this time if we are provided with the EIA reference number we will send it to DEA and the PICC Technical Task Team for tracking and unblocking if required.	Noted.
Pieter de Klerk – adjacent landowner 5/436	Confirmed new landowner of Portion 5 of Farm 436 Kapstewel. P.J. van Niekerk not later owner (as detailed on Municipal records).	Registered.
National Department of Energy (DoE)	**No comment**. We wish you all the best in securing a positive Environmental Authorisation.	Noted.
Northern Cape Department of Environmental Affairs & Nature Conservation	Marvin Matthews no longer employed. Deneo Moleko will review DEIR. Moses Ramakulukusha will review FEIR with Deneo Moleko.	De-registered. Registered and provided DEIR. Registered.
SAHRA	Case ID 6299 all Heritage documents noted on SAHRIS.	Please provide comment.
Northern Cape Provincial Roads Department	Niel Joubert not correct representative. Jaco Roelofse correct representative & will provide comment.	De-registered. Registered.
Leads2 Business	Please register Cheri Roberts instead of Lana Ignjatovic.	Registered.
Northern Cape Department of Forestry	Will comment on DEIR / FEIR.	Forward comment to DEA. Note approx. 30 protected trees will be affected by solar development.
Autumn Skies Resources & Logistics / Strata Africa Resources (Pty) Ltd.	Autumn Skies Resources & Logistics (Pty) Ltd has registered Mining Rights in close proximity to Remainder of the Farm Kapstewel 436. It must be noted that prospecting and mining activities generate a great deal of dust. No objection to the rezoning of the property, subject to us finalizing and completing our prospecting programme. Will endeavour to have open communication lines with Developer before invasive prospecting activities start.	Noted. Developer intends to maintain open lines of communications & to enter into a Joint Land Use Agreement, Memorandum of Agreement or similar in order to protect both parties' interests.

Refer to Annexure E1 for the Comments & Response Table, which reflects all correspondence with I&APs and Stakeholders to date. Copies of all comments received to date are included in **Appendix E** of this report. Comments received in response to this Final Environmental Impact report will be submitted to the Department of Environmental Affairs (DEA) for consideration. I&AP's have been informed that any comments on the Final Environmental Impact Report must be submitted to the DEA and copied to the EAP.

18 CONCLUSION & RECOMMENDATIONS

The decision to grant or refuse authorisation in terms of Section 24 of NEMA must be made in the light of the provisions of NEMA. Section 24 provides that, in order to give effect to the general objectives of integrated environmental management laid down in NEMA, the potential impact on the environment of listed activities must be **considered, investigated, assessed and reported on** to the competent authority charged by the Act with deciding applications for environmental authorisation. An environmental impact assessment report (an "EIA Report") concerning the impact of the proposed activity and alternative activity options on the environment, has been compiled and submitted as prescribed and authorisation may only be issued after consideration of such report.

The Regulations *inter alia* require that an EIA report must contain all information that is necessary for the competent authority to consider the application and to reach a decision concerning the application, and must include an assessment of each identified potentially significant impact, including cumulative impacts of the proposed development on the environment, socio-economic conditions and cultural heritage. The *objective of this exercise* is both to identify and predict the actual and potential impact on socio-economic conditions, and consider ways of minimising negative impacts while maximising benefit. We submit that the environmental process undertaken thus far complies with these requirements and that the assessment has considered potential impacts and responded thereto by either complete avoidance where possible, or appropriate mitigation.

Irrespective of having investigated and addressed the known impacts, NEMA requires "*a risk-adverse and cautious*" approach to be applied by the decision-makers. This process entails taking into account the limitation on present knowledge about the consequences of an environmental decision (i.e. cumulative impacts associated with other photovoltaic applications).

The preferred / mitigated development proposal presented in this report is responsive to the integrated results of the assessment of potential impacts made by the various specialists on the project team. The majority of recommendations have been accommodated in the Postmasburg Solar PV Energy Facility 2 layout and mitigation measures proposed for the pre-construction, construction, operation and decommissioning have been included in the Environmental Management Programme (EMPr) for implementation.

The relevant alternatives considered have been refined in an iterative manner based on the constraints / concerns raised and recommendations provided by the specialists, the public, state departments. This will ensure that the preferred alternative/s presented to the competent authority for decision-making are the best practicable environmental, reasonable and viable option, where the negative impacts associated with the proposal have been avoided as a priority, and reduced via mitigation measures were necessary. This precautionary approach has allowed impacts to be avoided and/or minimised, while the positive benefits enhanced.

Based on comparative evaluation of the various alternatives, including the No-Go option, it is evident that the status quo (vacant land with limited agricultural potential) is not necessarily the best environmental option (subject to the implementation of recommended development mitigation measures).

This Final Environmental Impact Report (FEIR) summarises the environmental process undertaken for this renewable energy development proposal, the findings of impact assessment studies, the key recommendations pertaining to the pre-construction, construction, operation and decommissioning of the proposed solar facility, as well as the details of the preferred / mitigated facility proposal.

Cape EAPrac is of the opinion that the information contained in this FEIR and the documentation attached hereto is sufficient to allow the competent authority to apply their minds to the potential negative and/or positive impacts associated with the development, in respect of the activities applied for. We believe that the abovementioned preferred / mitigated proposal (described as Alternative 3) is considered a **reasonable and feasible** alternative that requires only limited mitigation to enable it to be **sustainable**, and is thus considered to be the **best practicable environmental option** with the least level of impact. In terms of the two proposed Access Road alternatives, **Road Access Option 1** is the preferred as it is the shortest, however as both road routes are along existing farm roads, they are both considered viable options.

This Final EIR therefore concludes that the proposed Postmasburg Solar PV Energy Facility 2 has been considered via a balanced approach, mindful of **cumulative impacts** and **need and desirability** requirements, and that **no fatal flaws** have been identified that warrant refusal of the proposed development. It is believed proposed Postmasburg Solar PV Energy Facility 2 will be sustainable in the long term and that the proposed development will be an asset to the Postmasburg area, Northern Cape region and the broader South African society through supplementing the electricity supply for the National Eskom Grid.

This Final Environmental Impact Report (FEIR) and Final Environmental Management Programme (FEMPr) are made available for final stakeholder review and comment on the *Cape EAPrac* website for a period of 21-days extending from **Friday 6 March to Friday 27 March 2015**.

As there are no substantial changes or adjustment between the Draft and Final EIA Reports, the FEIAr has been submitted to the Department of Environmental Affairs (DEA) at the same time as being made available to registered stakeholders for review. Thus any further comments from stakeholders must be submitted directly to the DEA case officer, Mmamohale Kabasa before 27 March 2015. These comments must also be copied to Siân Holder of *Cape EAPrac,* via the details below. Please refer to the DEA Reference No: 14/12/16/3/3/2/698 is all correspondence regarding this project.

Department of Environmental Affairs Attention: **Mmamohale Kabasa** P/Bag X447, Pretoria, 0001 Tel: 012 399 9420 Email: mkabasa@environment.gov.za	***Cape EAPrac* (Pty) Ltd** Attention: **Mrs Siân Holder** PO Box 2070, George, 6530 Tel: 044 874 0365 Fax: 044-874 0432 Email: sian@cape-eaprac.co.za

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