REVISED DRAFT BASIC ASSESSMENT REPORT

for

GEEL KOP GRID CONNECTION INFRASTRUCTURE

On

Remaining Extent Farm Geel Kop 456, Portion 5 of Farm Bloemsmond 455, Portion 14 of Farm Bloemsmond 455, Remainder of Farm Dyasonsklip 454, Remainder of Farm 638 Tungsten Lodge, Remaining Extent of Portion 35 of the farm 453 Mctaggarts Camp, Remaining Extent (Portion 0) of the Farm 636 and Olyvenhouts Drift Settlement Agricultural Holding Number 1080.

In terms of the

National Environmental Management Act (Act No. 107 of 1998, as amended) & 2014 Environmental Impact Regulations

Prepared for Applicant: Geel Kop Grid (Pty) Ltd.

Date: 14 December 2020

Author of Report: Dale Holder

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Report Reference: KAI632/29

Department Reference: 14/12/16/3/3/1/2235

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DOCUMENT TRACKING

DOCUMENT HISTORY

REVISION	DATE	AUTHOR
Draft Basic Assessment Report	07 October 2020	Dale Holder
Revised Draft Basic Assessment Report	14 December 2020	Dale Holder
Final Basic Assessment Report	Pending	Dale Holder
Draft Environmental Management Programme	07 October 2020	Dale Holder
Final Environmental Management Programme	Pending	Dale Holder

APPROVAL FOR RELEASE

NAME	TITLE	SIGNATURE
Dale Holder	Senior Environmental Practitioner	

DISTRIBUTION

DISTRIBUTION LIST
Department of Environment, Forestry and Fisheries
Potential and Registered Interested and Affected Parties
Geel Kop Grid (Pty) Ltd

SUBMISSION AND CORRESPONDENCE

SUBMISSION / CORRESPONDENCE	DATE
Application form Submitted	07 October 2020
Application form Acknowledged	08 October 2020
Draft Basic Assessment Report Submitted	07 October 2020
Draft Basic Assessment Report Acknowledged	08 October 2020
Comment on Draft Basic Assessment Report	29 October 2020
Revised Draft Basic Assessment Submitted	14 December 2020
Revised Draft BAR Acknowledged	Pending
Comment on Revised Draft BAR	Pending
Final Basic Assessment Report Submitted	Pending

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:** Dale Holder (Ndip Nature Conservation), who has over 15 years' experience as an environmental practitioner. **Registrations:** 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 fifteen years' experience as an environmental practitioner.

PURPOSE OF THIS REPORT:
Review and Comment

APPLICANT:
Geel Kop Grid (Pty) Ltd

CAPE EAPRAC REFERENCE NO:
KAI632/29

DEPARTMENT REFERENCE:
14/12/16/3/3/1/2235

SUBMISSION DATE:
14 December 2020

Revised Draft Basic Assessment Report

in terms of the

National Environmental Management Act, 1998 (Act No. 107 of 1998 as amended) & Environmental Impact Regulations2014 (as amended)

Geel Kop Grid Connection Infrastructure

Remaining Extent Farm Geel Kop 456, Portion 5 of Farm Bloemsmond 455, Portion 14 of Farm Bloemsmond 455, Remainder of Farm Dyasonsklip 454, Remainder of Farm 638 Tungsten Lodge, Remaining Extent of Portion 35 of the farm 453 Mctaggarts Camp, Remaining Extent (Portion 0) of the Farm 636 and Olyvenhouts Drift Settlement Agricultural Holding Number 1080.

Submitted for:

Additional Stakeholder Review & Comment

Report Issued by:

Cape Environmental Assessment Practitioners

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REPORT DETAILS

Title:	Revised Draft Basic Assessment Report for Geel Kop Grid Connection Infrastructure
Purpose of this report:	The Draft Basic Assessment Report for the Geel Kop Grid Connection Infrastructure was made available to all registered and potential Interested and Affected Parties (I&APs) for review and comment. Proposed changes to the preferred alignment of the powerline to the Upington MTS have necessitated that a Revised Draft BAR be compiled and subjected to an additional 30 Day comment period in compliance with Regulation 19(1)(b). This BAR forms part of a series of reports and information sources that are being provided during the Basic Assessment Process for the proposed Geel Kop Grid Connection Infrastructure near Keimoes in the Northern Cape Province. Registered I&APs will be given an opportunity to comment on the following reports as part of this environmental process: - Draft Basic Assessment Report, - All Specialist Studies, and - Draft Environmental Management Programme. - Revised Draft Basic Assessment Report with updated specialist studies. In accordance with the regulations, the objectives of an environmental process are to, through a consultative process: (a) identify the relevant policies and legislation relevant to the activity; (b) motivate the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location; (c) identify and confirm the preferred activity and technology alternative through an impact and risk assessment and ranking process; (d) identify and confirm the preferred site, through a detailed site selection process, which includes an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment; (e) identify the key issues to be addressed in the assessment phase; (f) agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required as well as the extent of further consultation to be undertaken to determine the impacts and risks the activity will impose on the preferred site through the life of the activity, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site; and (g) identify suitable measures to avoid, manage or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored. The Draft Basic Assessment Report was available to all registered and potential interested and affected parties for a 30-day review and comment period extending from **07 October 2020 – 09 November 2020.** The Revised Draft Basic Assessment Report will be made available for an additional 30 Day comment period extending from **Monday 08 January 2021 – Monday 08 February 2021**. All comments received during both of these comment periods will be incorporated into the Final BAR that will be submitted to the DEFF for Decision making.
Prepared for:	Geel Kop Grid (Pty) Ltd
Published by:	Cape Environmental Assessment Practitioners (Pty) Ltd. (Cape EAPrac)
Authors:	Mr Dale Holder
Cape EAPrac Ref:	KAI632/29
DEA Case officer & Ref. No:	Samkelisiwe Dlamini 14/12/16/3/3/1/2235
Date:	14 December 2020
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TECHNICAL CHECKLIST

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

Applicant Details	Geel Kop Grid (Pty) Ltd	
Company Registration Number:	2020 / 171709 / 07	
BBBEE Status:	N/A	
Project Name:	Geel Kop Grid Connection Infrastructure	
Site Details	The grid connection crosses the following properties: • Remaining Extent Farm Geel Kop 456 • Portion 5 of Farm Bloemsmond 455 • Portion 14 of Farm Bloemsmond 455 • Remainder of Farm Dyasonsklip 454 • Remainder of Farm 638 Tungsten Lodge • Remaining Extent of Portion 35 of the Farm 453 Mctaggarts Camp • Remaining Extent (Portion 0) of the Farm 636 • Olyvenhouts Drift Settlement Agricultural Holding Number 1080	
Grid connection	**Substation to which project will connect.**	The Geel Kop grid connection infrastructure will facilitate the connection of seven authorised solar PV facilities to a collector switching station, and then a double circuit 132kV powerline will connect the collector switching station to the National Grid via the Upington Main Transmission Substation (MTS).
	Capacity of facility switching stations	Three Eskom switching stations are required for the Geel Kop grid connection infrastructure. • GK Solar PV switching station: up to 132kV capacity • Shrubland PV switching station: up to 132kV capacity • Karroid PV switching station: up to 132kV capacity
	Collector switching station	One collector switching station: • Geel Kop collector switching station (Alt 1); or • Bushmanland PV collector switching station (Alt 2).
Power line/s	**Number of overhead power lines required**	Five overhead power lines are required for the Geel Kop grid connection infrastructure: • a single or double circuit 33kV or 132kV power line linking GK Solar PV switching station and Shrubland PV switching station • a single or double circuit 33kV or 132kV power line linking Shrubland PV switching station and Karroid PV switching station / Hari PV facility substation. • a single or double circuit 33kV or 132kV power line linking Karroid PV switching station / Hari PV facility substation and Geel Kop collector switching station. • a single or double circuit 33kV or 132kV power line linking the Geel Kop Collector switching station (Alt 1 – Preferred) and Bushmanland PV facility substation. • a double circuit 132kV line from the Geel Kop collector switching station to the Upington MTS (Updated Alternative 1) There are two alternative routes to link the collector switching station to the Upington MTS: <u>Updated Alternative 1 – Preferred</u>: A double circuit 132kV line from the Geel Kop collector switching station to the Upington MTS, running parallel to the Eskom Aries-Upington 400kV for approximately 7.2km before turning towards and adjacent to the N14 to the Upington MTS. <u>Alt 2:</u> a loop in loop out (LILO) from the Bushmanland PV collector switching station into the McTaggerts/Oasis 132kV powerline, and reconductored as a double circuit 132kV line back to the Upington MTS.

	Voltage of overhead power lines	33kV or 132kV
	Height of the Power Line	<32m
	Servitude Width	Maximum of 31m – 36m.
Auxiliary Infrastructure		
Other infrastructure	**Additional Infrastructure**	Access tracks/roads Laydown areas
	Details of access roads	The access roads will not exceed 8m in width. Access to the grid connection infrastructure will be possible via existing roads in close vicinity to the infrastructure. Apart from these existing roads, the proposed Geel Kop solar PV facilities will contain access roads that can also be used to access the infrastructure. Formal roads will not be constructed underneath the power lines for maintenance purposes; access for maintenance purposes will be limited to jeep tracks.
	Extent of areas required for laydown of materials and equipment	Approximately 1 - 2 ha of laydown areas will be required (Laydown areas will not exceed 2 ha)

Geel Kop Grid (Pty) Ltd proposes the construction and operation of grid connection infrastructure for the seven authorised PV facilities[1] near Upington in the Northern Cape Province. The grid connection infrastructure comprises the following:

- Three switching stations;
  - GK Solar PV switching station;
  - Shrubland PV switching station; and
  - Karroid PV switching station.
- One collector switching station
  - Geel Kop collector switching station (Alternative 1); or
  - Bushmanland PV collector switching station (Alternative 2).
- Four single or double circuit 33kV or 132kV lines from the switching stations / facility substations to the chosen collector switching station; and
- One double circuit 132kV power line from the chosen collector switching station to the Upington Main Transmission Substation (MTS).

Additional associated infrastructure will also be required for the grid connection solution, including access roads, feeder bays (inclusive of line bays, busbars, bussection and protection equipment), switching stations, a fibre and optical ground wire (OPGW) layout, insulation and assembly structures.

A grid connection corridor of approximately 300m wide and 34 km long is being assessed to allow for the optimisation of the grid connection and associated infrastructure. The grid connection infrastructure will be developed within the 300m wide grid connection corridor, which will allow for the avoidance of identified environmental sensitivities. The grid corridor will connect seven authorised PV projects to the Upington MTS.

LOCATION OF PREFFERED ALTERNATIVE

The table below reflects the positions of the preferred alternatives. It must be noted that alternative collector switching station and powerline alignment positions were considered as part of this environmental process (see section 2.10 of this Final BAR for details of the alternatives considered). The table below shows the start,

[1] The proposed Geel Kop Grid Connection infrastructure will connect the following authorised projects to the National Grid: Bushmanland PV, Duneveld PV, Gordonia Solar PV, Hari PV, Shrubland PV, Karroid PV and GK Solar PV.

middle and end co-ordinates for each section of the proposed grid connection. A table showing the co-ordinates at 100m intervals is attached in Appendix D.

POWERLINES			
Powerline Section		**Latitude (DMS)**	**Longitude (DMS)**
GK Solar SS - Shrubland SS	Start Point	-28° 31' 29.54"	20° 57' 13.90"
	Centre point	-28°32'16.60"	20°57'39.40"
	End Point	-28° 32' 16.86"	20° 58' 19.29"
Shrubland SS - Karroid SS / Hari Facility Substation	Start Point	-28° 32' 16.86"	20° 58' 19.29"
	Centre point	-28°34'11.01"	20°58'51.27"
	End Point	-28°36'14.23"	21°0'10.17"
Karroid SS / Hari Facility Substation – Geel Kop Collector SS	Start Point	-28° 36' 11.97"	21° 00' 11.47"
	Middle point	-28°36'59.15"	21°0'43.46"
	End point	-28° 37' 34.98"	21° 01' 03.31
Bushmanland SS - Geel Kop Collector SS	Start Point	-28°38'15.10"	21°3'12.92"
	Middle point	-28°37'29.33"	21°2'26.23"
	End Point	-28° 37' 34.98"	21° 01' 03.31
Updated Alternative 1 Preferred Connection to Upington MTS Geel Kop Collector SS to Upington MTS	Start Point	-28°36'59.26"	21°0'43.54"
	Middle Point	-28°35'27.10"	21°5'2.864"
	End Point	-28°32' 50.90"	21°8' 16.96"

SWITCHING STATIONS & COLLECTOR SUBSTATION[2][3][4]		
Switching Station	**Latitude (DMS)**	**Longitude (DMS)**
GK Solar PV switching station	-28° 31' 29.54"	20° 57' 13.90"
Shrubland PV switching station	-28° 32' 16.86"	20° 58' 19.29"
Karroid PV switching station	-28° 36' 11.97"	21° 00' 11.47"
Geel Kop Collector switching station	-28° 37' 34.98"	21° 01' 03.31

CONTENTS OF A BASIC ASSESSMENT REPORT.

Appendix 1 of Regulation 326 of the 2014 EIA Regulations (as amended) contains the required contents of a Basic Assessment Report. The checklist below serves as a summary of how these requirements were incorporated into this Basic Assessment Report.

[2] These indicate approximate centre points of the switching stations

[3] Hari and Karroid share a switching station.

[4] Gordonia and Duneveld will connect directly to the Geel Kop Collector switching station.

Requirement	Details
(1) A basic assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include -	
(a) Details of - The EAP who prepared the report; and The expertise of the EAP, including, a curriculum vitae.	The report was compiled by Dale Holder of Cape EAPrac. The author has sixteen years' experience as an EAP and holds a ND Nature Conservation qualification. The CV of the EAP and Company Profile is included as Annexure J4 of this report.
(b) The location of the activity, including – The 21 digit Surveyor General code of each cadastral land parcel; Where available, the physical address and farm name; Where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties.	**21 Digit SG Code** C02800000000045600000 C02800000000045500014 C02800000000045500005 C02800000000045400000 C02800000000061700000 C02800000000063800000 C02800000000045300035 C02800000000063600000[5] ±30km West of Upington in the Northern Cape **Co-ordinates:** POWERLINES GK Solar SS - Shrubland SS Start Point -28° 31' 29.54" 20° 57' 13.90" Centre point -28°32'16.60" 20°57'39.40" End Point -28° 32' 16.86" 20° 58' 19.29" Shrubland SS - Karroid SS / Hari Facility Substation Start Point -28° 32' 16.86" 20° 58' 19.29" Centre point -28°34'11.01" 20°58'51.27" End Point -28°36'14.23" 21°0'10.17" Karroid SS / Hari Facility Substation – Geel Kop Collector SS Start Point -28° 36' 11.97" 21° 00' 11.47" Middle point -28°36'59.15" 21°0'43.46" End point -28° 37' 34.98" 21° 01' 03.31 Bushmanland SS - Geel Kop Collector SS Start Point -28°38'15.10" 21°3'12.92" Middle point -28°37'29.33" 21°2'26.23" End Point -28° 37' 34.98" 21° 01' 03.31 Updated Alternative 1 Preferred Connection to Upington MTS: Geel Kop Collector SS to Upington MTS Start Point -28°36'59.26" 21°0'43.54" Middle Point -28°35'27.10" 21°5'2.864" End Point -28°32' 50.90" 21°8' 16.96""" SWITCHING STATIONS & COLLECTOR SUBSTATION GK Solar PV switching station -28° 31' 29.54" 20° 57' 13.90" Shrubland PV switching station -28° 32' 16.86" 20° 58' 19.29" Karroid PV switching station -28° 36' 11.97" 21° 00' 11.47"

[5] Agricultural Holding 1080 (cadastral unit containing the Upington MTS) does not have a registered S21 digit code.

Requirement	Details
	Geel Kop Collector switching station -28° 37' 34.98" 21° 01' 03.31
(c) a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is A linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or On land where the property has not been defined, the coordinates within which the activity is to be undertaken.	As a linear activity, the powerlines are being assessed as 300m wide corridors. Both the co-ordinates as well as the property details of all properties are detailed in the table above. The cartographic representation of all affected properties are included in Appendix A and B of this report.
(d) a description of the scope of the proposed activity, including - All listed and specified activities triggered and being applied for; and A description of the activities to be undertaken including associated structures and infrastructure.	The relevant listed activities are captured in Section 3.1.2 The description of the activity is provided in Section 2 of this report with graphic representation provided in Appendix B.
(e) A description of the policy and legislative context within which the development is proposed, including – An identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and .How the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks and instruments.	Please refer to Section 3 of this document.
(f) A motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred location.	Please refer to Section 2.2 of this document.
(g) A motivation for the preferred site, activity and technology alternative.	The preferred alternative has been identified as the best practicable option and is discussed in detail in section 2.4 of this report.
(h) A full description of the process followed to reach the proposed preferred alternative within the site, including - • Details of all alternatives considered; • Details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; • A summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; • The environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; • The impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts - (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated. • The methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives; • Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 2.4 addresses feasible and reasonable alternatives which were identified for the grid connection infrastructure. Alignment and technological alternatives were considered. Details of Public Participation are included in section 8 of the report. A summary of all issues raised by I&APs as well as the responses thereto are included in Appendix F. The environmental attributes of the study site are included in section 5 of the report. The identification and assessment of Impacts are included in section 6 of the report. The summary of proposed mitigation measures are included in section 7 of the report. The outcome of the site selection matrix is attached in Annexure E7 and is summarised in section 2.3 of the report. The concluding statement is contained in section 6.14 of the report.

Requirement	Details
• The possible mitigation measures that could be applied and level of residual risk; • The outcome of the site selection matrix; • If no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and • A concluding statement indicating the preferred alternatives, including preferred location of the activity.	
(i) A full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including - A description of all environmental issues and risks that were identified during the basic assessment process; and An assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.	Please see Summary and Section 6 of the report and Appendix E for the specialist reports.
(j) An assessment of each identified potentially significant impact and risk, including - Cumulative impacts; The nature, significance and consequences of the impact and risk; The extent and duration of the impact and risk; The probability of the impact and risk occurring; The degree to which the impact and risk can be reversed; The degree to which the impact and risk may cause irreplaceable loss of resources; and The degree to which the impact and risk can be mitigated.	Please see Section F of the report and Appendix E for the specialist reports.
(k) Where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report.	Please see Section 6 of the report and Appendix E for the specialist reports.
(l) An environmental impact statement which contains – • A summary of the key findings of the environmental impact assessment; • A map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and • A summary of the positive and negative impacts and risks of the proposed activity and identified alternatives.	Section 6.23 and 6.14 of this report. See Appendix B Section 6.13 of this report.
(m) Based on the assessment, and where applicable, impact management measures from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr.	See section 7 report.
(n) Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation.	See section 7 of this report.
(o) A description of assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed.	See 3.4 of this report.
(p) A reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation.	See section 9 of this report.
(q) Where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required, the date on which the activity will be concluded and the post construction monitoring requirements finalised.	The proposed activity does include operational aspects.

Requirement	Details
(r) An undertaking under oath or affirmation by the EAP in relation to: The correctness of the information provided in the reports; The inclusion of comments and inputs rom stakeholders and I&APs; The inclusion of inputs and recommendations from the specialist reports where relevant; and Any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties.	The declaration of the EAP is attached in Appendix G.
(s) Where applicable, details of any financial provisions for the rehabilitation, closure and ongoing post decommissioning management of negative environmental impacts.	This environmental assessment does not include application for decommissioning and closure of activities.
(t) Any specific information that may be required by the competent authority.	Currently not applicable but will be included if such a request is made.
(u) Any other matters required in terms of section 24(4)(a) and (b) of the Act.	This section will be updated on receipt of the mandatory comment from the competent authority.

AUTHORITY COMMENT ON DRAFT BASIC ASSESSMENT REPORT.

The competent authority (DEFF: Chief Directorate, Integrated Environmental Authorisations) provided comment on the Draft Basic Assessment Report on 29 October 2020. A copy of this comment is included in Annexure F5. This comment along with the responses thereto are included in the Comments and Responses report in Annexure F2 and in the table below.

Comment	Response
a) Listed Activities	
Please ensure that all relevant listed activities are applied for, are specific and can be linked to the development activity or infrastructure as described in the project description. Only activities applicable to the development must be applied for and assessed.	Table 6 in section 3.1.2 of this report specifically links the activities applied for with the infrastructure as described in the project description.
If the activities applied for in the application form differ from those mentioned in the final BAR, an amended application form must be submitted. Please note that the Department's application form template has been amended and can be downloaded from the following link https://www.environment.gov.za/documents/forms.	A revised application form is attached in appendix I. This revised application form has been updated to ensure that the assessed and applied activities are the same. The application form used is the June 2020 form and has been confirmed to be the latest form on 07 December 2020.
It is imperative that the relevant authorities are continuously involved throughout the basic assessment process as the development property possibly falls within geographically designated areas in terms of numerous GN R. 985 Activities. Written comments must be obtained from the relevant authorities and submitted to this Department. In addition, a graphical representation of the proposed development within the respective geographical areas must be provided.	The relevant authority in terms of the GNR 985 activities is the Northern Cape Department of Environment and Nature Conservation (DENC). DENC were given an opportunity to comment on the Draft Basic Assessment Report and will be given a further opportunity to comment on this Revised Draft Basic Assessment

Comment	Response
	Report [6] . The DEFF Biodiversity and Conservation Directorate did provide comment on the Draft BAR. This comment and the responses thereto are included in the following table as well as in the comment and responses report attached in appendix F2.
b) Alternatives	
Please note that you are required to provide a full description of the process followed to reach the proposed preferred alternative within the site, in terms of Appendix 1(3)(1)(h) of the EIA Regulations 2014, as amended.,	In compliance with Appendix 1(3)(1)(h), details of how the preferred alternative was selected are included in sections 2.8 (site selection) and section 2.9 (selection of preferred alternative within the preferred site).
c) Public Participation	
i. The following information must be submitted with the final BAR: a) A list of registered interested and affected parties as per Regulation 42 of the NEMA EIA Regulations, 2014, as amended; b) Copies of all comments received during the Draft BAR comment period; and c) A comment and response report which contains all comments received and responses provided to all comments and issues raised during the public participation process for the Draft BAR. Please note that comments received from this Department must also form part of the comment and response report.	a) The list of registered interested and affected parties is attached in Annexure F1. b) All copies of comments received during the comment period on the Draft BAR are included in Annexure F5. c) A comments and responses report is attached in appendix F2. This report includes the comments received from both the Chief Directorate Integrated Environmental Authorisations as well as the Directorate Biodiversity and Conservation.
i. Please ensure that all issues raised and comments received during the circulation of the Draft BAR from registered I&APs and organs of state which have jurisdiction (including this Department's Biodiversity Section) in respect of the proposed activity are adequately addressed in the final BAR.	Please refer to the comments and responses form attached in Annexure F2, which demonstrates how the comments from all organs of state who have jurisdiction in respect of the activity have been incorporated into this report. This includes comments received from the Department's Directorate Biodiversity and Conservation.
ii. Proof of correspondence with the various stakeholders must be included in the final BAR. Should you be unable to obtain comments, proof should be submitted to the Department of the attempts that were made to obtain comments. The Public Participation Process must be conducted in terms of Regulation 39, 40, 41, 42, 43 & 44 of the EIA Regulations 2014, as amended.	Proof of correspondence with various stakeholders is included in Annexures F4. A table demonstrating compliance with Regulation 39, 40, 41, 42, 43 and 44 of the 2014 EIA regulations is included in section 8 of this report.
d) Environmental Management Programme	
(i) Please note that there was no EMPr attached as part of the Draft BAR instead of EMPr there is windeed property report. You are therefore requested to make sure that the EMPR with all the mitigation measures and recommendations as proposed by the specialist is included in the final BAR.	Apologies for incorrectly named file submitted with the Draft Basic Assessment Report. The Generic EMPr's for the Development of substations and overhead electrical distribution infrastructure, inclusive of specialist recommendations, are Attached as appendix H of this Revised Draft BAR.

[6] The DENC provided comment on the PV facilities authorised on RE Farm Geel Kop 456, but at the time of submission of this report, had not yet provided comment on the Grid Connection Infrastructure.

Comment	Response
Please also ensure that the final BAR includes the period for which the Environmental Authorisation is required and the date on which the activity will be concluded as per Appendix 1(3)(1)(q) of the NEMA EIA Regulations, 2014, as amended.	Due to the uncertainties associated with the REIPPPP and other energy programs, it is requested that the Environmental Authorisation be valid for the full 10 year period allowable in the regulations.
You are further reminded to comply with Regulation 19(1)(a) of the NEMA EIA Regulations, 2014, as amended, which states that: *"Where basic assessment must be applied to an application, the applicant must, within 90 days of receipt of the application by the competent authority, submit to the competent authority - (a) a basic assessment report, inclusive of specialist reports, an EMPr, and where applicable a closure plan, which have been subjected to a public participation process of at least 30 days and which reflects the incorporation of comments received, including any comments of the competent authority."*	Kindly note that a notification in terms of Regulation 19(1)(b) was submitted to the Department on 07 December 2020. The final Basic Assessment Report thus needs to be submitted within 140 days from receipt of application by the competent authority.
Should there be significant changes or new information that has been added to the BAR or EMPr which changes or information was not contained in the reports or plans consulted on during the initial public participation process, you are required to comply with Regulation 19(b) of the NEMA EIA Regulations, 2014, as amended, which states: *"the applicant must, within 90 days of receipt of the application by the competent authority, submit to the competent authority – (b) a notification in writing that the basic assessment report, inclusive of specialist reports an EMPr, and where applicable, a closure plan, will be submitted within 140 days of receipt of the application by the competent authority, as significant changes have been made or significant new information has been added to the basic assessment report or EMPr or, where applicable, a closure plan, which changes or information was not contained in the reports or plans consulted on during the initial public participation process contemplated in subregulation (1)(a) and that the revised reports or, EMPr or, where applicable, a closure plan will be subjected to another public participation process of at least 30 days".*	Significant changes (the change in alignment of the preferred powerline route) have been made to the Draft BAR. In compliance with regulation 19, the Revised Draft Basic Assessment Report will be subjected to an additional 30 day comment period.

In addition to the comments received from the Chief Directorate Integrated Environmental Authorisations, the Directorate Biodiversity and Conservation also provided comment on the Draft BAR on 06 November 2020. A copy of this comment is included in Annexure F5. This comment along with the responses thereto are included in the Comments and Responses report in Annexure F2 and in the table below.

Comment	Response
Based on the findings of the specialist studies there are no impacts associated with Geel Kop Grid Connection Infrastructure that cannot be mitigated to a medium level or low level (no medium – high or high impacts are associated with the Geel Kop Grid Infrastructure). As such there are no fatal flaws or high post-mitigation impacts. All impacts range from high positive to medium negative and all high negative impacts have been avoided by the risk adverse approach to the development of this grid connection infrastructure.	The same applies to the revised preferred alternative as presented in this Revised Draft Basic Assessment Report.
Pre-construction walk-through of the final power line route/corridor to locate species of conservation concern that can be translocated or avoided must be undertaken	This requirement has been included as a recommended condition of authorisation in section 7 of this report. It has furthermore been included in the EMPr in appendix H. An ecological and heritage walk through of the powerline will need to take place prior to construction once the exact alignment and pylon positions within the assessed corridor are determined.
Sensitive habitats in close proximity to the development footprint must be avoided or demarcated as No-Go area i.e. drainage lines, wetlands; CBA's.	It must be noted that the proposed infrastructure does straddle a number of drainage lines. Furthermore, it does cross a CBA2 for certain parts of the alignment. The Ecological and Freshwater Specialist have assessed

Comment	Response
	the significance of construction within these features and have provided management and mitigation measures in this regard.
Search and rescue plan for the identified Species of Conservation Concern (SCC) must be developed and submitted as part of the final report.	A plant rescue plan will be developed and included in Appendix H of the Final Basic Assessment Report.
Alien Invasive plant species Management Plan and Rehabilitation Plan must be developed and submitted as part of the final report to mitigate on habitat degradation due to erosion and alien plant invasion.	An Alien Species and Habitat Restoration plan will be developed and included in Appendix H of the Final Basic Assessment Report.
A buffer must be in place around all watercourses as per the DWAF guidelines to avoid any potential impacts on freshwater by the proposed development.	As noted in the report, the proposed powerline does cross a number of drainage lines along its alignment. However, in compliance with the relative Guidelines, no pylons for the powerline will be constructed within 32m of any of the watercourses identified by the Aquatic Specialist.
The preferred option Alternative 2 must be considered, because it follows the existing McTaggerts/Oasis132kV powerline and will reduce the impact significantly because it restricts the length of line.	Eskom as part of their cost estimate letter have confirmed that alternative 2 can only be considered further at preferred bidder stage as this will require reconfiguration of the existing network. The applicant has received a valid Eskom cost estimate letter which favours the option that that runs parallel to the 400 kV Aries -Upington line. Please note that the 400Kv Aries-Upington line, although not yet constructed is authorised. The environmental benefits of routing the powerline parallel to this authorised line would still be achieved with the currently preferred alternative.

AUTHORITY COMMENT ON REVISED DRAFT BASIC ASSESSMENT REPORT.

This section will be updated upon receipt of comment on the Revised Draft Basic Assessment Report.

ORDER OF REPORT

Report Summary

Revised Draft Basic Assessment Report – Main Report

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Appendix B	:	Revised Biodiversity Overlays
Appendix C	:	Site Photographs
Appendix D	:	Revised Grid Connection Infrastructure Alignment Plan / Technical Report / Co-ordinates (Geel Kop Grid (Pty) Ltd)
Appendix E	:	Supplementary Reports (Specialist Reports and Technical Reports)
Annexure E1	:	Revised Ecological Impact Assessment Report (Faunal and Botany) (Hoare, 2020)
Annexure E2	:	Revised Avifaunal Impact Assessment (Van Rooyen, 2020)
Annexure E3	:	Revised Freshwater Ecological Impact Assessment (Colloty, 2020)
Annexure E4	:	Revised Agricultural Impact Assessment Report (Lubbe, 2020)
Annexure E5	:	Revised Heritage Impact Assessment Report (van der Walt et al, 2020)
Annexure E6	:	Revised Paleontology Desktop Study (Bamford, 2020)
Annexure E7	:	Revised Visual Impact Assessment (Marshall, 2020)
Annexure E8	:	Revised Social Impact Assessment (Barbour, 2020)
Annexure E9	:	Revised Technical Design Report (Geel Kop Grid (Pty) Ltd)
Appendix F	:	Public Participation Process
Annexure F1	:	I&AP Register
Annexure F2	:	Comments and Response Report
Annexure F3	:	Adverts & Site Notices
Annexure F4	:	Draft BAR Notifications
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Annexure F6		Revised Draft BAR Notifications (to be included in FBAR)
Annexure F7	:	Revised Draft BAR Comments and Responses (to be included in FBAR)
Annexure F8	:	Approved Public Participation Plan
Appendix G	:	Other Information
Annexure G1	:	Correspondence with Authorities (Approval of Public Participation Plan, Acknowledgement of receipt of application, Acknowledgement of receipt of Draft Basic Assessment Report, Comment on Draft Basic Assessment Report)
Annexure G2	:	Landowner Consent

Annexure G3	:	EAP Declaration & CV
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Annexure G5	:	Title Deed / Windeed Report
Annexure G6	:	SAHRA Approval (to be included in FBAR, as SAHRA are required to provide comment on the Revised DBAR)
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Appendix H	:	Environmental Management Programme
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EXECUTIVE SUMMARY

I. INTRODUCTION

PLEASE NOTE: This Revised Draft Basic Assessment is subjected to an additional 30 Day comment period in compliance with regulation 19(1)(b). The Draft Basic Assessment Report and associated specialist reports have been updated to reflect a change in alignment of preferred powerline alternative.

Cape EAPrac has been appointed by Geel Kop Grid (Pty) Ltd, hereafter referred to as the Applicant, as the independent Environmental Assessment Practitioner (EAP), to facilitate the Basic Assessment process required in terms of the National Environmental Management Act (NEMA, Act 107 of 1998) for the proposed development of the Geel Kop Grid Connection Infrastructure near Upington and Keimoes in the Northern Cape Province of South Africa.

The applicant proposes the construction and operation of grid connection infrastructure for the Authorised PV facilities on the Remaining Extent of the Farm Geel Kop 456 near Upington in the Northern Cape Province. This grid connection infrastructure will connect the following authorised PV Projects to the National Grid via the Eskom Upington Main Transmission Substation (MTS):

- Bushmanland PV (14/12/16/3/3/1/2204),
- Duneveld PV (14/12/16/3/3/1/2205),
- Gordonia Solar PV (14/12/16/3/3/1/2207),
- Hari PV (14/12/16/3/3/1/2208),
- Karroid PV (14/12/16/3/3/1/2209),
- Shrubland PV (14/12/16/3/3/1/2210), and
- GK Solar PV (14/12/16/3/3/1/2206)

NOTE: The abovementioned projects have the IPP portion of the respective on-site sub-station considered, assessed and authorised as part of their respective EA's. This report should therefore be considered in conjunction with the Final Basic Assessment Reports for the abovementioned projects.

The purpose of this **Revised Draft Basic Assessment Report** (BAR) is to describe the environment to be affected, the proposed project as amended, to present the site constraints identified by the various specialist during their site assessments, and identify and assess the impacts of this development on the receiving environment. This information is presented to registered and potential interested and affected parties for review and comment.

The Draft BAR was available for a 30-Day comment period extending from **07 October 2020 – 09 November 2020.**

The Revised Draft BAR is available for a further 30 day review and comment period extending from **08 January 2021 – 08 February 2021.**

All comments received on the Draft BAR and the Revised Draft BAR will be incorporated into the Final BAR that will be submitted to the DEA for consideration and decision making.

RECOMMENDATION OF THIS EIA

The proposal by the Applicant is to develop joint grid connection infrastructure to connect seven authorised PV energy facilities to the National Grid via the Upington MTS. The intent of this project is to reduce the potential duplication of infrastructure and impacts by developing a single grid connection solution, rather than for each project to have a standalone connection.

NOTE: The proposed powerline alignment alternatives and substation positions were assessed in this environmental process as corridors to allow for minor adjustments / flexibility during the final design / micro-siting phase post environmental decision, and to avoid protracted administrative amendment processes because of these potential minor adjustments.

It is Cape EAPrac's reasoned opinion that the following infrastructure / alternatives as described in the Draft BAR be considered for approval:

- GK Solar PV switching station
- Shrubland PV switching station
- Karroid PV switching station
- Geel Kop Collector switching station
- Powerline from GK Solar SS to Shrubland SS
- Powerline from Shrubland SS to Karroid SS/Hari Facility Substation
- Powerline from Karroid SS / Hari facility substation to Geel Kop Collector Switching Station
- Powerline from, Bushmanland Facility substation to Geel Kop Collector Switching Station
- Powerline from Geel Kop Collector Switching Station to Upington MTS (Updated Alternative 1 Preferred Connection)

NEED AND DESIRABILITY

Need and desirability for this project has been considered in detail in this environmental process. The overall need and desirability in terms of developing renewable energy generation facilities and associated infrastructure in South Africa and globally is considered in section 1, while the project specific need and desirability is considered in section 5.

ENVIRONMENTAL LEGISLATIVE REQUIREMENTS

The current assessment is being undertaken in terms of the **National Environmental Management Act** (NEMA, Act 107 of 1998). 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 Environment, Forestry and Fisheries, DEFF) based on the findings of an Environmental Assessment.

The proposed development entails several listed activities, which require a Basic Assessment Process, which must be conducted by an independent EAP. Cape EAPrac has been appointed to undertake this process.

Table 1: NEMA 2014 (As amended in April 2017) listed activities applicable to the Geel Kop Grid Connection Infrastructure.

Activity No(s):	Basic Assessment Activity(ies) as set out in Listing Notice 1 (GN R983)	Description
11	The development of facilities or infrastructure for the transmission and distribution of electricity— (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts;	Construction of the 3 x switching stations and a collector switching station with a maximum capacity of 132 kilovolts and the construction of overhead powerlines with a maximum capacity of 132 kilovolts.
12	The development of— (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse; (c) if no development setback line exists, within 32m of a watercourse measured from the edge of a watercourse	Construction of powerline infrastructure straddling the ephemeral washes and watercourses.
19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;	Construction of powerline infrastructure straddling the ephemeral washes and watercourses.
27	The clearance of an area of 1 hectares or more , but less than 20 hectares.	The construction of the switching stations, the collector switching station and the temporary

		laydown areas will require the clearance of more than 1ha.
28	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: ((ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;	The switching stations and collector switching station are considered to be industrial use and the development footprint of these substations will exceed 1ha.
Activity No(s):	**Basic Assessment Activity(ies) as set out in Listing Notice 3 (GN R985)**	**Description**
4	The development of a road wider than 4 metres with a reserve less than 13 metres. g. Northern Cape iii. Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;	At the pylon positions, the construction access road will exceed 4m in width. These will however be rehabilitated to a single jeep track on completion of construction.
12	The clearance of an area of 300 square metres or more of indigenous vegetation. g. Northern Cape i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; ii. Within critical biodiversity areas identified in bioregional plans;	Portions of the powerline corridor and the collector switching station and jeep track fall within a Critical Biodiversity Area (CBA2) and clearance of vegetation for the establishment of this powerline substation / switching station will exceed 300 square metres.
14	The development of— (ii) infrastructure or structures with a physical footprint of 10 square metres or more. g. Northern Cape ii. Outside urban areas: (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;	Portions of the powerline corridor, the collector switching station and jeep track fall within a Critical Biodiversity Area (CBA2) and infrastructure installed for these will exceed 10 square metres.
18	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre. g. Northern Cape ii. Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ii) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland; or	Portions of the powerline fall within a CBA2 and within 100m of the watercourses along the alignment. Some of the existing access roads used to access the powerline corridor may need to be widened by more than 4m.

NOTE: Only activities in Listing Notice 1 and Listing Notice 3 are applicable to the development of the Geel Kop Grid Connection Infrastructure and as such, a Basic Assessment process is to be followed.

Before any of the above-mentioned listed activities can be undertaken, authorisation must be obtained from the relevant authority, in this case the DEFF. 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 in respect of the activity.

II. DEVELOPMENT PROPOSAL & ALTERNATIVES

Geel Kop Grid (Pty) Ltd, a Special Purpose Vehicle (SPV), proposes the construction and operation of grid connection infrastructure for the 7 authorised PV facilities on the farm Geel Kop 456 near Upington in the Northern Cape Province. The Basic Assessment Report (BAR) considers and assesses a joint grid solution required to evacuate power from the following authorised PV Projects:

- Bushmanland PV (14/12/16/3/3/1/2204),
- Duneveld PV (14/12/16/3/3/1/2205),
- Gordonia Solar PV (14/12/16/3/3/1/2207),
- Hari PV (14/12/16/3/3/1/2208),
- Karroid PV (14/12/16/3/3/1/2209),
- Shrubland PV (14/12/16/3/3/1/2210), and
- GK Solar PV (14/12/16/3/3/1/2206)

Each of the above projects include an assessment of the IPP portions of the respective on-site substations, and this BAR assesses the remainder of the joint grid solution as described in this report.

Alternatives considered are discussed in section 2.7

III. PROFFESIONAL INPUT

The following professionals[7] have provided input into this environmental process:

1.	Ecology	-	Dr David Hoare
2.	Avifaunal	-	Mr Chris van Rooyen
3.	Archaeology	-	Heritage Contracts and Archaeological Consulting (HCAC)
4.	Palaeontology	-	Professor Marion Bamford
5.	Heritage	-	Heritage Contracts and Archaeological Consulting (HCAC)
6.	Agricultural Potential	-	Mr Christo Lubbe
7.	Visual	-	Mr Jon Marshall
8.	Freshwater	-	Dr Brian Colloty
9.	Social	-	Mr Tony Barbour
10.	Engineering aspects	-	Geel Kop Grid (Pty) Ltd

IV. PLANNING CONTEXT

The proposed Geel Kop Grid Connection Infrastructure is situated within a Gazetted Strategic Powerline Corridor and the establishment of this infrastructure is thus compliant with national strategic planning objectives.

V. ASSESSMENT OF IMPACTS

The potential key impacts identified and assessed by the various specialists (more details on the significance and ratings of these impacts are provided in section 6 below and in the attached specialist reports).

Ecological impacts assessed

- Vegetation clearing for construction could impact indigenous species. Vegetation clearing will also lead to **habitat loss** for fauna and potentially the loss of sensitive faunal species, habitats and ecosystems within the remaining natural areas;
- Presence and operation of construction machinery on-site. This will create a physical impact as well as generate noise, pollution and other forms of disturbance at the site. Disturbance could affect faunal species;
- Increased human presence can lead to faunal conflict;

[7] Note that not all these professionals are considered specialists as contemplated in chapter 3 of Regulation 326. Studies such as Engineering, water consumption and planning constitute "technical" studies, rather than specialist studies and as such, the requirements in appendix 6 of R326 do not apply to all these professionals

- The presence of the development could disrupt the connectivity of the landscape;
- Human-animal conflict can occur;
- Alien clearing will improve the ecology and habitat of the area; and
- Transformation of intact habitat could disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations.

Freshwater impacts assessed

- Disturbance to riparian habitat;
- Disturbance to watercourse bed and banks;
- Sedimentation of downstream watercourses;
- Water Quality Impacts; and
- Alien plant introduction.

Heritage Impacts Assessed

- Impact on scenic routes during construction;
- Impacts on the heritage resources;
- Impact on scenic routes;
- Impact of new structures on cultural landscape and character; and
- Change to the rural character.

Archaeological Impacts Assessed

- Disturbance to surface and sub-surface sediments.

Visual Impacts Assessed

- Visual scarring because of new powerline, clearing vegetation and construction works;
- Change in the rural visual character of the site;
- Visual impact on key visual receptors and secondary visual receptors;
- Potential visual massing,
- Visibility from sensitive receptors; and
- Visual intrusion of lighting at night.

Socio-Economic Impacts Assessed

- Creation of business and employment opportunities;
- Impacts associated with the presence of construction workers on-site;
- Security and safety impacts associated with the presence of construction workers;
- Noise, dust and safety impacts associated with construction related activities and the movement of heavy vehicles;
- Impact on rural sense of place and character of the area;
- Crime levels and pressure on local services; and
- Socio-economic upliftment.

Impact Summary

The table below summarises the significance (with mitigation) of all impacts assessed in the sections above[8].

[8] To attain these outcomes, the mitigation measures reflected in section 7 of the report need to be implemented.

For ease of reference, impacts are visually reflected using the following colour scheme[9].

All positive impacts (regardless of their significance)	
Neutral or Negligible negative impacts	
Very Low and Low negative impacts	
Medium negative impacts	
Medium – High, High and Very High negative impacts	

Table 2: Summary of the significance of impacts associated with the Geel Kop Grid Connection Infrastructure[10].

Impact	Significance (with mitigation)
Social Impacts during the construction Phase	
Creation of employment and business opportunities.	Medium positive
Presence of construction workers and potential impacts on family structures and social networks.	Low negative
Influx of job seekers.	Low negative
Safety risk, stock theft and damage to farm infrastructure associated with presence of construction workers.	Low negative
Increased risk of veld fires.	Low negative
Impact of heavy vehicles and construction activities.	Low negative
Loss of farmland.	Low negative
Social Impacts during the operational phase	
Promotion of renewable energy projects.	High positive
Creation of employment and business opportunities.	Medium positive
Establishment of Community Trust.	High positive
Generate income for affected landowner/s.	Medium positive
Visual impact and impact on sense of place.	Low negative
Impact on tourism.	Low positive and negative
Visual Impacts during construction and operation phase	
Change the character and sense of place of the landscape setting.	Low Negative
Change the character of the landscape as seen from the N14.	Low – Medium Negative
Change the character of the landscape as seen from the R359.	Low Negative
Change the character of the landscape as seen from the un-surfaced Lutzputs Road to the north and east.	Low Neutral
Change the character of the landscape as seen from local homesteads and settlements.	Low Neutral
Lighting impacts.	Low Negative
Palaeontological Impacts	
Impact on potential palaeontological resources.	Low negative
Agricultural Impacts	
Soil pollution with contaminants during the construction.	Low negative
Loss of Agricultural land.	Low negative
Reduction in land capability.	Low negative
Alteration of drainage patterns and erosion.	Low negative
Soil pollution with contaminants during the operational phase may take place, including spillages of hydrocarbon (fuel oil) and cement. This is possible during the maintenance of the facility.	Low negative
Decrease in availability of soil for agriculture.	Low negative
Clearing of vegetation increases flow speed and a lower infiltration tempo increases silt transport (Cumulative).	Medium negative
Chemicals, hazardous substances and waste used or generated.	Medium negative

[9] Where specialist ratings fall across 2 of the groups, the worst case is reflected in the quick reference.

[10] This includes cumulative impacts associated with the facility

Impact	Significance (with mitigation)
Freshwater Ecology Impacts	
Loss of Very High Sensitivity systems, namely the mainstem alluvial water course and pans through physical disturbance although the proposed layout could avoid any of these systems.	Low negative
Impact on secondary alluvial water courses (Moderate Sensitivity), through physical disturbance.	Low negative
Impact on all riparian and wetland systems through the possible increase in surface water runoff from the substations and any access tracks on riparian form and function through hydrological changes.	Low negative
Increase in sedimentation and erosion.	Low negative
Risks on the aquatic environment due to water quality impacts.	Low negative
Cumulative impacts.	Medium Negative
Ecological Impacts	
Loss and/or fragmentation of indigenous natural vegetation.	Medium – Low negative
Loss of individuals of protected plants.	Low negative
Loss of faunal habitat and refugia.	Low negative
Mortality of Fauna.	Low negative
Displacement of Terrestrial Fauna.	Low negative
Increased poaching and illegal collecting.	Low negative
Vegetation damage due to dust deposition.	Low negative
Establishment and spread of declared weeds.	Low negative
Changes in behavioural patterns of animals.	Low negative
Increased runoff and erosion.	Low negative
Continued disturbance of indigenous natural vegetation.	Low negative
Mortality of fauna during operation.	Low negative
Continued establishment and spread of declared weeds.	Low negative
AVIFAUNAL IMPACTS	
Displacement of priority species.	Very low negative
Operational phase avifaunal impacts associated with electrocution.	Very Low negative
Operational phase avifaunal impacts associated with collisions.	Low negative
Cumulative Avifaunal Impacts.	Low negative

As can be seen from the table above, there are several positive impact associated with Geel Kop Grid Infrastructure. Most of the negative impacts are either low or negligible, with a few Low – Medium and Medium Impacts (mostly associated with cumulative impacts). There are no high or very high impacts associated with The Geel Kop Grid Connection Infrastructure.

Impact Statement

None of the participating specialists identified any impacts that remain high after mitigation. Because of the risk adverse approach followed for the development of the preferred infrastructure and the fact that grid connection infrastructure will follow existing or proposed infrastructure and straddle sensitive features. No structures are proposed within the sensitive features identified by participating specialists.

From an ecological perspective the preferred grid connection infrastructure corridors will not result in major fragmentation of the landscape. The affected area is considered suitable for development and there are no impacts associated with Geel Kop Grid Connection Infrastructure that cannot be mitigated to a medium level or low level (no medium – high or high impacts are associated with the Geel Kop Grid Infrastructure). As such there are no fatal flaws or high post-mitigation impacts that should prevent the development from proceeding. Based on the layout provided for the assessment, the Geel Kop Grid Infrastructure can be supported from an ecology, aquatic, avifaunal, visual, social, heritage and agricultural point of view.

A map showing the proposed activity in relation to the key sensitive features is in attached in Appendix B as well as in the respective specialist reports in Appendix E. All sensitive features along with their appropriate buffers are shown in this plan. As required by the EMPr, all areas outside of the proposed development footprint are to be demarcated as no go areas.

Please refer to the table in the section above listing the key impacts and their significance post mitigation for the preferred alternative. This section must be read in conjunction with the suggested mitigation measures listed in section 7 of this Report.

VI. CONCLUSIONS & RECOMMENDATIONS

This environmental process is currently being undertaken to present proposals to the public and potential and registered I&APs and to identify and assess environmental impacts, issues and concerns raised as a result of the proposed Geel Kop Grid Connection Infrastructure and the alternatives considered.

Cape EAPrac is of the opinion that the information contained in the Draft BAR and the Revised Draft BAR along with the documentation attached hereto is sufficient to allow the I&APs to apply their minds to the potential negative and/or positive impacts associated with the development, in respect of the activities applied for. This environmental process has not identified any fatal flaws with the proposal and as such it is our reasoned view that the project should be conditionally authorised.

All specialists concur that the development as proposed (3 on-site switching stations and a collector switching station, interconnection powerlines between the on-site switching stations, the Geel Kop collector switching station and Updated Alternative 1 (preferred) powerline from the Geel Kop collector switching station to the Upington MTS) can be considered for approval and that there are no reason(s) why the development should not be implemented. All impacts range from high positive to medium negative and all high and medium - high negative impacts have been avoided by the risk adverse approach to the development of this grid connection infrastructure.

All stakeholders are requested to review the Revised Draft BAR and the associated appendices, and provide comment, or raise issues of concern, directly to *Cape EAPrac* within the specified 30-day comment period. All comments received during this comment period will be included in the Final BAR to be submitted to DEFF for decision making.

It is Cape EAPrac's reasoned opinion that the following infrastructure / alternatives as described in the Draft BAR be considered for approval:

- GK Solar PV switching station
- Shrubland PV switching station
- Karroid PV switching station
- Geel Kop Collector switching station
- Powerline from GK Solar SS to Shrubland SS
- Powerline from Shrubland SS to Karroid SS/Hari Facility Substation
- Powerline from Karroid SS / Hari facility substation to Geel Kop Collector Switching Station
- Powerline from, Bushmanland Facility substation to Geel Kop Collector Switching Station
- Powerline from Geel Kop Collector Switching Station to Upington MTS (Updated Alternative 1 Preferred Connection)

REMAINDER OF ENVIRONMENTAL PROCESS

The following process is to be followed for the remainder of the environmental process:

- The Revised Draft BAR is herewith available for review and comment for a 30 day period.
- All comments received during the comment period on the Draft BAR and Revised Draft BAR will be considered, addressed and incorporated into a Final BAR.
- The Final BAR will be submitted to the DEFF for consideration and decision-making; and
- The DEFF's decision (Environmental Authorisation) and the appeal process on the Final BAR will be communicated with all registered I&APs.

FINAL BASIC ASSESSENT REPORT

1 INTRODUCTION

PLEASE NOTE: This Revised Draft Basic Assessment is subjected to an additional 30 Day comment period in compliance with regulation 19(1)(b). The Draft Basic Assessment Report and associated specialist reports have been updated to reflect a change in alignment of preferred powerline alternative.

Cape EAPrac has been appointed by Geel Kop Grid (Pty) Ltd, hereafter referred to as the Applicant, as the independent Environmental Assessment Practitioner (EAP), to facilitate the Basic Assessment process required in terms of the National Environmental Management Act (NEMA, Act 107 of 1998) for the proposed development of the Geel Kop Grid Connection Infrastructure near Upington and Keimoes in the Northern Cape Province of South Africa.

The applicant proposes the construction and operation of grid connection infrastructure for the 7 PV facilities authorised on the Remaining Extent of the Farm Geel Kop 456 near Upington in the Northern Cape Province. This grid connection infrastructure will connect the following authorised PV energy facilities to the National Grid via the Eskom Upington Main Transmission Substation (MTS):

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- Duneveld PV (14/12/16/3/3/1/2205),
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- Hari PV (14/12/16/3/3/1/2208),
- Karroid PV (14/12/16/3/3/1/2209),
- Shrubland PV (14/12/16/3/3/1/2210), and
- GK Solar PV (14/12/16/3/3/1/2206)

NOTE: The abovementioned projects have the IPP portion of the respective on-site substation considered, assessed and authorised as part of their applications for EA. This report should therefore be considered in conjunction with the Final Environmental Impact Assessment Reports for the abovementioned projects.

The purpose of this **Revised Draft Basic Assessment Report** (BAR) is to describe the environment to be affected, the proposed project (including the revised preferred alternatives), to present the site constraints identified by the various specialist during their site assessments, and identify and assess the impacts of this development on the receiving environment. This information is presented to registered and potential interested and affected parties for review and comment.

The Draft BAR was available for a 30-Day period extending from **07 October 2020 – 09 November 2020.**

The Revised Draft BAR is made available for a further 30 Day comment period extending from **08 January 2021 – 08 February 2021.**

All comments received on the Draft BAR as well as the revised Draft BAR will be incorporated into the Final BAR that will be submitted to the DEA for consideration and decision making.

RECOMMENDATION OF THIS EIA

The proposal by the Applicant is to develop joint grid connection infrastructure to connect seven PV energy facilities authorised on the Remaining Extent of the Farm Geel Kop 456 to the National Grid via the Upington MTS. The intent of this project is to reduce the potential duplication of infrastructure and impacts by developing a single grid connection solution, rather than for each project to have a standalone connection.

NOTE: The proposed powerline alignment alternatives and substation positions were assessed in this environmental process as corridors to allow for minor adjustments / flexibility during the final design /

micro-siting phase post environmental decision, and to avoid protracted administrative amendment processes because of these potential minor adjustments.

It is Cape EAPrac's reasoned opinion that the following infrastructure / alternatives as described in the Draft BAR be considered for approval:

- GK Solar PV switching station
- Shrubland PV switching station
- Karroid PV switching station
- Geel Kop Collector switching station
- Powerline from GK Solar SS to Shrubland SS
- Powerline from Shrubland SS to Karroid SS/Hari Facility Substation
- Powerline from Karroid SS / Hari facility substation to Geel Kop Collector Switching Station
- Powerline from, Bushmanland Facility substation to Geel Kop Collector Switching Station
- Powerline from Geel Kop Collector Switching Station to Upington MTS (Updated Alternative 1 Preferred Connection)

1.1 Overview of Alternative Energy in South Africa and the Northern Cape

This proposed grid connection infrastructure is directly linked to and inseverable from the renewable energy projects on the remainder of the farm Geel Kop 456 and as such, this review considers the grid connection infrastructure as part of the greater renewable energy projects.

South Africa's generation capacity is dominated by coal-fired generation stations with a net output of 35.6 GWp, which represents over 85% of the country's total installed capacity of over 44 GW.

Globally, renewable energy has gained momentum, with a significant rise in the uptake of various RE technologies such as solar PV, wind energy, biogas and other biofuels, hydroelectricity, landfill gas, geothermal energy, and concentrated solar power (CSP).

Ministerial determinations by the South African government to procure RE — such as the Integrated Resource Plan (IRP) for Electricity 2010-2030, which lays out the country's electricity future — have given growth in the renewable energy sector a significant boost.

South Africa's green economy, partly driven by the country's utility-scale Renewable Energy Independent Power Production Procurement Programme (REIPPPP), reflects these trends and is leading the way in some areas. According to Moody's, South Africa had the fastest growing green economy in the world in 2015. The REIPPPP, a key factor in this growth, is in its sixth year and has achieved remarkable successes. To date, the programme has:

- Procured over 6 300 MWp of RE generation capacity, of which over 2 500 MWp was connected and has been feeding electricity into the national grid since June 2016.
- Selected 102 preferred bidders to develop utility-scale projects across the country – with projects in every province across South Africa.
- Received a ministerial determination to procure a further 6 300 MWp of generation capacity. This is the second time capacity to the programme has been doubled – a testimony to its success.
- Attracted over R195 billion of investment into South Africa, with over 25% from foreign investors. In doing so, the programme, through local content requirements, has successfully stimulated the development of a local RE technology components manufacturing sector. Given the additional 6 300 MWp still to be procured, this sector is set to grow further.
- Achieved significant technology price reductions, with South Africa boasting some of the world's lowest clean energy costs.

Beyond these successes, the programme and, consequently, the utility-scale Renewable Energy industry, is well positioned to continue contributing to South Africa's national development, as enshrined in the government's Strategic Infrastructure Projects (SIP) and the National Development Plan (NDP). The programme's socio-economic development (SED) and enterprise development (ED) mechanisms give successful project developers a unique opportunity to be competitive in their bidding strategy, while contributing meaningfully to the local and national economy. Project developers have fully embraced the SED/ED component of the REIPPPP, resulting in numerous inspiring contributions to priority areas on the government's developmental agenda. Among other areas, these contributions span community development, local economic development, skills development and early childhood development.

The recent uncertainties involving the state-owned utility, Eskom, highlight the need for reforms in an evolving energy sector, where electricity generation, transmission and distribution systems require unbundling. The interest from local municipalities in procuring renewable energy generation capacity from independent power producers (IPPs) contributes further to the shift in the structure of the country's power sector.

Regionally, the Northern Cape is suggested by many to be the ideal location for various forms of alternative energy; this has resulted in several feasibility studies being conducted, not least of which, an investigation by the Industrial Development Corporation in 2010 into potential for photovoltaic, thermal, solar and wind power (Northern Cape Business website, 2010).

The northern area of the Northern Cape 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, 2014).

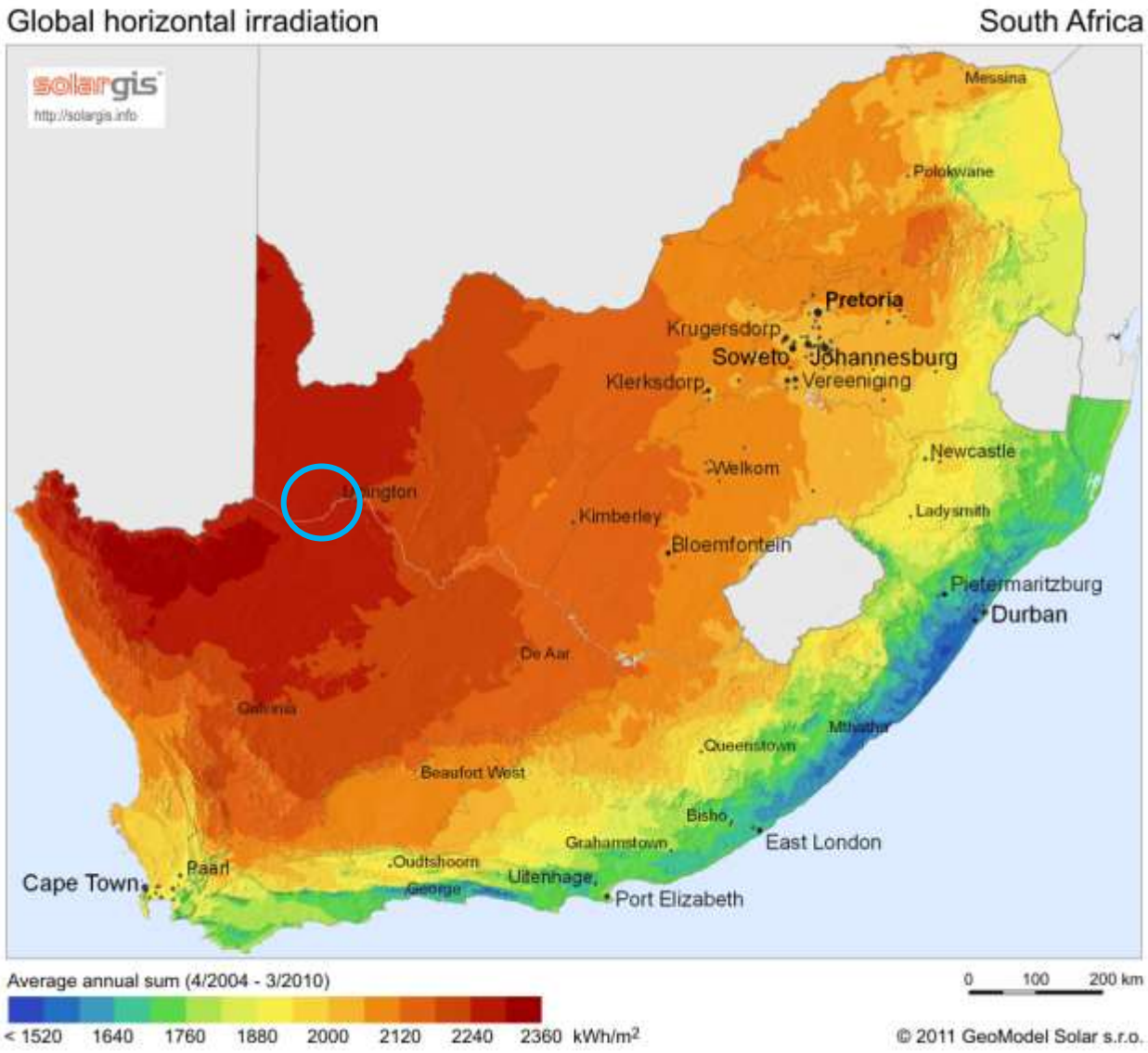


Figure 1: Global Horizontal radiation map for South Africa (Source: http://solargis.info, 2015) showing the approximate area proposed for Geel Kop projects and their associated infrastructure.

The Northern Cape area is considered to have extremely favourable solar radiation levels over most of the year, making it ideal to produce solar-power via photovoltaic (fixed and tracking panels) and concentrated (solar thermal) solar technology systems. Several solar irradiation maps have been produced for South Africa, all of which indicate that the Northern Cape area has high solar irradiation.

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, 2014). An advantage that the Northern Cape has over the Sahara Desert is the relatively wind-free environment that prevails in large portions of 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, 2015).

The introduction of private sector generation offers multiple benefits; it will contribute greatly to the diversification of both the supply and nature of energy production, assist in the introduction of new skills and in new investment into the industry, and enable the benchmarking of performance and pricing. The Department of Energy (DoE), National Treasury (NT) and the Development Bank of Southern Africa (DBSA) established the IPP Office for the specific purpose of delivering on the IPP procurement

objectives. The REIPPPP is a competitive bidding process used by national government to procure RE generation capacity in line with the national IRP for Electricity 2010-2030.

The IRP 2019 indicates that there is a short-term electricity supply gap of approximately 2 000 MW between 2019 and 2022.

The DMRE launched a Risk Mitigation Independent Power Producer Procurement Programme (RMIPPPP) on the 23rd of August 2020. The objective of the RMIPPPP is to fill the current short-term supply gap, alleviate the current electricity supply constraints and reduce the extensive utilisation of diesel-based peaking electrical generators. The Determination for the RMIPPPP was gazetted on the 7th of July 2020.

NOTE: It is the intention that the PV projects on the Remainder of Farm Geel Kop 456, which would include this Grid Connection Infrastructure, will submit a bid under the RMIPPPP or subsequent REIPPPP.

The Strategic Environmental Assessment (SEA) for wind and solar PV energy in South Africa (CSIR, 2013) identified eight (8) Renewable Development Zones (REDZs). The REDZs identified areas where large scale renewable energy facilities can be developed in a manner that limits significant negative impacts on the environment while yielding the highest possible socio-economic benefits to the country.

The Geel Kop Grid Connection Infrastructure is located within the Upington REDZ and the Eastern Powerline Corridor, which was formally gazetted in 2018. The area has therefore been identified as suitable for the establishment of renewable energy facilities, specifically large-scale solar facilities and their associated infrastructure.

1.2 ASSUMPTIONS & LIMITATIONS

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

- 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) as well as the Upington REDZ, 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 considered during the strategic planning for the area.
- It is assumed that all the relevant **mitigation and management measures** and agreements specified in this report will be implemented 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**, caused by differing software programs, and that it is understood that the ultimate/final positioning of infrastructure will only be confirmed on-site with the relevant specialist/s.
- The Department of Water and Sanitation **will consider the submission of a water use application** necessary for allowing the use of water from any water resource on-site. The assumption is made that water provision is to be obtained from the local municipality.
- It is assumed that Stakeholders and Interested and Affected Parties notified of the availability of the Draft BAR and Revised Draft BAR will submit all relevant **comments within the designated 30-days** review and comment period on the Draft BAR and Revised Draft BAR, so that these can be included in the Final BAR to be timeously submitted to the competent authority, the Department Environment, Forestry and Fisheries, for consideration and decision making.

The assumptions and limitations of the various specialist studies are included in their respective reports attached in Appendix E.

2. PROPOSED ACTIVITY

Geel Kop Grid (Pty) Ltd, a Special Purpose Vehicle (SPV), proposes the construction and operation of grid connection infrastructure for the 7 authorised PV facilities on the Remaining Extent Farm Geel Kop 456 approximately 30km south-east of Upington in the Northern Cape Province. This Basic Assessment Report (BAR) considers and assesses a joint grid solution required to evacuate power from the following authorised PV energy projects:

- Bushmanland PV (14/12/16/3/3/1/2204);
- Duneveld PV (14/12/16/3/3/1/2205);
- Gordonia Solar PV (14/12/16/3/3/1/2207);
- Hari PV (14/12/16/3/3/1/2208);
- Karroid PV (14/12/16/3/3/1/2209);
- Shrubland PV (14/12/16/3/3/1/2210); and
- GK Solar PV (14/12/16/3/3/1/2206)

The proposed infrastructure includes the following:

1. GK Solar PV switching station
2. Shrubland PV switching station
3. Karroid PV switching station
4. Geel Kop Collector switching station
5. Powerline from GK Solar SS to Shrubland SS
6. Powerline from Shrubland SS to Karroid SS/Hari Facility Substation
7. Powerline from Karroid SS / Hari facility substation to Geel Kop Collector Switching Station
8. Powerline from, Bushmanland Facility substation to Geel Kop Collector Switching Station
9. Powerline from Geel Kop Collector Switching Station to Upington MTS (Revised Alternative 1 Preferred Connection)

These components are diagrammatically shown in the single line diagram below.

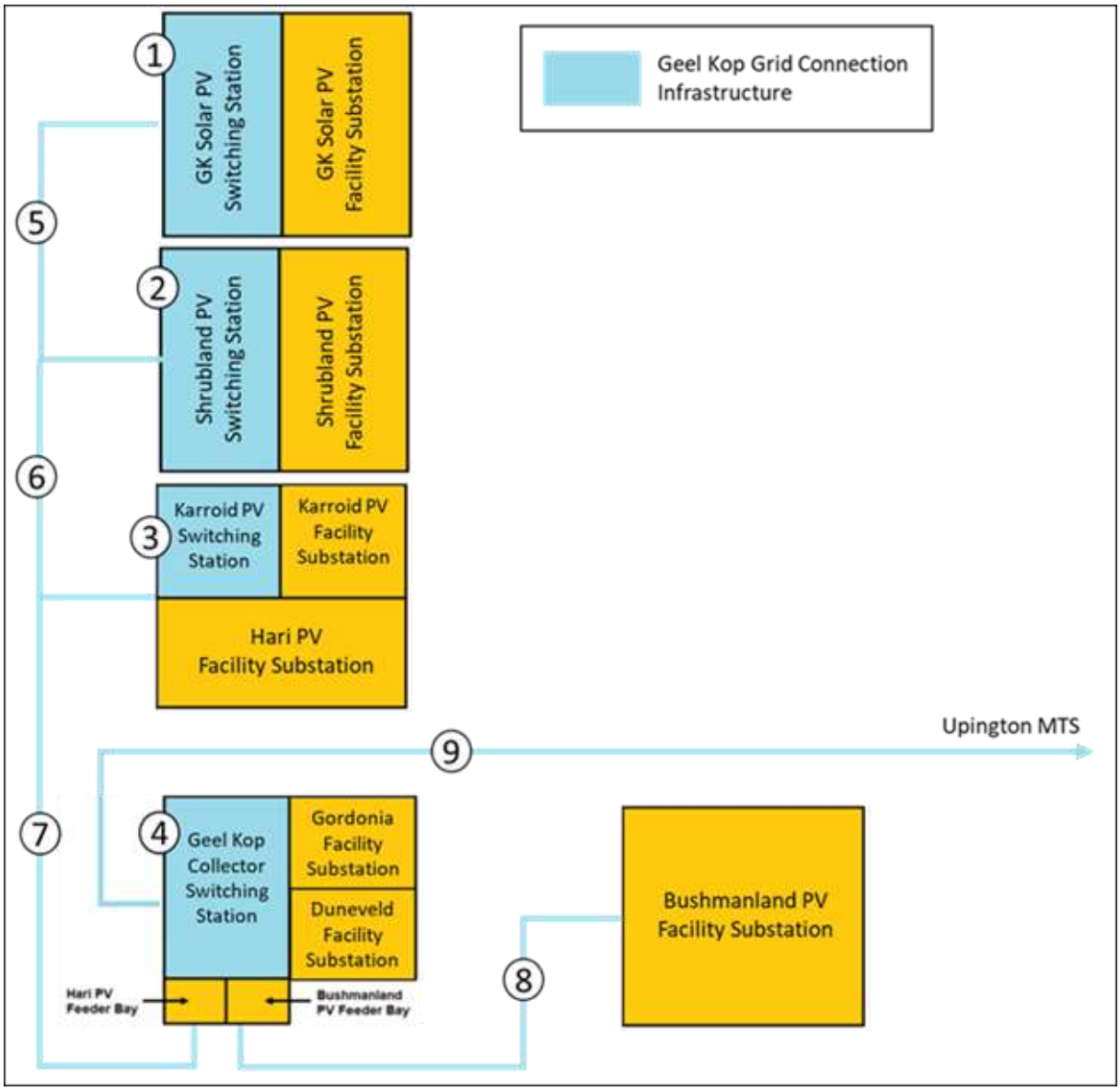


Figure 2: Single line diagram of proposed Geel Kop Grid Connection Infrastructure[11].

As is evident in the descriptions below, the proposed grid connection infrastructure will align as far as possible along landscape divides (i.e. farm roads/tracks, fence lines, fire breaks and approved powerlines) to avoid impacting of the agricultural land use and ecological corridors. In addition, the pylons/towers will not be located on prominent landscape or sensitive features and would become a smaller component of the greater solar energy facility landscape emerging in the area.

Each of the above projects included the authorisation of the IPP portions of the respective on-site substations, and this BAR assesses the remainder of the joint grid solution as described below. For

[11] The components reflected in blue in this table are those that form part of this application, and those in yellow are already authorised as part of the EA's for the respective facilities.

ease of continuity the description of the project components is divided into the following spatially distinct sections[12]:

1. Switching stations;
2. Infrastructure between the individual switching stations/facility substations and the Collector switching station;
3. Collector switching station;
4. Infrastructure between the Collector switching station and the Upington MTS; and
5. Works within the Upington MTS.

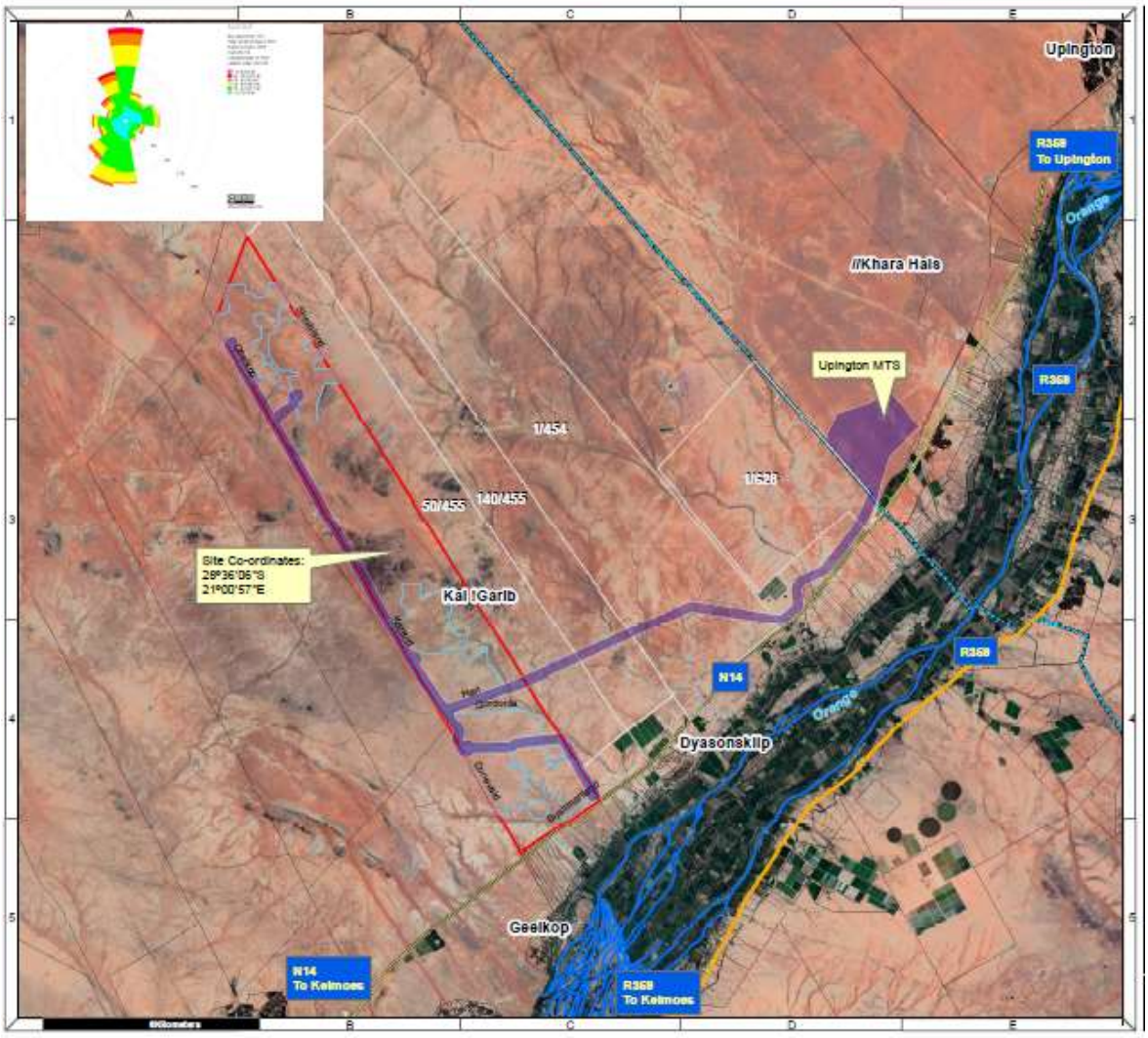


Figure 3: Location of proposed infrastructure forming part of the Geel Kop Grid Infrastructure. Please also refer to the full scale location plans attached in Appendix A.

This proposed infrastructure is discussed separately below.

2.1 SUBSTATION / SWITCHING STATIONS AT EACH PROJECT SITE

A switching station is proposed abutting some of the IPP substations on the project sites. These include:

[12] The descriptions here include the preferred infrastructure only. Please refer to section 2.7 for the description of alternatives considered.

- GK Solar PV switching station - 100m x 50m
- Shrubland PV switching station - 100m x 50m
- Karroid PV switching station - 75m x 75m

Each of these switching stations would include the following typical components:

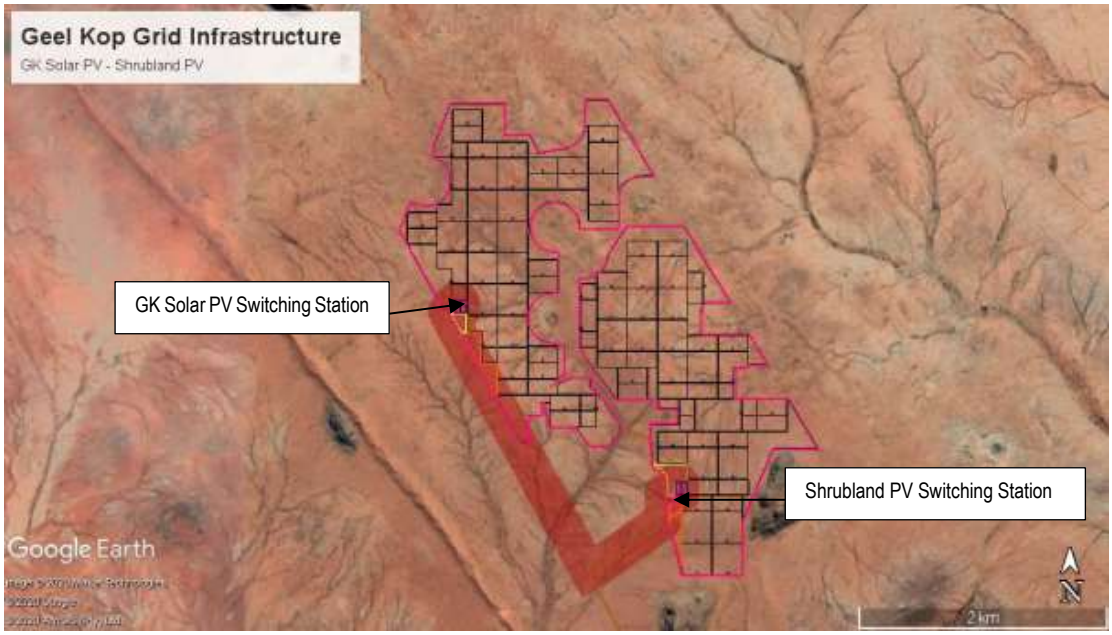
- Platforms;
- Earth mat;
- Incoming/ outgoing feeder bays as required, inclusive of breakers, CTs, VTs, isolators, surge arrestors and line terminal supports;
- New tubular busbar and bussection for the new feeder bays, inclusive of isolators, voltage transformers (VTs) and tubular busbar sections;
- Temporary laydown areas; and
- Access roads and fencing, lightning protection as may be required, and auxiliary buildings as may be required.

2.2 POWERLINES BETWEEN THE INDIVIDUAL ON-SITE SWITCHING STATIONS / FACILITY SUBSTATIONS AND THE GEEL KOP COLLECTOR SWITCHING STATION

There are four assessment corridors that will connect each of the facility switching stations / substations to one another and / or to the collector switching station. The final configuration of the overhead powerlines within each of the corridors described below will depend on the final number of projects that proceed to the construction phase. Notwithstanding the final configuration, all powerline infrastructure will fall within the corridors described below[13].

2.2.1 Powerline corridor between GK Solar PV switching station and Shrubland PV switching station

This will include a single or double circuit 33kV or 132kV overhead powerline as shown below. This line will connect the GK Solar PV switching station to the Shrubland PV switching station.



[13] All corridors have been considered and assessed as 300m wide corridors.

Figure 4: Powerline corridor between GK Solar PV switching station and Shrubland PV switching station is 3.5km in length.

2.2.2 Powerline corridor between Shrubland PV switching station and Karroid PV switching station / Hari facility substation

This will include either a single or double circuit 33kV or 132kV as shown in the image below. This line will connect the Shrubland PV switching station to the Karroid PV switching station / Hari facility substation.

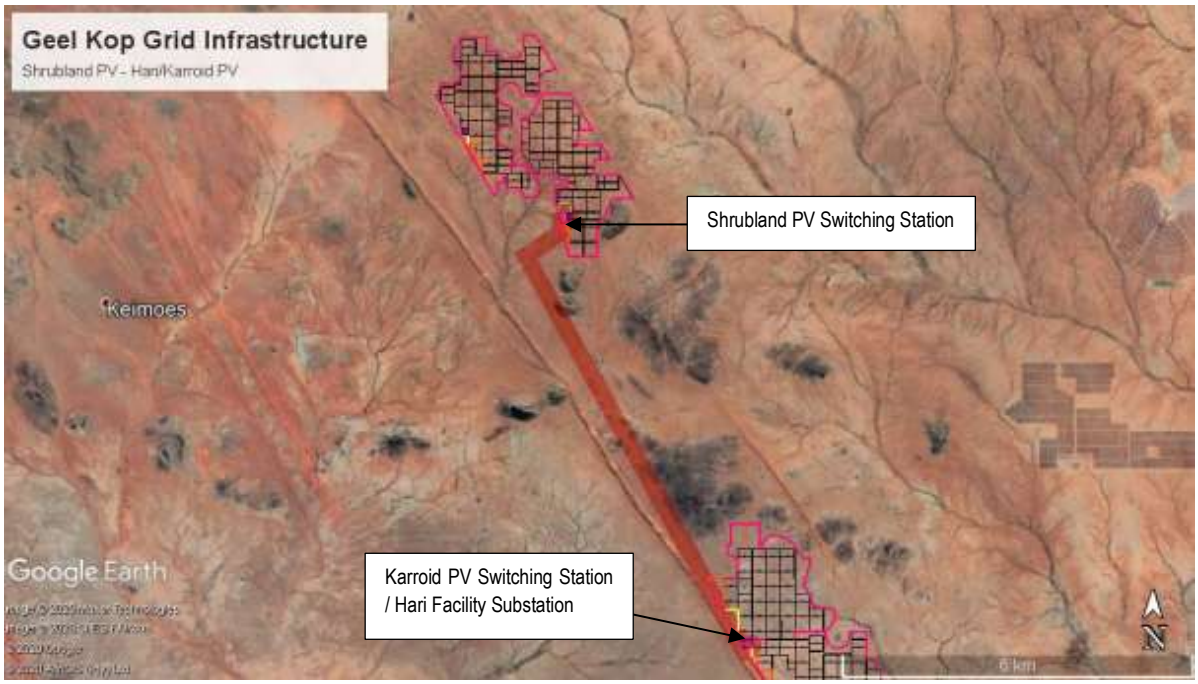


Figure 5: Powerline corridor between Shrubland PV switching station and Karroid PV switching station / Hari Facility Substation is 8.7km in length.

2.2.3 Powerline corridor between Karroid PV switching station / Hari PV facility substation and Geel Kop collector switching station

This will include a single or double circuit 33kV or 132kV power line linking the Karroid PV switching station / Hari PV facility substation and Geel Kop collector switching station as shown in the image below.

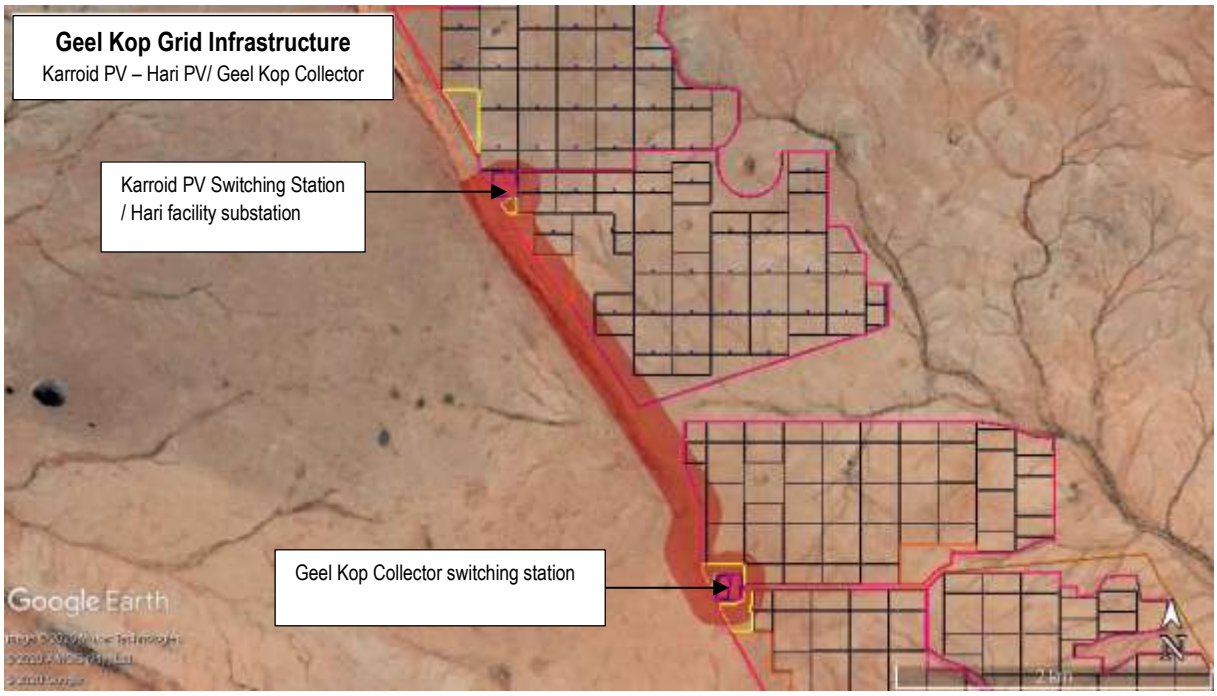


Figure 6: Powerline corridor between Karroid PV switching station / Hari PV facility substation and Geel Kop collector switching station is 3.2 km in length.

2.2.4 Power line corridor between Geel Kop collector switching station and Bushmanland PV facility substation

This corridor will include a single or double circuit 33kV or 132kV powerline connecting Geel Kop collector switching station and Bushmanland PV facility substation as shown in the image below.

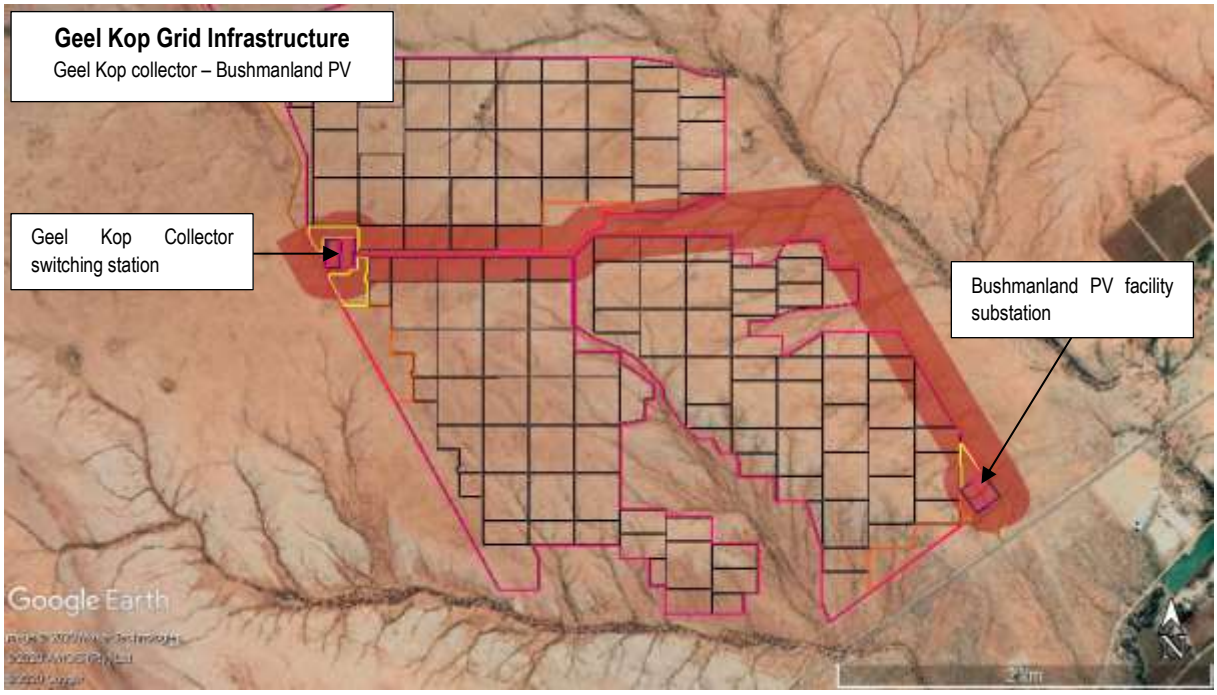


Figure 7: Power line corridor between Geel Kop collector switching station and Bushmanland PV facility substation station is approximately 4.3 km in length.

2.3 COLLECTOR SWITCHING STATION

The Geel Kop collector switching station is positioned to support the preferred connection to the Upington MTS. It is positioned on the South West Corner of Gordonia Solar PV and North West Corner of Duneveld PV as shown below.

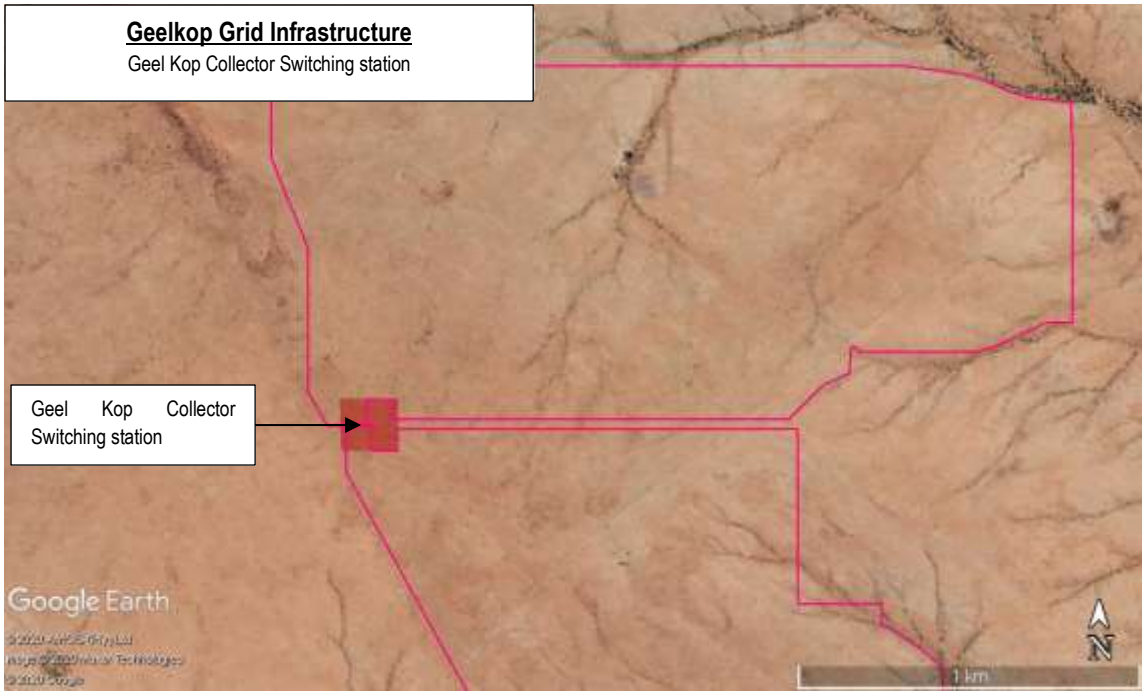


Figure 8: Proposed position of the preferred Geel Kop collector switching station

The Geel Kop collector switching station has a footprint of 150m x 75m.

2.4 INFRASTRUCTURE BETWEEN THE GEEL KOP COLLECTOR SWITCHING STATION AND THE UPINGTON MTS

The preferred connection is a double circuit 132 kV powerline from Geel Kop collector switching station to the Upington MTS. This powerline will be aligned with the Aries-Upington 400 kV Powerline (Authorised but not yet constructed) for approximately 7.2km, then towards and along the N14 to the MTS.

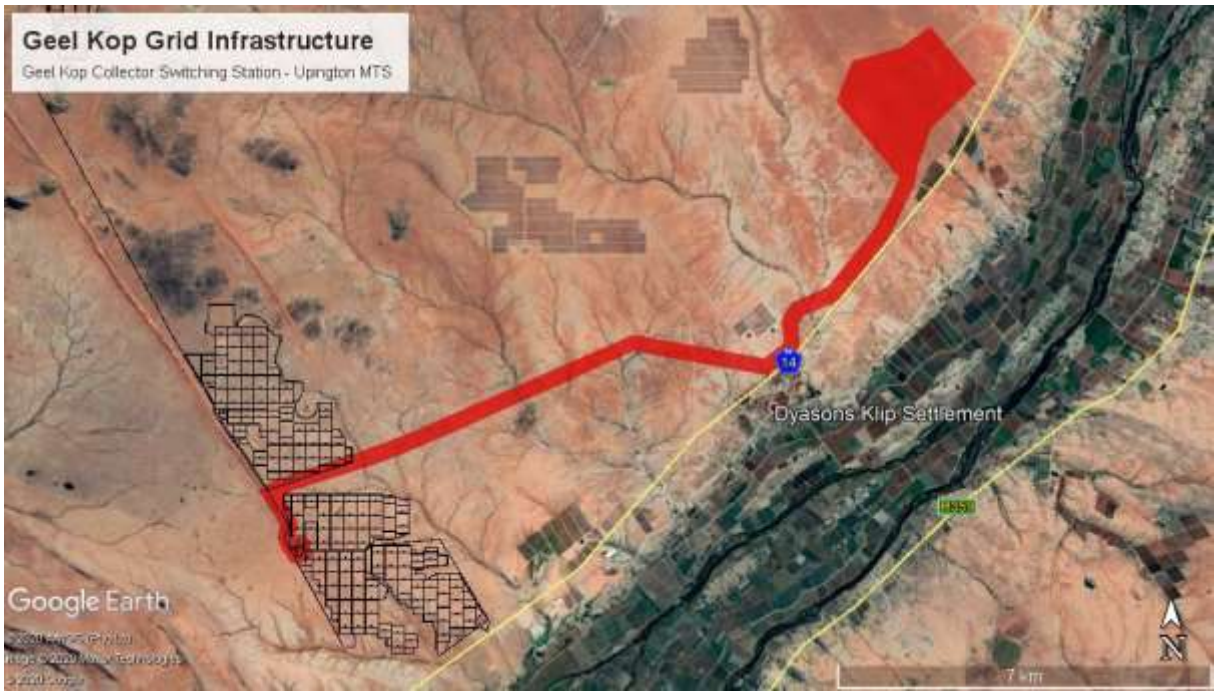


Figure 9: 132 kV line from the Geel Kop collector switching station to the Upington MTS (Preferred) is approximately 16km in length.

2.5 WORKS WITHIN THE UPINGTON MTS

The following activities may take place within the authorised footprint of the existing Upington MTS:

- Establish new 132kV feeder bays at the existing 400/132kV Upington MTS;
- Install new 132kV line bays, inclusive of breakers, current transformers (CTs), isolators and surge arrestors; and
- Install a new tubular busbar and bussection for the new line bays, inclusive of isolators, voltage transformers (VTs) and tubular busbar sections.

2.6 ACCESS ROADS

Sites for the Geel Kop Grid Infrastructure will be accessed via Roads authorised as part of the EA's for the PV projects. The establishment of access roads for the construction and operation of this integrated grid connection will require the widening of some of the existing farm tracks. A two-track access road will be constructed within the powerline servitude for construction and maintenance activities. No formal structures will be constructed as part of this access road, which will remain as a jeep track for maintenance activities.

2.7 PROJECT NEED AND DESIRABILITY

The need and desirability of grid connection infrastructure is directly related to the renewable energy projects as a whole. This section therefore considers the need and desirability cumulatively along with the authorised PV projects on the remaining extent of the farm Geel Kop 456.

In keeping with the requirements of an integrated Environmental Impact process, the DEA and DP[14] *Guidelines on Need and Desirability (2010 & 2011)* were referenced to provide the following estimation

[14] The Western Cape Provincial guidelines on Need and Desirability were considered in the absence of National and Northern Cape Guidelines.

of the activity in relation to the broader societal needs. The concept of need and desirability can be explained in terms of its two components, where *need* refers to *time,* and *desirability* refers to *place*. Questions pertaining to these components are answered in the sections below.

The section above considers the overall need for alternative, so-called 'green energy' considering the known environmental burdens associated with the impact of coal power generation through which most of our country's electricity is currently being generated. Associated aspects such as air pollution, water use, and carbon tax are discussed to further explain the need and desirability for 'green energy' projects in general.

2.7.1 Feasibility consideration

The commercial feasibility for the proposed 7 x 100MW Geel Kop solar projects along with this associated infrastructure to be built on private land near Keimoes, has been informed by its contextual location, and economic, social and environmental impacts and influence. The project has gathered sufficient information and conducted studies of the site and the region to make qualified and reliable assumptions on the project's various impacts.

2.7.2 Solar Resource & Energy Production

The arid climate experienced in the Northern Cape lends itself to the availability of high levels of solar energy. Considering the steady nature of the solar radiation at the PV sites, the resource is sufficient to guarantee a positive return on investment.

2.7.3 Solar Farm & Grid Connection

Among the outstanding characteristics of the Geel Kop PV sites is the exceptionally flat nature, sufficient medium-low sensitivity environments and accessible location, facilitating the delivery of bulky PV panel and electrical pylon infrastructure, and the construction and assembly process. The proximity of the site to the N14 decreases the impact on secondary roads and natural habitat from the traffic going to and from Geel Kop projects and the Grid connection infrastructure during construction and operations. The proximity of the existing Eskom Upington MTS also allows for connection via a relatively short distribution line. As none of the target properties are used for intensive agricultural purposes, the Geel Kop Grid Connection Infrastructure will not significantly interfere with the agricultural productivity of the area.

2.7.4 Social impact

Please refer to the Social Impact Assessment Report in Annexure E8 for a detailed description of the social environment. The Northern Cape region is economically challenged due to its arid climate, challenging agricultural conditions, lack of water and limited natural resources (away from the Orange River). The local economy, mainly supported by limited agriculture, simply isn't enough to accommodate the high level of unemployment.

Private sector development is seen to offer opportunities to access Enterprise Development funds of the main mining groups. This can contribute to entrepreneurial activities linked to their supply chain. The same applies to the investment, in terms of employment opportunities and entrepreneurial activities, associated with renewable energy projects.

Power generation and distribution is one of the rare growth opportunities for the Northern Cape (and even more so within the REDZ such as where Geel Kop PV projects and their associated grid infrastructure is proposed) due to the high solar irradiation levels and its strategic position relative to the National Transmission Network. This setup creates unprecedented growth opportunities for the area and the establishment of a renewable energy project is considered important to diversify and complement the economic development of the region.

2.7.5 Employment & Skills Transfer

The benefits of renewable energy facilities to local regions are not confined to the initial investment in the project. They also provide a reliable and on-going income for landowners and municipality, creating direct employment opportunities for locals, as well as flow-on employment for local businesses through provision of products and services to the project and its employees.

The Geel Kop Grid Connection Infrastructure will have a positive impact on local employment. During the estimated 18-month construction phase, the project will employ approximately 100 individuals of various qualifications. The majority will be provided by the local labour market. Limited operational phase job opportunities will be realised (these will mostly consist of maintenance activities).

2.7.6 Need (time)

Is the land use considered within the timeframe intended by the existing approved Spatial Development Framework (SDF)? (I.e. is the proposed development in line with the projects and programmes identified as priorities within the credible IDP?)

Yes, the employment of renewable energy technology (including its associated infrastructure) has a spatial strategic place in the Kai !Garib Municipality SDF while the need for a policy on the development of sustainable solar energy facilities has been identified as Key Development Priority / Project.

Should the development occur here at this point in time?

Yes, the proposed Geel Kop Grid Connection Infrastructure is to be located outside the Upington and Keimoes Urban Edges urban edge, but within a legislated REDZ and Strategic Powerline Corridor, and would promote diversification to the local economy as well as serve as a catalyst for further expansion in the stream of sustainable renewable energy development within these REDZ (identified as a priority development strategy in the IDP and the SDF). There are currently four renewable energy developments completed or currently under construction in very close proximity to the proposed Geel Kop PV projects.

Does the community / area need the activity and the associated land use concerned?

The Kai !Garib Municipality identified the opportunity for a renewable energy projects through their SDF and IDP processes, which include public participation. The proposed renewable energy developments and associated infrastructure will allow for a diversification of employment, skills and contribute to the potential development of small business associated with its construction, operation and maintenance activities.

The proposed solar facilities and their associated infrastructure will contribute electricity to the constrained Northern Cape and National electrical network, contributing to a provincial and national need. The Geel Kop Grid Connection Infrastructure has been designed in such a way so as to avoid or minimise potential negative impacts of the local environment while enhancing potential positive impacts, locally and regionally. The social specialist undertook interviews with various municipal officials as part of the Social Impact Assessment. The proposed development was strongly supported by Mr McKay and Mr Clarke, the Director of Planning and Head of Engineering Services respectively at the Kai !Garib Municipality.

Are the necessary services with adequate capacity currently available?

Some existing, some new. The Geel Kop Grid Connection Infrastructure includes the installation of an overhead powerline to connect to the existing Eskom Upington MTS via the Geel Kop Collector switching station (feed into the national grid system). The cost of supplying the new infrastructure will be covered by the Applicant, and the impacts thereof have been assessed in this environmental process.

The water required for the construction of the Geel Kop Grid Connection Infrastructure will be sourced from the Kai !Garib Municipality (this activity will not utilise water during operation).

Construction waste (general waste) will be disposed of at the existing landfill sites. Construction waste volumes associated with the installation of the Geel Kop Grid Connection Infrastructure will be very low.

Is this development provided for in the infrastructure planning of the municipality?

Yes. Attracting private investment and the employment opportunities associated with renewable energy development are identified as priority strategies to create sustainable urban and rural settlements.

Is this project part of a national programme to address an issue of national concern or importance?

Yes. To meet the increasing power demand within South Africa, Eskom has set a target of 30% of all new power generation to be derived from independent power producers (IPPs). The Geel Kop Grid Connection Infrastructure is associated with seven renewable energy projects, which if implemented will assist in achieving this target. The proposed Geel Kop Grid Connection Infrastructure is also situated within a legislated REDZ and a Strategic Powerline Corridor.

2.7.7 Desirability (place)

Is the development the best practicable environmental option for this land / site?

The target properties are outside the Upington and Keimoes Urban Edge, within a legislated REDZ and Strategic Powerline Corridor and as such will unlikely be considered for an alternative land use such as urban development. The properties have a poor agricultural potential due to the arid climate and other limiting factors. These factors have rendered the property vacant with limited land use option alternatives.

Would the approval of this application compromise the integrity of the existing approved and credible municipal IDP and SDF?

No. According to the IDP, attracting Renewable Energy Investment is seen as an IDP Strategy and economic driver to alleviate unemployment and poverty and "to ensure sustainable economic and social transformation in the District". The performance of which would be reflected in the development of a Renewable Energy Strategy and Policy for the District (IDP, 2012-2018). The IDP furthermore specifically promotes socio-economic development, SMME's, job creation and private sector investment and identifies solar energy as a growth opportunity within the local economy.

Would the approval of this application compromise the integrity of the existing approved environmental management priorities for the area?

Unlikely. According to the national vegetation map (Mucina & Rutherford 2018, the Grid connection infrastructure lies entirely within a vegetation types that is classified as Least Threatened, namely Bushmanland Arid Grassland, Kalahari Karroid Shrubland and Gordonia Duneveld (ecosystems that cover most of their original extent and which are mostly undamaged, healthy and functioning). Considering the extent of this relatively intact ecosystem type, and the fact that the site is not highly sensitive (there are no unique, threatened or otherwise unique habitats present which are not widely available in the wider landscape), it can withstand some loss of natural area through development.

Do location factors favour this land use at this place?

Yes. The Northern Cape region has been identified as being one of the most viable areas for solar energy generation (this grid connection infrastructure is directly linked to renewable energy generation) due to the following factors:

- Excellent solar radiation (compared to other regions);
- Close to existing main transport routes and access points;
- Close to connection points to the local and national electrical grid; and
- Outside Critical Biodiversity Areas.

The proposed properties affected by the grid connection infrastructure are furthermore situated within a legislated REDZ and Strategic Powerline Corridor and as such has been subjected to a detailed SEA in which highly sensitive landscapes were already excluded from these areas.

The ecological sensitive areas on and surrounding the grid connection infrastructure have informed the optimal location and layout for the proposed infrastructure, with minimal impact to the receiving environment, subject to implementation of mitigation measures.

How will the activity or the land use associated with the activity applied for, impact on sensitive natural and cultural areas?

The alternatives considered for the grid connection infrastructure have been iteratively designed and informed by various investigations and assessments that considered both the natural and cultural landscapes as well as technical feasibility. The natural and culturally sensitive areas have been identified and where possible, avoided to prevent negative impacts on such areas.

How will the development impact on people's health and wellbeing?

The grid connection infrastructure is located outside of the Upington and Keimoes Urban Edge and as a result is unlikely to impact negatively on the community's health and wellbeing. The closest populated settlement is situated on Kanoneiland, situated more than 8km from the grid connection infrastructure.

Will the proposed activity or the land use associated with the activity applied for, result in unacceptable opportunity costs?

Unlikely. The next best land use alternative to PV and associated infrastructure is limited agriculture (the status-quo). However, the proposed affected properties will not have any significant agricultural value and has not been utilised for any intensive agricultural purposes. The carrying capacity of the properties is too low to generate noteworthy financial benefit from agricultural activities. The economic benefits and opportunities that the proposed solar development holds for the landowner and the local economy of the municipal area cannot be recovered from the current or potential agricultural activities.

The opportunity costs in terms of the water-use requirements of Geel Kop Grid Connection Infrastructure are within acceptable bounds if one considers the minimal demand on the resources.

Will the proposed land use result in unacceptable cumulative impacts?

Unlikely. Since the Northern Cape, and specifically sites within the legislated REDZ have been identified as an area with high potential for renewable energy generation: solar irradiation and availability of vast tracts of land with low sensitivity; there are several on-going applications in the region already. The potential for further, future solar developments in the area cannot be discounted (as many have already been approved or are in progress). However, these will have synergistic benefits for the economy and growth of the area, while the contribution to cumulative habitat loss in the area associated with this and potential future solar development would be relatively small in relation to the land resources available, with low impacts restricted to the local area.

2.8 SITE SELECTION PROCESS

Site selection for the grid connection infrastructure is determined entirely by the location of the power generating facility (in this case, the authorised PV facilities on the Remainder of the farm Geel Kop 456) and that of a suitable substation connected to the national energy grid (in this case the Upington MTS). The site selection process associated with the PV facilities is considered in the respective BAR's and is not reiterated here.

2.9 CONSIDERATION OF ALTERNATIVES

A number of alternatives have been considered as part of this environmental process. These include

- Corridor Alignments between the facility substation/ switching stations[15] and the proposed collector switching station;
- Alternative positions of the collector switching station.
- Corridor alignments between the collector switching stations and the national grid (via either direct connection or a loop in loop out connection).

These alternatives are discussed in the sections that follow.

2.9.1 Powerline corridor alignments between the facility substations / switching stations and the collector switching station.

There are four assessment corridors that will connect each of the facility substations / switching stations to one another and/or to the collector switching station. The final configuration of the overhead powerlines within each of the corridors described below will depend on the final number of projects that proceed to the construction phase. Notwithstanding the final configuration, all powerline infrastructure will fall within the corridors described below[16]

2.9.1.1 Powerline corridor between GK Solar PV switching station and Shrubland PV switching station

This will include a single or double circuit 33kV or 132kV overhead powerline (OHL) as shown below. This line will connect the GK Solar PV switching station to the Shrubland PV switching station (the footprint of each of these switching stations will be 100m x 50m).

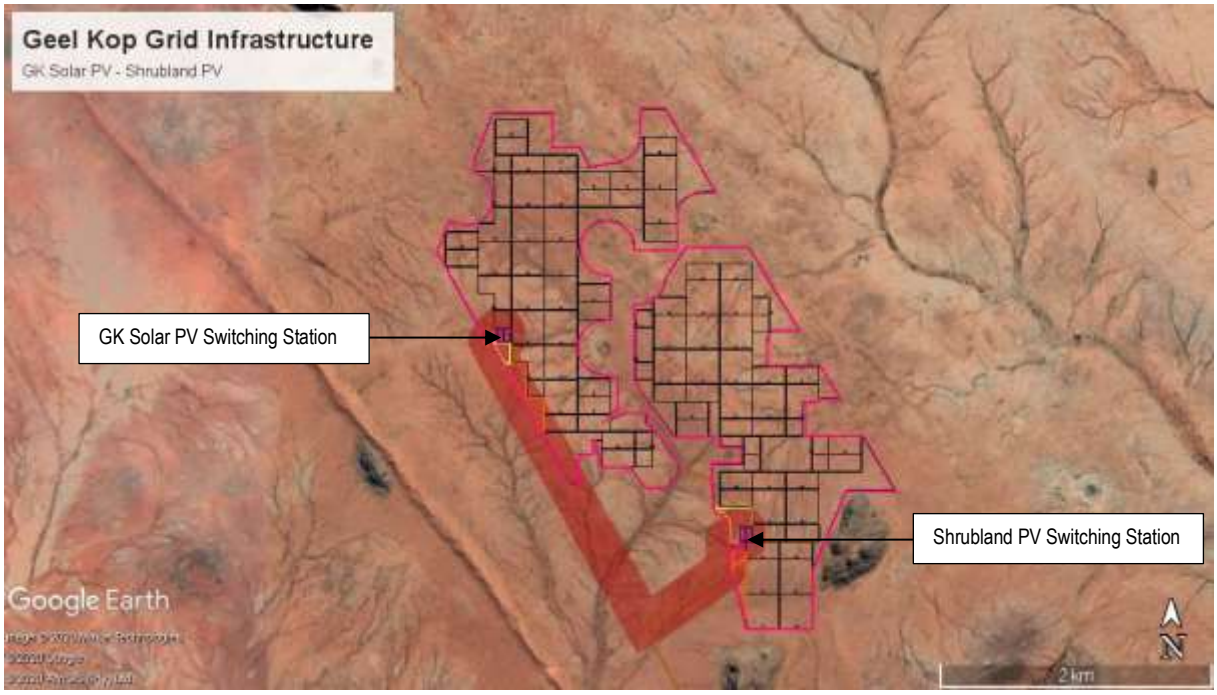


Figure 10: Powerline corridor between GK Solar PV switching station and Shrubland PV switching station

[15] This Basic Assessment process includes application and assessment of the Eskom portion of the on-site substation (i.e. the switching station component), the IPP portion of the on-site substation (i.e. the facility substation) was applied for and assessed as part of the BAR's for the individual PV facilities.

[16] All corridors have been considered and assessed as 300m wide corridors.

2.9.1.2 Powerline corridor between Shrubland PV switching station and Karroid PV switching station/ Hari PV facility substation

This will include either a single or double circuit 33kV or 132kV OHL within the corridor shown in the image below. This line will connect the Shrubland PV switching station to the Karroid PV switching station/Hari PV facility substation (the footprint of the Shrubland switching station will be 100m x 50m and the Karroid PV switching station will be 75m x 75m).

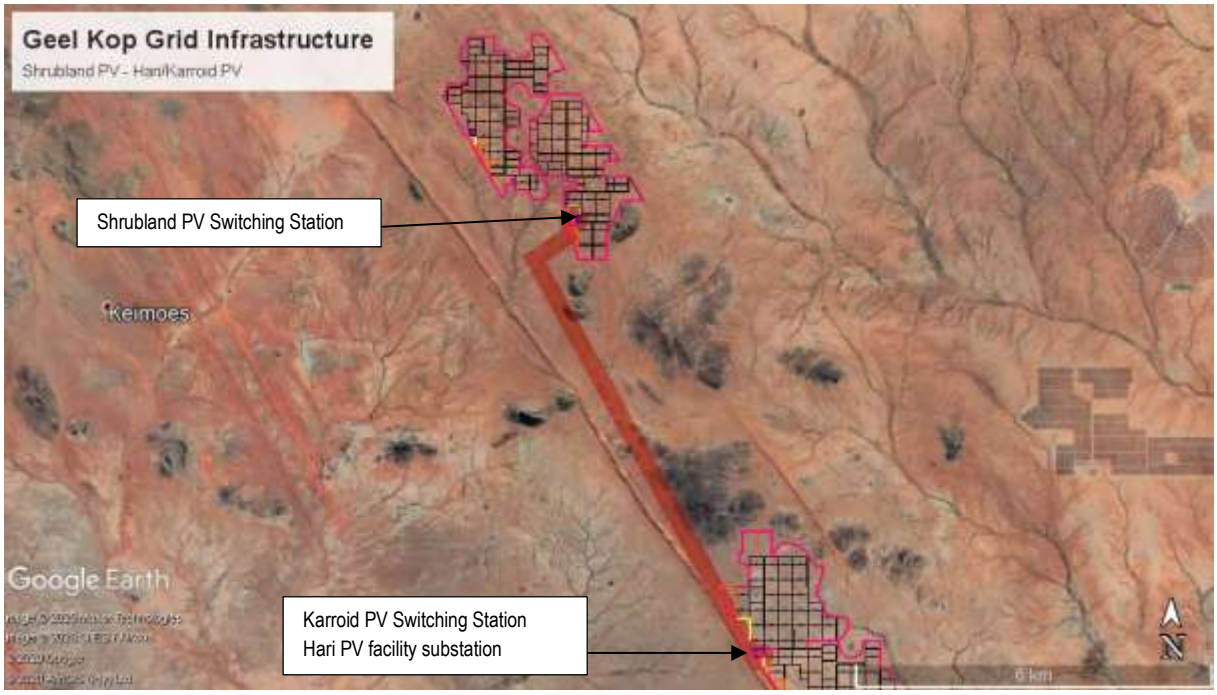


Figure 11: Powerline corridor between Shrubland PV switching station and Karroid PV switching station/ Hari PV facility substation.

2.9.1.3 Powerline corridor between Karroid PV switching station/ Hari PV facility substation and the Geel Kop collector switching station.

This will include a double circuit 33kV or 132kV power line linking the Karroid PV switching station / Hari PV facility substation and Geel Kop collector switching station as shown in the image below. The footprint of both the Geel Kop collector switching station will be approximately 150m x 75m.

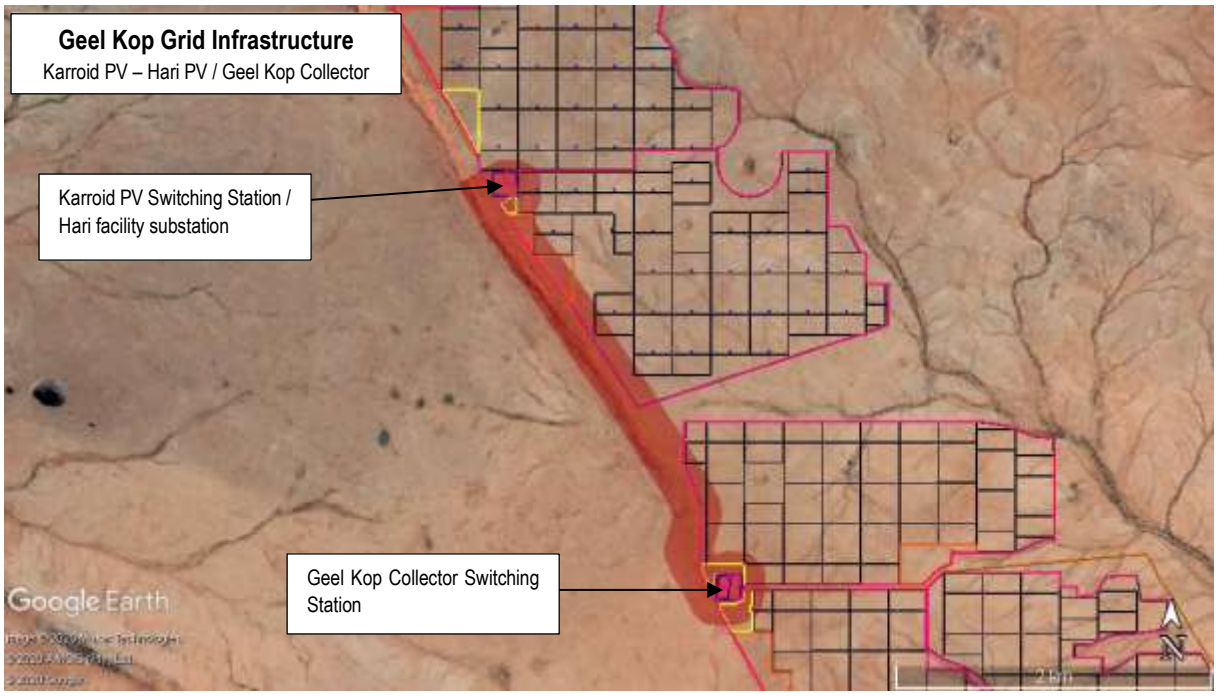


Figure 12: Powerline corridor between Karroid PV switching station/ Hari PV facility substation and Geel Kop Collector switching station.

2.9.1.4 Power line corridor between Geel Kop collector switching station and Bushmanland PV facility substation/ collector switching station

It must be noted that the Geel Kop collector switching station is the preferred collector as discussed in section 2.7.2 below.

This corridor will include a single or double circuit 33kV or 132kV powerline connecting Geel Kop collector switching station and Bushmanland PV facility substation/ collector switching station as shown in the image below. The Bushmanland collector switching station would have a footprint 150m x 75m.[17]

[17] It is unlikely that the Bushmanland collector substation would be constructed, as the Geel Kop Collector is preferred as it is centrally located. However, the overhead line between the Geel Kop Collector switching station and the approved Bushmanland facility substation would be constructed.

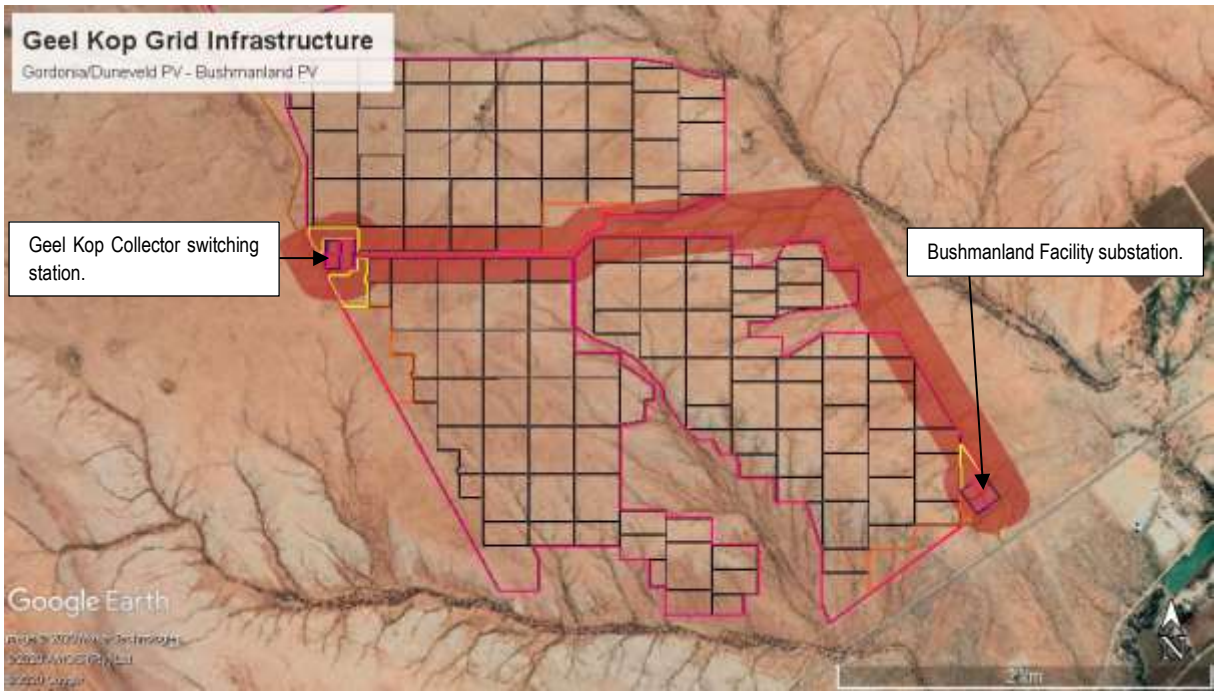


Figure 13: Power line corridor between Geel Kop collector switching station and Bushmanland PV facility substation/ collector switching station.

2.9.2 Alternative positions of the collector switching stations

As shown above, there are two alternative positions for the collector switching station, depending on which connection to the MTS is developed. These are described as follows and discussed separately below:

- Geel Kop collector switching station (preferred)
- Bushmanland PV collector switching station

2.9.2.1 Geel Kop collector switching station (preferred)

The Geel kop collector switching station is positioned to support the preferred connection route to the Upington MTS. It is positioned on the South West Corner of Gordonia Solar PV and North West Corner of Duneveld PV as shown below.

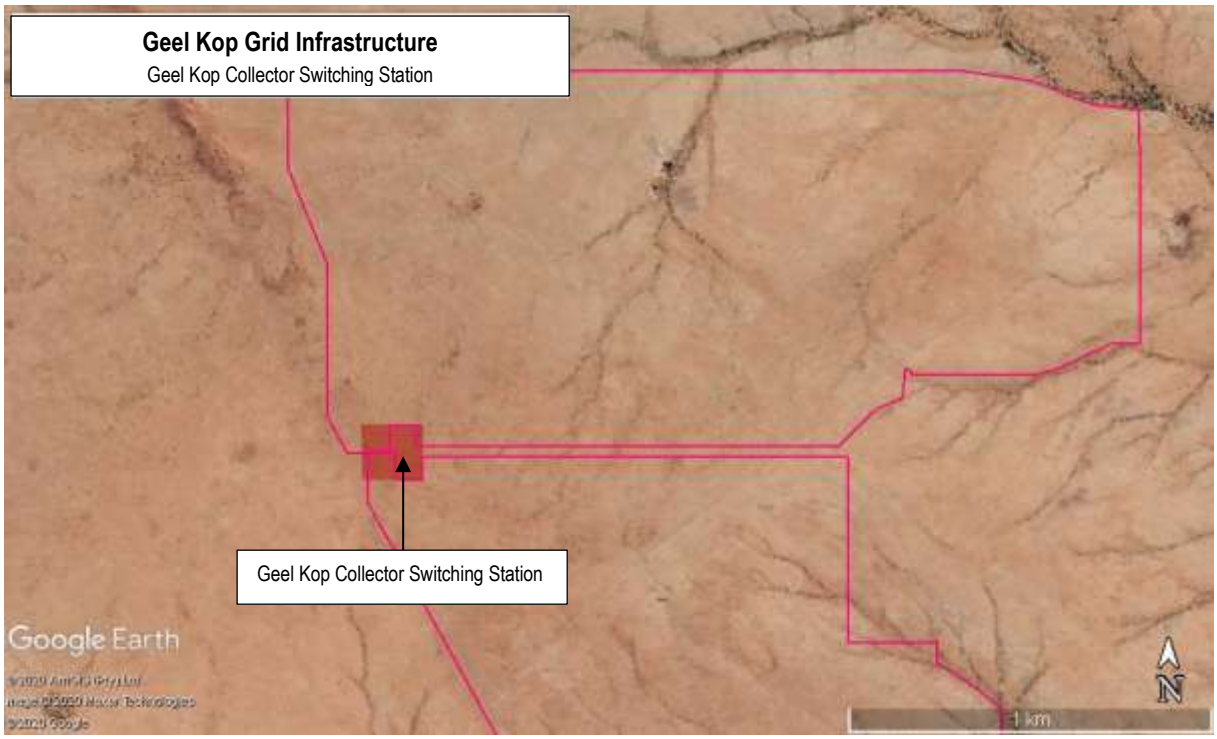


Figure 14: Proposed position of the preferred Geel Kop collector switching station

The Geel Kop collector switching station has a footprint of 150m x 75m.

2.9.2.2 Bushmanland PV collector switching station

The alternative collector switching station is positioned on the South Eastern Corner of Bushmanland PV as shown in the image below

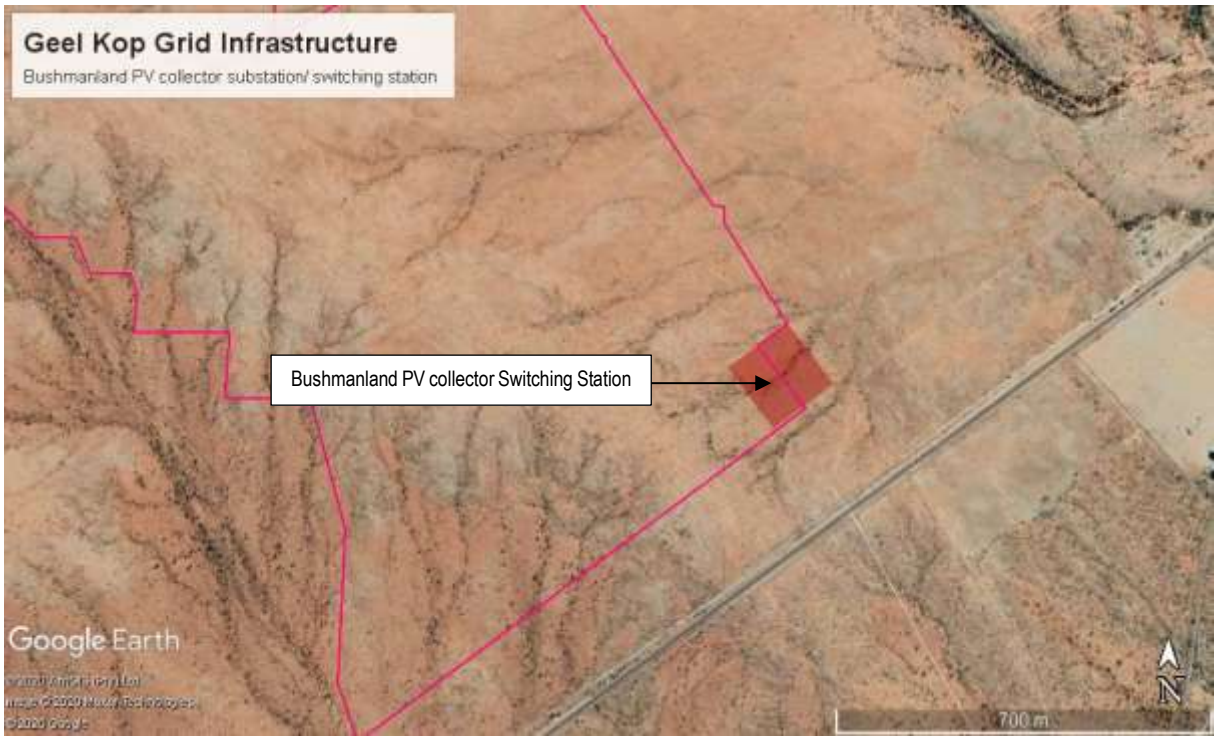


Figure 15: Position of Bushmanland PV collector substation/ switching station.

The Bushmanland PV collector switching station has a footprint of 150m x 75m.

2.9.3 Corridor alignments between the collector switching stations and the national grid

Two alternatives have been considered in this regard, namely:

- Alternative 1[18] : a double circuit 132kV line from the Geel Kop collector switching station to the Upington MTS, running parallel to the Eskom Aries-Upington 400kV 110m servitude to the Upington MTS.
- Updated Alternative 1 (preferred): a double circuit 132kV line from the Geel Kop collector switching station to the Upington MTS, running parallel to the Eskom Aries-Upington 400kV 110m servitude for approximately 7.2km, before turning towards the N14 and running along the N14 to the Upington MTS.
- Alternative 2: a loop in loop out (LILO) from the Bushmanland PV collector switching station into the McTaggerts / Oasis 132kV powerline, and reconductored as a double circuit 132kV line back to the Upington MTS.

These two[19] alternatives are discussed in the section below:

2.9.3.1 Alternative 1 – 132kV line from the Geel Kop collector switching station to the Upington MTS

This alternative includes a double circuit 132 kV powerline from Geel Kop collector switching station to the Upington MTS which is approx. 15km in length. This powerline will be aligned with the Aries-Upington 400kV Powerline (Authorised but not yet constructed) to the Upington MTS.

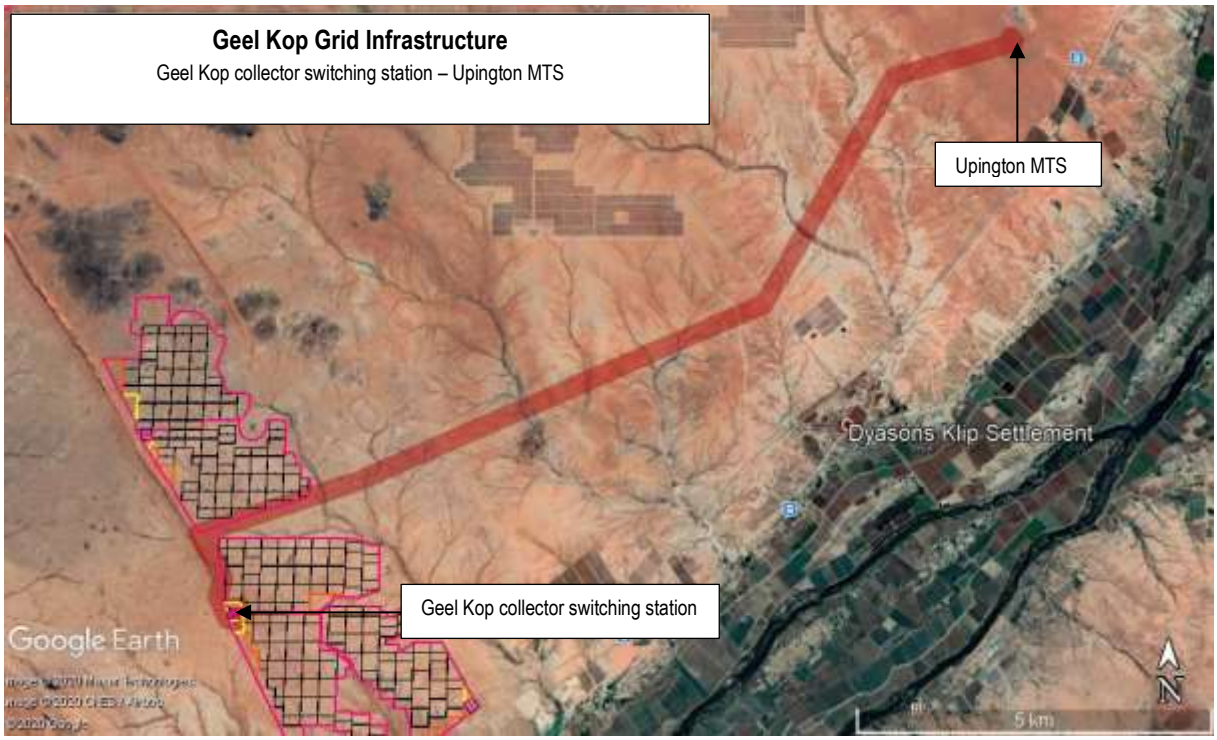


Figure 16: 132kV line from the Geel Kop collector switching station to the Upington MTS

[18] This was the preferred alternative as considered during the Draft BAR. This Revised Draft BAR proposes an update to this previously preferred alternative, namely "Updated Alternative 1" as described in this section.

[19] Alternative 1 and Updated Alternative 1 are deemed to be the same alternative, as the original alternative 1 is no longer feasible.

Due to conflicting land use activities on the RE Farm 628, the previously preferred alternative 1 has been eliminated from further consideration in the environmental process and has been replaced with a new alternative, Updated Alternative 1, as described in the section below.

2.9.3.2 Updated Alternative 1 – 132kV line from the Geel Kop collector switching station to the Upington MTS

During the servitude option negotiations for the previously preferred alternative (Alternative 1), conflicting land uses on the RE Farm 628 were identified. This required that the previously preferred alternative be updated to avoid these conflicting land uses.

This updated preferred alternative includes a double circuit 132 KV powerline from Geel Kop collector switching station to the Upington MTS which is approx. 16km in length. This powerline will be aligned with the Aries-Upington 400kV Powerline (Authorised but not yet constructed) for approximately 7.2km before turning towards and along the N14 to the Upington MTS.

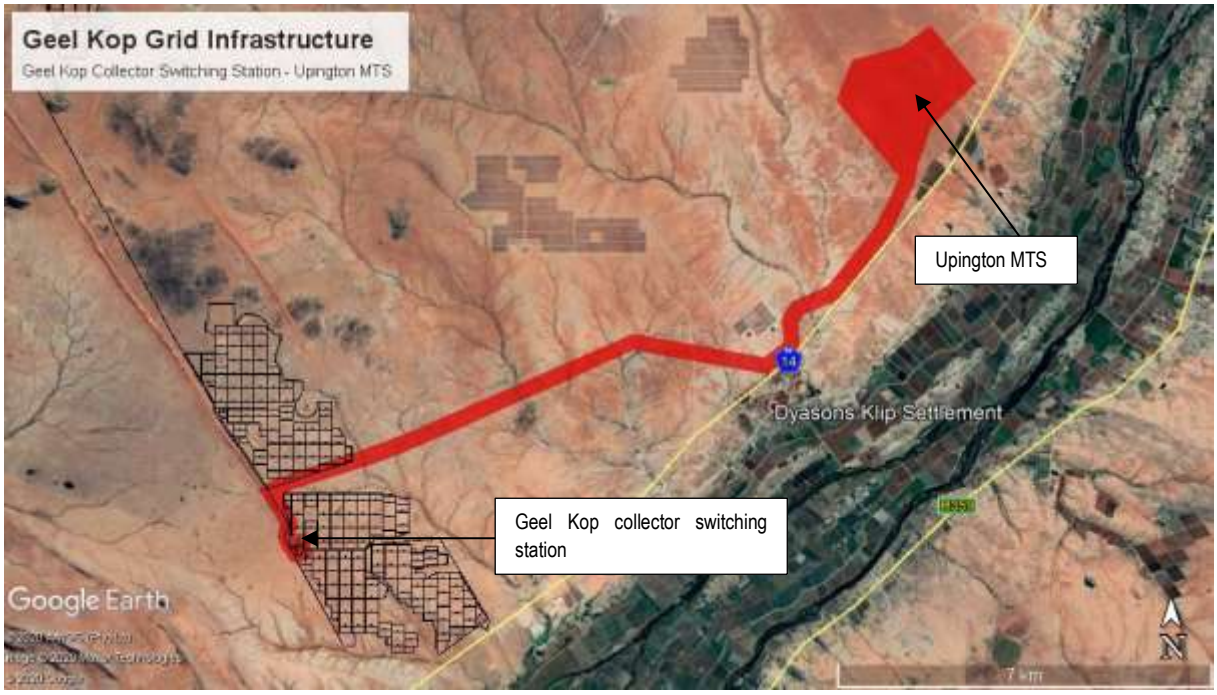


Figure 17: PREFERRED ALTERNATIVE (Updated Alternative 1):132kV line from the Geel Kop collector switching station to the Upington MTS.

2.9.3.3 Alternative 2 - loop in loop out (LILO) from the Bushmanland PV collector switching station into the McTaggerts / Oasis 132kV powerline.

The alternative connection is a loop in loop out (LILO) from the Bushmanland PV collector switching station into the McTaggerts / Oasis 132kV powerline, and reconductored as a double circuit 132kV line back to the Upington MTS.

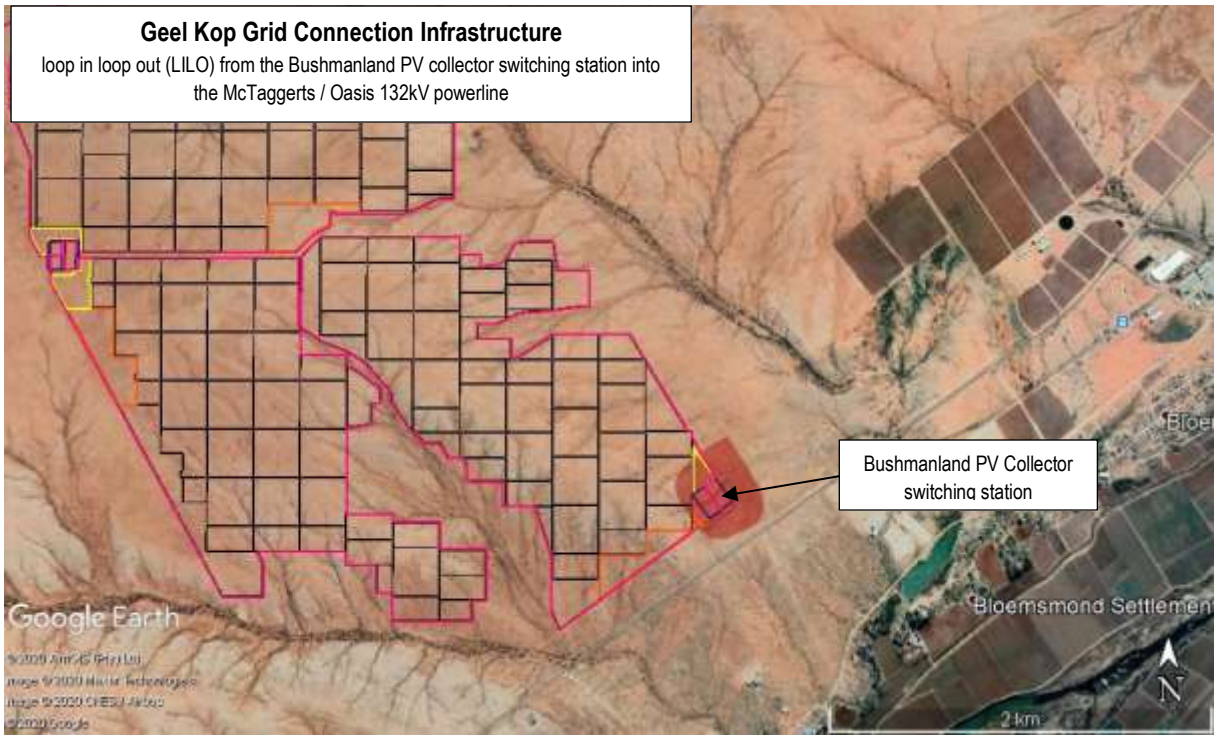


Figure 18: Position of loop in loop out (LILO) from the Bushmanland PV collector switching station into the McTaggerts / Oasis 132kV powerline

The Applicant has engaged with Eskom Grid Access Unit with regards the grid connection alternatives into the national grid. From a technical standpoint, the loop in loop out (LILO) alternative into the McTaggerts/Oasis 1 132kV powerline, with reconductored portion back to the Upington MTS along the existing servitude, is the least preferred technical solution for the primary reason that this is an existing powerline that services an existing generator (50 MW Khi CSP plant) as well as load customers in the area. Whilst Eskom has not objected to this connection alternative, they have stated that any connection to the McTaggerts / Oasis 1 132kV powerline will require very careful consideration and planning at Preferred Bidder stage to ensure least disruptions to all existing clients on this network. The risk of disruptions along this powerline therefore compels the Applicant to consider the preferred solution of a double circuit 132 kV powerline from the Geel Kop collector switching station to the Upington MTS.

The formal cost estimate letter CEL from Eskom has confirmed that the direct connection (as described as the updated alternative 1 above) is the most viable connection option.

Powerline Alternative 2 has been eliminated from further consideration in this environmental process.

2.9.4 The no-go alternative

The no-go alternative is considered the option of not commencing with the activity (i.e. the activities proposed as part of the BAR).

This would render the Authorised PV facilities on the remainder of the Farm Geel Kop 456 unviable and all the environmental and social benefits associated with those facilities would be lost.

The consideration of individual grid connections for each of these facilities would result in significantly higher environmental impacts and higher opportunity cost than the proposed joint connection infrastructure proposed in this environmental process.

The no-go alternative will however be used as the baseline for all assessments in respect of this environmental process.

2.9.5 Comparison of alternatives

The table below reflects the key environmental advantages and disadvantages of the grid connection alternatives including the identification of the preferred alternatives in each case.

Table 3: Comparison of Advantages and Disadvantages of grid connection infrastructure and corridor Alternatives.

Alternative	Preference	Reasons (incl. potential issues)
ON-SITE SUBSTATION / SWITCHING STATION POSITIONS		
The position of the on-site switching stations is determined by the positions of the IPP portions of these substations (i.e. those positions considered, assessed and approved as part of the Environmental Processes for the respective PV facilities on RE Geel Kop 456). Alternative positions therefore cannot be considered as part of this environmental process.		
GRID CONNECTION CORRIDORS FROM ON-SITE SUBSTATIONS TO COLLECTOR SWITCHING STATIONS		
The alignment of these proposed corridors has been done in such a manner as to follow the access roads approved as part of the respective PV facilities. Due to the risk adverse approach of following existing infrastructure, no alternative corridors were considered in this regard.		
COLLECTOR SWITCHING STATION POSITIONS		
Geel Kop collector switching station	Preferred	- Centrally situated - Setback from N14 (lower visual exposure) - Links to preferred grid connection to MTS
Bushmanland PV collector switching station	Least Preferred	- Close proximity to N14 (higher visual exposure) - Only viable if least preferred grid connection is applicable.
GRID CONNECTION CORRIDORS FROM COLLECTOR SWITCHING STATION TO UPINGTON MTS		
Alternative 1 (direct connection to Upington MTS)	Not possible	- Technically feasible. - Follows existing powerline servitude - No existing generator load customers (as it is a new line) - No fatal flaws or unacceptable environmental impacts. - Conflicting land use on the Remaining Extent of the Farm 628 Tungston Lodge.
Updated Alternative 1 (direct connection to Upington MTS)	Preferred	- Technically preferred. - Follows existing powerline servitude - No existing generator load customers (as it is a new line) - No fatal flaws or unacceptable environmental impacts. - No Conflicting land use.
Alternative 2 (LILO)	Least Preferred	- Least preferred technical solution for the primary reason that this is an existing powerline that services an existing generator (50 MW Khi CSP plant) as well as load customers in the area. - Can only be considered whether viable at preferred bidder stage. - The risk of disruptions along this powerline therefore compels the Applicant to consider the preferred solution of a double circuit 132 kV powerline from the Geel Kop collector switching station to the Upington MTS.

As can be seen in the table above, the Geel Kop collector switching station and updated alternative 1 (direct connection to Upington MTS) are preferred.

2.10 PROJECT PROGRAMME AND TIMELINES

As mentioned previously, the Geel Kop PV projects along with their associated infrastructure intend to be bid into the RMIPPPP or future REIPPPP. The programme has definite and stringent timelines that the project needs to meet. Note that the DoE has not yet released the exact dates of the bidding schedules, so the implementation schedule below is based on the best available information we have at this time and is subject to change.

Table 4: Preliminary implementation schedule if successful under RMIPPPP

	Description	Timeline
1	Expected RMIPPPP submission date	Last Quarter 2020
2	Preferred bidders selected	First Quarter 2021
3	Finalisation of agreements	Second Quarter 2021
4	Procurement of infrastructure	Last 2021
5	Construction	First Quarter 2022
6	Commissioning	Last Quarter 2022

Table 5: Preliminary implementation schedule if successful under REIPPPP

	Description	**Timeline**
1	Expected REIPPPP submission date (5th round)	Second Quarter of 2021
2	Preferred bidders selected	Fourth Quarter 2021
3	Finalisation of agreements	Second Quarter 2022
4	Procurement of infrastructure	First Quarter 2023
5	Construction	2023 - 2024
6	Commissioning	2024

The table above clearly depicts the dependence of the project on the RMIPPPP and REIPPPP's timelines. Any delay or acceleration within the REIPPPP will have a corresponding effect on the timelines of the projects. .

NOTE: The Geel Kop PV projects, including the Geel Kop Grid Connection Infrastructure intend submitting their bids during the RMIPPPP, the REIPPPP's 5th bidding window or thereafter if unsuccessful in immediate bidding rounds.

NOTE: Due to the uncertainty relating to timeframes associated with these programmes, it is requested that the EA in respect of this proposed activity be granted for the full 10-year period allowable in terms of these regulations.

3. 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.

3.1 NATIONAL LEGISLATION

This section deals with nationally promulgated or nationally applicable legislation associated with the proposed Geel Kop Grid Connection Infrastructure.

3.1.1 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 measures are applied to protect the environment. This includes preventing pollution and promoting conservation and environmentally sustainable development, while promoting justifiable social and economic development.

The Constitution and Bill of Rights provides that:

Everyone has the right:

- to an environment that is not harmful to their health or well-being; and
- to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures:
    - prevent pollution and ecological degradation
    - promote conservation; and
    - secure ecologically sustainable development and the use of natural resources while promoting justifiable economic and social development.

NEMA (discussed below) is the enabling legislation to ensure this primary right is achieved.

3.1.2 National Environmental Management Act (NEMA)

The current assessment is being undertaken in terms of the **National Environmental Management Act** (NEMA, Act 107 of 1998)[20]. 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 (in this case, a Basic Assessment Process).

The project triggers activities listed in both listing notices 1 and 3 and as such require the undertaking of a Basic Assessment Process. Such a process must be conducted by an independent EAP. Cape EAPrac has been appointed to undertake this process. The figure below depicts a summary of the Basic Assessment process.

[20] 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 (as amended in April 2017). These regulations came into effect on 08 December 2014 (amended on 07 April 2017) and replace the EIA regulations promulgated in 2006 and 2010.

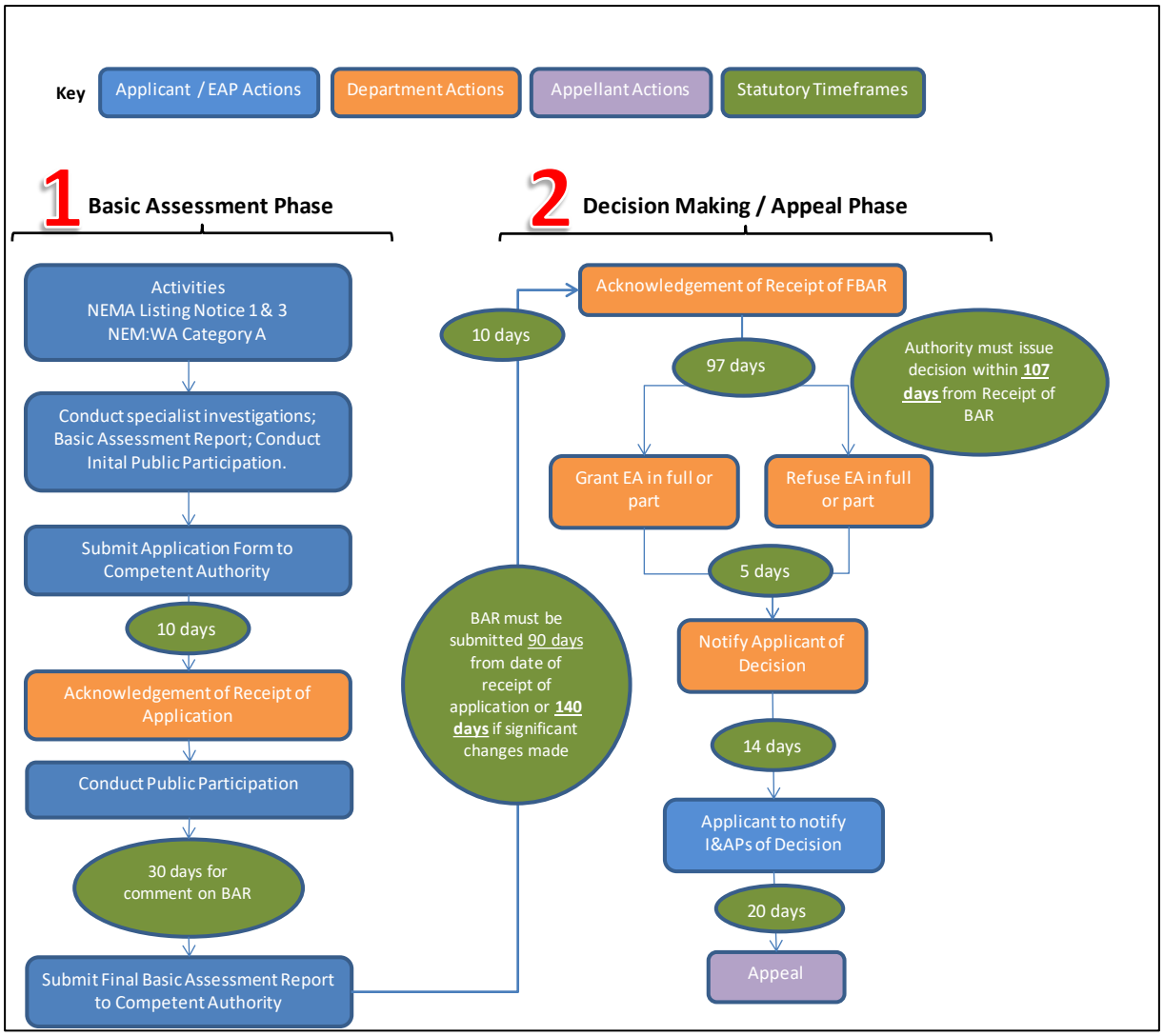


Figure 19: Summary of Basic Assessment Process in terms of the 2014 Regulations (as amended).

The listed activities associated with the proposed development, as stipulation under 2014 Regulations **327, 325 and 324** are as follows:

Table 6: NEMA 2014 (As amended in April 2017) listed activities applicable to the Geel Kop Grid Connection Infrastructure.

Activity No(s):	Basic Assessment Activity(ies) as set out in Listing Notice 1 (GN R983)	Description
11	The development of facilities or infrastructure for the transmission and distribution of electricity— (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts;	Construction of the 3 x switching stations and a collector switching station with a maximum capacity of 132 kilovolts and the construction of overhead powerlines with a maximum capacity of 132 kilovolts.
12	The development of— (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse; (c) if no development setback line exists, within 32m of a watercourse measured from the edge of a watercourse	Construction of powerline infrastructure straddling the ephemeral washes and watercourses.

19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;	Construction of powerline infrastructure straddling the ephemeral washes and watercourses.
27	The clearance of an area of 1 hectares or more , but less than 20 hectares.	The construction of the switching stations, the collector switching station and the temporary laydown areas will require the clearance of more than 1ha.
28	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: ((ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;	The switching stations and collector switching station are considered to be industrial use and the development footprint of these substations will exceed 1ha.
Activity No(s):	**Basic Assessment Activity(ies) as set out in Listing Notice 3 (GN R985)**	**Description**
4	The development of a road wider than 4 metres with a reserve less than 13 metres. g. Northern Cape iii. Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;	At the pylon positions, the construction access road will exceed 4m in width. These will however be rehabilitated to a single jeep track on completion of construction.
12	The clearance of an area of 300 square metres or more of indigenous vegetation. g. Northern Cape i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; ii. Within critical biodiversity areas identified in bioregional plans;	Portions of the powerline corridor and the collector switching station and jeep track fall within a Critical Biodiversity Area (CBA2) and clearance of vegetation for the establishment of this powerline substation / switching station will exceed 300 square metres.
14	The development of— (ii) infrastructure or structures with a physical footprint of 10 square metres or more. g. Northern Cape ii. Outside urban areas: (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;	Portions of the powerline corridor, the collector switching station and jeep track fall within a Critical Biodiversity Area (CBA2) and infrastructure installed for these will exceed 10 square metres.
18	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre. g. Northern Cape ii. Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ii) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland; or	Portions of the powerline fall within a CBA2 and within 100m of the watercourses along the alignment. Some of the existing access roads used to access the powerline corridor may need to be widened by more than 4m.

Table 7: Activities applied for and their applicability to the components in the project description.

Activity No(s):	Basic Assessment Activity(ies) as set out in Listing Notice 1 (GN R983)	Applicable Aspects of Project Description
11	The development of facilities or infrastructure for the transmission and distribution of electricity— (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts;	- Collector switching station; - Facility switching stations - Overhead powerlines up to 132KV
12	The development of— (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse;	- Powerline infrastructure.
19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;	- Powerline infrastructure and maintenance track.
27	The clearance of an area of 1 hectares or more , but less than 20 hectares.	- Facility switching Stations - Collector switching station; - Temporary laydown areas
28	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: ((ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;	- Collector switching station; - Facility switching stations
Activity No(s):	**Basic Assessment Activity(ies) as set out in Listing Notice 3 (GN R985)**	**Description**
4	The development of a road wider than 4 metres with a reserve less than 13 metres. g. Northern Cape iii. Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;	- Maintenance Track
12	The clearance of an area of 300 square metres or more of indigenous vegetation. g. Northern Cape i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; ii. Within critical biodiversity areas identified in bioregional plans;	- Pylon positions; - Access Tracks - Bushmanland PV collector switching station
14	The development of— (ii) infrastructure or structures with a physical footprint of 10 square metres or more. g. Northern Cape ii. Outside urban areas: (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;	- Access Track; - Powerline infrastructure - Bushmanland PV collector switching station
18	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre. g. Northern Cape ii. Outside urban areas:	- Access track; - Maintenance Track.

Activity No(s):	Basic Assessment Activity(ies) as set out in Listing Notice 1 (GN R983)	Applicable Aspects of Project Description
	(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ii) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland; or	

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

3.1.3 National Environmental Management: Biodiversity (Act 10 of 2004)

The National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA) provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), vulnerable (VU) or protected. The Draft National List of Threatened Ecosystems (Notice 1477 of 2009, Government Gazette No 32689, 6 November 2009) has been gazetted for public comment.

The list of threatened terrestrial ecosystems supersedes the information regarding terrestrial ecosystem status in the NSBA 2004. In terms of the EIA regulations, a basic assessment report is required for the transformation or removal of indigenous vegetation in a critically endangered or endangered ecosystem regardless of the extent of transformation that will occur. **However, the vegetation types on the preferred and alternative grid connection corridor alignments and substation positions are Least Threatened.**

NEMBA also deals with endangered, threatened and otherwise controlled species. The Act provides for listing of species as threatened or protected, under one of the following categories:

- **Critically Endangered**: any indigenous species facing an extremely high risk of extinction in the wild in the immediate future.
- **Endangered**: any indigenous species facing a high risk of extinction in the wild soon, although it is not a critically endangered species.
- **Vulnerable**: any indigenous species facing an extremely high risk of extinction in the wild in the medium-term future; although it is not a critically endangered species or an endangered species.
- **Protected species**: any species which is of such high conservation value or national importance that it requires national protection. Species listed in this category include, among others, species listed in terms of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Certain activities, known as Restricted Activities, are regulated by a set of permit regulations published under the Act. These activities may not proceed without environmental authorisation.

The study area is in the Kalahari Karroid Shrubland (Least threatened), Bushmanland Arid Grassland (Least threatened) and Gordonia Duneveld (Least Threatened) vegetation types. The study area is not located in a threatened ecosystem the Lower Gariep Alluvial Vegetation threatened ecosystem is located south of the study area.

Kalahari Karroid Shrubland vegetation type is endemic to the Northern Cape Province. The vegetation type is characteristic of forming belts alternating with belts of Gordonia Duneveld on plains northwest of Upington through Lutzputs and Noenieput to the Rietfontein/Mier area in the north. Other patches occur around Kakamas and north of Groblershoop. The unit is also found in the neighbouring Namibia. The vegetation can be described as low karroid shrubland on flat, gravel plains. Karoo-related and northern floristic elements such as shrubs meet here, indicating a transition to the Kalahari region and sandy soils. Altitude varies mostly from 700 - 1100 m.

The conservation target is set at 21% with very little statutorily conserved in the Augrabies Falls National Park. Although only a small area has been transformed many of the belts of this type were preferred routes for early roads, thus promoting the introduction of alien plants (about a quarter of the unit has scattered *Prosopis* species). Erosion is very low (94%) (Mucina & Rutherford, 2010).

The Bushmanland Arid Grassland vegetation type occurs only in the Northern Cape Province. It spans about one degree of latitude from around Aggeneys in the west to Prieska in the east. The southern border of the unit is formed by edges of the Bushmanland Basin while in the northwest this vegetation unit borders on desert vegetation (northwest of Aggeneys and Pofadder). The northern border (near Upington) and the eastern border (between Upington and Prieska) are formed with often intermingling units of Lower Gariep Broken Veld, Kalahari Karroid Shrubland and Gordonia Duneveld. Most of the western border is formed by the edge of the Namaqualand hills. Altitude varies mostly from 600–1 200 m. The conservation target is set at 21% with only small patches statutorily conserved in Augrabies Falls National Park and Goegab Nature Reserve. Very little of the area has been transformed. Erosion is very low (60%) and low (33%) (Mucina & Rutherford, 2010).

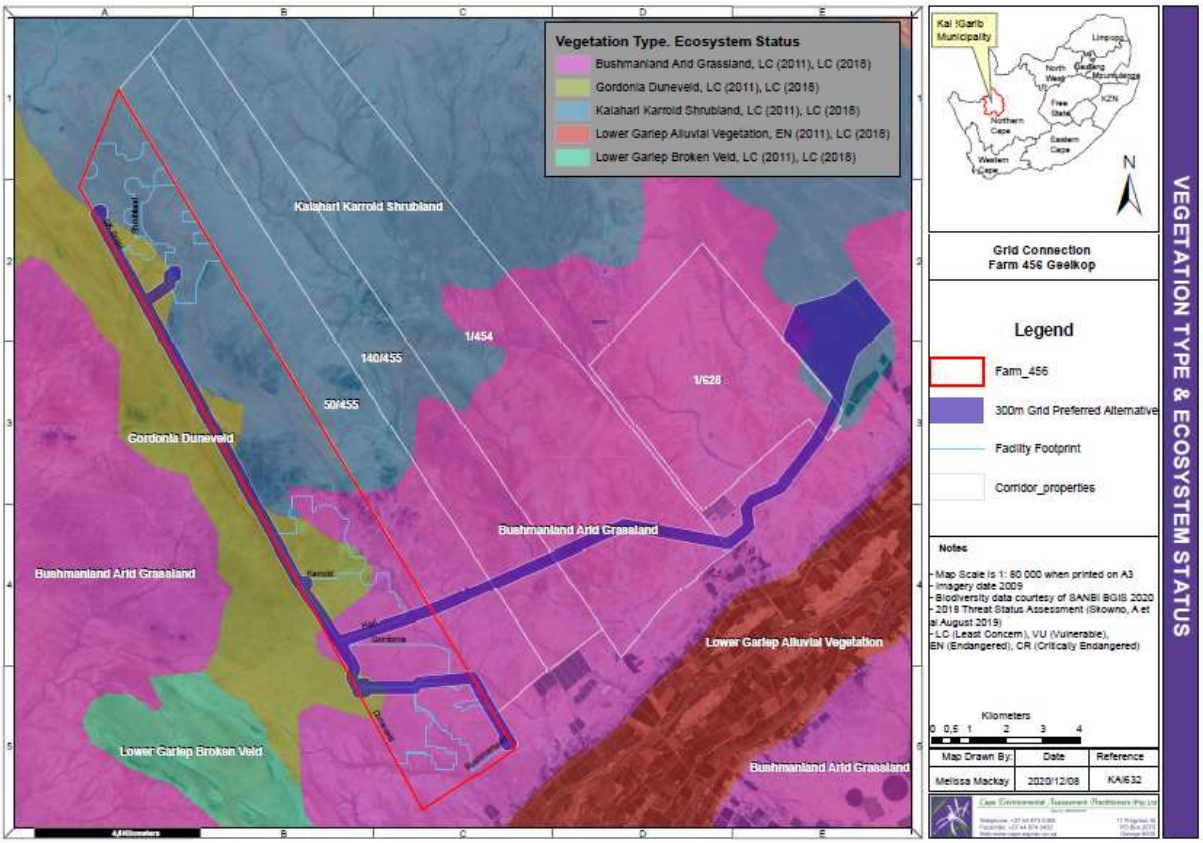


Figure 20: The study area for the Geel Kop Grid Connection Infrastructure in relation to threatened ecosystems, namely the lower Gariep Alluvial Vegetation (Red Polygon) to the south of the study site.

3.1.4 Conservation of Agricultural Resources Act – CARA (Act 43 of 1983):

The Conservation of Agricultural Resources Act (CARA) provides for the regulation of control over the utilisation of the natural agricultural resources to promote the conservation of soil, water and vegetation and provides for combating weeds and invader plant species. CARA 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 flood lines of water courses and wetlands.

The abundance of alien plant species in the study area assessed for the Geel Kop Grid Connection Infrastructure is very low, which can be ascribed mainly to the aridity of the study area.

The Department of Agriculture, Land Reform and Rural Development is guided by Act 43 of 1983.

To comply with their mandate in terms of this legislation, the applicant is required to take note of the following:

Article 7. (3)b of Regulation 9238: CONSERVATION OF AGRICULTURE RESOURCES, 1983 (Act 43 of 1983)

Utilisation and protection of vleis, marshes, water sponges and water courses

- 7.(1) “no land user shall utilize the vegetation in a vlei, marsh or water sponge or within the flood area of a water course or within 10 meters horizontally outside such flood area in a manner that causes or may cause the deterioration of or damage to the natural agriculture resources.”
- (3)(b) “cultivate any land on his farm unit within the flood area of a water course or within 10 meters horizontally outside the flood area of a water course”.

Kindly refer to the Freshwater Ecological Impact Assessment in Annexure E3 for a discussion of potential impacts on the freshwater resources in the study area.

3.1.5 The Subdivision of Agricultural Land, Act 70 Of 1970

The Subdivision of Agricultural Land Act 70 of 1970 (SALA”) came into operation on 2 January 1971. The Department of Agriculture, Forestry and Fisheries (DAFF) administers the Subdivision of Agricultural Land Act No. 70 of 1970. Subdivision of agricultural land, therefore, requires DAFF’s consent.

DAFF is considered a commenting authority on this environmental process, but will be a decision-making authority on the SALA application which will take place after the project receives an EA.

3.1.6 National Water Act, No 36 of 1998

Section 21c & i of the National Water Act (NWA) requires the Applicant to apply for authorisation from the Department of Water and Sanitation for an activity in, or in proximity to any watercourse. Such an application would be required for any access road or PV infrastructure that crosses any watercourse.

Section 21(a) of the National Water Act is related to the abstraction of water from a water resource (including abstraction of groundwater); a Water Use Licence (WUL) would be required for such abstraction. Please refer to Appendix E3 for a descriptions of the surface water resources in vicinity to the Grid Connection Infrastructure. It is important to note that no pylons are proposed within any of these resources (the proposed powerline will straddle the identified ephemeral washes and water courses.

Water required for the construction of the Geel Kop Grid Connection Infrastructure (this activity will not utilize water during operation) is to be sourced from the Kai !Garib Local Municipality. Should the applicant in the future, wish to utilise groundwater for the purposes of construction the facility, such use will require a licence in terms of Section 21(a) of the NWA.

The Department of Water and Sanitation have been registered as a key stakeholder in this environmental process.

3.1.7 National Forests Act (No. 84 of 1998):

The National Forests Act (NFA) 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".*

The ecological specialist, Dr David Hoare, identified the following species within the study area assessed for the Geel Kop Grid Connection Infrastructure, which are protected in terms of the National Forest Act.

Table 8: Species present in the study area that are protected in terms of the National Forest Act.

Species	Common Name	SANBI National Red List[21]
Boscia albitrunca	Shepherd's tree	Least Concern
Vachellia erioloba	Camel thorn	Least Concern

Notwithstanding, the significance associated with the removal of protected trees for the proposed development, the applicant will be required to apply in terms of the NFA for a license to remove individuals of these two species.

The Department of Agriculture, Forestry and Fisheries (DAFF) have been registered as a key stakeholder in this environmental process and have been requested to provide comment in this regard.

3.1.8 National Heritage Resources Act, 25 of 1998

The protection and management of South Africa's heritage resources are controlled by the National Heritage Resources Act (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 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 a BA 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, powerline, 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; and
- the re-zoning of a site exceeding 10 000m^2 in extent.

Furthermore, 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.

- In terms of Section 36 (3), no person may 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.

[21] http://redlist.sanbi.org/

- 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.

Mr Jaco van der Walt of HCAC heritage consultants, has undertaken a heritage impact assessment for the proposed Geel Kop Grid Infrastructure.

The application in terms of Section 38 of the National Heritage Act will be lodged with SAHRA via their SAHRIS system. Proof of submission of the SAHRA application will be attached in the Final Basic Assessment Report.

3.1.9 National Energy Act (No. 34 of 2008)

The purpose of the National Energy Act (No. 34 of 2008) is to ensure that diverse energy resources are available, in sustainable quantities and at affordable prices, to the South African economy in support of economic growth and poverty alleviation; while taking environmental management requirements into account. In addition, the Act also provides for energy planning, and increased generation and consumption of Renewable Energies.

The objectives of the Act are to amongst other things, to:

- Ensure uninterrupted supply of energy to the Republic.
- Promote diversity of supply of energy and its sources.
- Facilitate energy access for improvement of the quality of life of the people of the Republic.
- Contribute to the sustainable development of South Africa's economy.

The National Energy Act therefore recognises the significant role which electricity plays growing the economy while improving citizens' quality of life. The Act provides the legal framework which supports the development of Renewable Energy facilities for the greater environmental and social good and provides the backdrop against which South Africa's strategic planning regarding future electricity provision and supply takes place.

3.2 PROVINCIAL LEGISLATION

This section deals with provincially promulgated or provincially applicable legislation associated with the proposed Geel Kop Grid Infrastructure.

3.2.1 Northern Cape Nature Conservation 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.

It is recommended that the perimeter fencing around the solar development site will be constructed in a manner which allows for the passage of small and medium sized mammals: The biodiversity specialist has made recommendations in terms of appropriate fencing.

The ecology specialist identified the following species protected in terms of this Act.

Table 9: Species identified on-site that are protected in terms of the Northern Cape Nature Conservation Act.

Species	Common Name	SANBI National Red List[22]
Aloe claviflora	Aanteelaalwyn	Least Concern
Anacampseros albissima		Least Concern
Boscia albitrunca	Shepherd's tree	Least Concern
Boscia foetida		Least Concern
Hoodia gordonii	Bitterghaap, Bobbejaanghaap	Least Concern
Vachellia erioloba	Camel thorn	Least Concern

Please also refer to the Ecological Impact Report attached in Annexure E1 for further information on protected species present within the study area assessed for the Geel Kop Grid Connection Infrastructure.

3.2.2 Nature and Environmental Conservation Ordinance, No 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 as per the Northern Cape Nature Conservation Act as described above.

3.2.3 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 must be protected.

Chapter 2 of the act allows for the declaration of astronomy advantage areas whilst Chapter 3 pertains to the management and control of astronomy advantage areas. Management and control of astronomy advantage areas include, amongst others, the following:

- Restrictions on use of radio frequency spectrum in astronomy advantage areas;
- Declared activities in core or central astronomy advantage area;
- Identified activities in coordinated astronomy advantage area; and
- Authorisation to undertake identified activities.

The South African SKA Project Office and SARAO have been registered as a key stakeholder on this environmental process and have been requested to provide input in terms of the Astronomy Geographic Advantage Act and potential impact to SKA. SARAO provided comment on the 7 parent projects and have confirmed that the projects pose a medium - low risk to SKA, due to the distance from the nearest SKA station.

3.2.4 Northern Cape Provincial Spatial Development Framework (PSDF) 2012

The Northern Cape Provincial Spatial Development Framework (PSDF) 2012 states that the overarching goal for the Province is to enable sustainability through sustainable development. The Province

[22] http://redlist.sanbi.org/

considers social and economic development as imperative to address the most significant challenge facing the Northern Cape, which is poverty.

The PSDF considers the release of greenhouse gas (GHG) emissions created by human activity as the key cause of global warming, which in turn could result in major negative effects and disasters in the short- and medium-term. This effect would increasingly undermine human development gains. Innovative strategies would have to be implemented to reduce the impact of global deterioration.

The PSDF identifies key sectoral strategies and plans which are the key components of the PSDF. Sectoral Strategy 19 refers to a provincial renewable energy strategy. Within the PSDF a policy has been included which states that renewable energy sources (including the utilisation of solar energy) are to comprise 25% of the Province's energy generation capacity by 2020.

The overall energy objective for the Province also includes promoting the development of renewable energy supply schemes which are strategically important for increasing the diversity of domestic energy supply and avoiding energy imports, while also minimising the detrimental environmental impacts. The implementation of sustainable renewable energy is also to be promoted within the Province through appropriate financial and fiscal instruments.

Considering the need for the development of renewable energy facilities to achieve the objective of sustainability the development of the proposed grid infrastructure within the Northern Cape and within the study area is aligned with the Northern Cape PSDF.

3.2.5 Northern Cape Province Provincial Growth and Development Strategy

The Northern Cape Provincial Growth and Development Strategy (NCPGDS) identifies poverty reduction as the most significant challenge facing the government and its partners. All other societal challenges that the province faces emanate predominantly from the effects of poverty. The NCPGDS notes that the only effective way to reduce poverty is through long-term sustainable economic growth and development. The sectors where economic growth and development can be promoted include:

- Agriculture and Agro-processing;
- Fishing and Mariculture;
- Mining and mineral processing;
- Transport;
- Manufacturing;
- Tourism.

However, the NCPGDS also notes that economic development in these sectors also requires:

- Creating opportunities for lifelong learning;
- Improving the skills of the labour force to increase productivity;
- Increasing accessibility to knowledge and information.

The achievement of these primary development objectives depends on the achievement of several related objectives that, at a macro-level, describe necessary conditions for growth and development. These are:

- Developing requisite levels of human and social capital;
- Improving the efficiency and effectiveness of governance and other development institutions;
- Enhancing infrastructure for economic growth and social development.

Of specific relevance to this BAR and more specifically, the SIA is that the NCPGDS refer to the need to ensure the availability of inexpensive energy. The section notes that to promote economic growth in the Northern Cape the availability of electricity to key industrial users at critical localities at rates that enhance the competitiveness of their industries must be ensured. At the same time, the development of new sources of energy through the promotion of the adoption of energy applications that display a

synergy with the province's natural resource endowments must be encouraged. In this regard the NCPGDS notes "the development of energy sources such as solar energy, the natural gas fields, bio-fuels, etc., could be some of the means by which new economic opportunity and activity is generated in the Northern Cape". The NCPGDS also highlights the importance of close co-operation between the public and private sectors for the economic development potential of the Northern Cape to be realised.

The NCPGDS also highlights the importance of enterprise development and notes that the current levels of private sector development and investment in the Northern Cape are low. In addition, the province also lags in the key policy priority areas of SMME Development and Black Economic Empowerment. The proposed solar energy facility therefore has the potential to create opportunities to promote private sector investment and the development of SMMEs in the Northern Cape Province.

In this regard care will need to be taken to ensure that the proposed STPs and other renewable energy facilities do not negatively impact on the region's natural environment. In this regard the NCPGDS notes that the sustainable utilisation of the natural resource base on which agriculture depends is critical in the Northern Cape with its fragile eco-systems and vulnerability to climatic variation. The document also indicates that due to the provinces exceptional natural and cultural attributes, it has the potential to become the preferred adventure and ecotourism destination in South Africa. Care therefore needs to be taken to ensure that the development of large renewable energy projects, such as the proposed solar energy facility, do not affect the tourism potential of the province.

3.2.6 Northern Cape Climate Change Response Strategy

The key aspects of the PCCRS Report are summarised in the MEC's (NCPG: Environment and Nature Conservation) 2011 budget speech: "The Provincial Climate Change Response Strategy will be underpinned by specific critical sector climate change adaptation and mitigation strategies that include the water, agriculture and human health sectors as the 3 key adaptation sectors, the industry and transport alongside the energy sector as the 3 key mitigation sectors with the disaster management, natural resources and Human society, livelihoods and services sectors as 3 remaining key sectors to ensure proactive long term responses to the frequency and intensity of extreme weather events such as flooding and wild fire, with heightened requirements for effective disaster management".

Key points from MEC's address include the NCPG's commitment to develop and implement policy in accord with the National Green Paper for the National Climate Change Response Strategy (2010), and an acknowledgement of the NCP's extreme vulnerability to climate-change driven desertification. The development and promotion of a provincial green economy, including green jobs, and environmental learnership is indented as an important provincial intervention in addressing climate change. The renewable energy sector, including solar and wind energy (but also biofuels and energy from waste), is explicitly indicated as an important element of the Provincial Climate Change Response Strategy. The MEC also indicated that the NCP was involved in the processing several wind and solar energy facility EIA applications.

3.3 REGIONAL AND MUNICIPAL LEGISLATION

This section deals with regionally and municipally promulgated or regionally or municipally applicable legislation associated with the proposed Geel Kop Grid Infrastructure [23].

3.3.1 ZF Mgcawu District Municipality Integrated Development Plan

The vision set out in the ZFMDM is "Quality support to deliver quality services". The mission is a "Centre of excellence in providing quality basic services through support to local municipalities".

[23] This section includes legislation applicable to both the District (Category C) and Local (Category B) municipalities.

In terms of the National Spatial Development Perspective, The ZF Mgcawu District area has been classified as a “medium” importance area which means that no significant investment is concentrated in the region. In terms of the National Spatial Development Perspective, The ZF Mgcawu District area has been classified as a “medium” importance area which means that no significant investment is concentrated in the region.

The IDP lists several strategic objectives and development objectives. The relevant objectives include:

Strategic objective
To Facilitate the Development of Sustainable regional land use, economic, spatial and environmental planning frameworks that will support and guide the development of a diversified, resilient and sustainable district economy. The associated development objective is to:

- Establish a vehicle to ensure all businesses are co-operating (i.e. District LED Forum);
- Create investment opportunities in sectoral development (i.e. investment activities; Entrepreneurial business support programme);
- Enable an environment for business establishment and support initiatives (i.e. Increase the number of businesses; entrepreneurial support)

Strategic objective
To market, develop and co-ordinate tourism in the ZFMDM. The associated development objective is to:

- Promote the Green Kalahari tourism brand in the ZF Mgcawu district

The IDP identifies several key challenges. The following are relevant to the proposed development:

- High rate of unemployment;
- Inadequate human capital;
- Youth development;
- Access to health care facilities.

In terms of the Kai !Garib Municipality, the priority issues include:

- Lack of Basic Services;
- Lack of proper housing / existing informal settlements/ Lack of Land Ownership;
- Poverty & unemployment, lack of youth development and social issues contributing thereto (Local Economic Development) / Lack of farming land/ commonage;
- Lack of sport and recreational facilities and services;
- Lack of sufficient and proper health services (HIV/AIDS).

The IDP also notes that the ZF Mgcawu District Municipality acknowledges that climate change poses a threat to the environment, its residents, and future development. Actions are required to reduce carbon emissions (mitigation) and prepare for the changes that are projected to take place (adaptation) in the District. ZF Mgcawu District Municipality has therefore prioritised the development of a Climate Change Vulnerability Assessment and Climate Change Response Plan.

3.3.2 Kai !Garib Local Municipality Integrated Development Plan

The vision for the Kai !Garib LM is “Creating an economically viable and fully developed municipality, which enhances the standard of living of all the inhabitants / community of Kai !Garib through good governance, excellent service delivery and sustainable development.” The mission is the “Provision of transparent, accountable and sustainable service delivery”.

The IDP notes that that the activities of the KGLM are guided by several values, of which the following are relevant to the proposed development:

- Transparency in planning and management;

- Proper understanding of the needs of communities;
- The implementation of a development orientated approach to Local Government;
- Building capacity among the staff and Community wherever possible to enable them to play an effective role in Local Government.

The IDP is aligned with the National Government identified Key Performance Areas (KPA's) which are:

- KPA 1: Service Delivery and Infrastructure Development;
- KPA 2: Local Economic Development;
- KPA 3: Municipal Financial Viability and Management;
- KPA 4: Institutional Development and Transformation;
- KPA 5: Public Participation and Good Governance.

KPA 2, Local Economic Development, is the most relevance KPA for the proposed development.

3.4 GUIDELINES, POLICIES AND AUTHORITATIVE REPORTS

This section includes relevant Guidelines, Policies and Authoritative reports applicable to the proposed Geel Kop Grid Infrastructure.

3.4.1 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 identifies 42 focus areas for land-based protected area expansion in South Africa. These are large intact and un-fragmented areas suitable for the creation or expansion of large protected areas. The closest focus area is the Eastern Kalahari Bushveld Focus Area; the proposed Geel Kop Grid Connection Infrastructure will not affect this or any other NPAES focus area as it is situated considerable distance from the Eastern Kalahari Bushveld Focus Area.

3.4.2 Critical Biodiversity Areas

A Critical Biodiversity Areas (CBA) Map is a spatial plan for ecological sustainability. It identifies a set of biodiversity priority areas, called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), which, together with protected areas, are important for the persistence of a viable representative sample of all ecosystem types and species as well as the long-term ecological functioning of the landscape.

CBA Maps can be given formal legal status through the National Environmental Management: Biodiversity Act (Act 10 of 2004).

The Northern Cape Critical Biodiversity Area (CBA) Map updates, revises and replaces all older systematic biodiversity plans and associated products for the province.

According to the CBA Map, the Geel Kop Grid Connection Infrastructure is mostly located in the category "Other Natural Areas" with a section of the Powerline route and the Bushmanland PV substation / switching station falling in a Type 2 CBA.

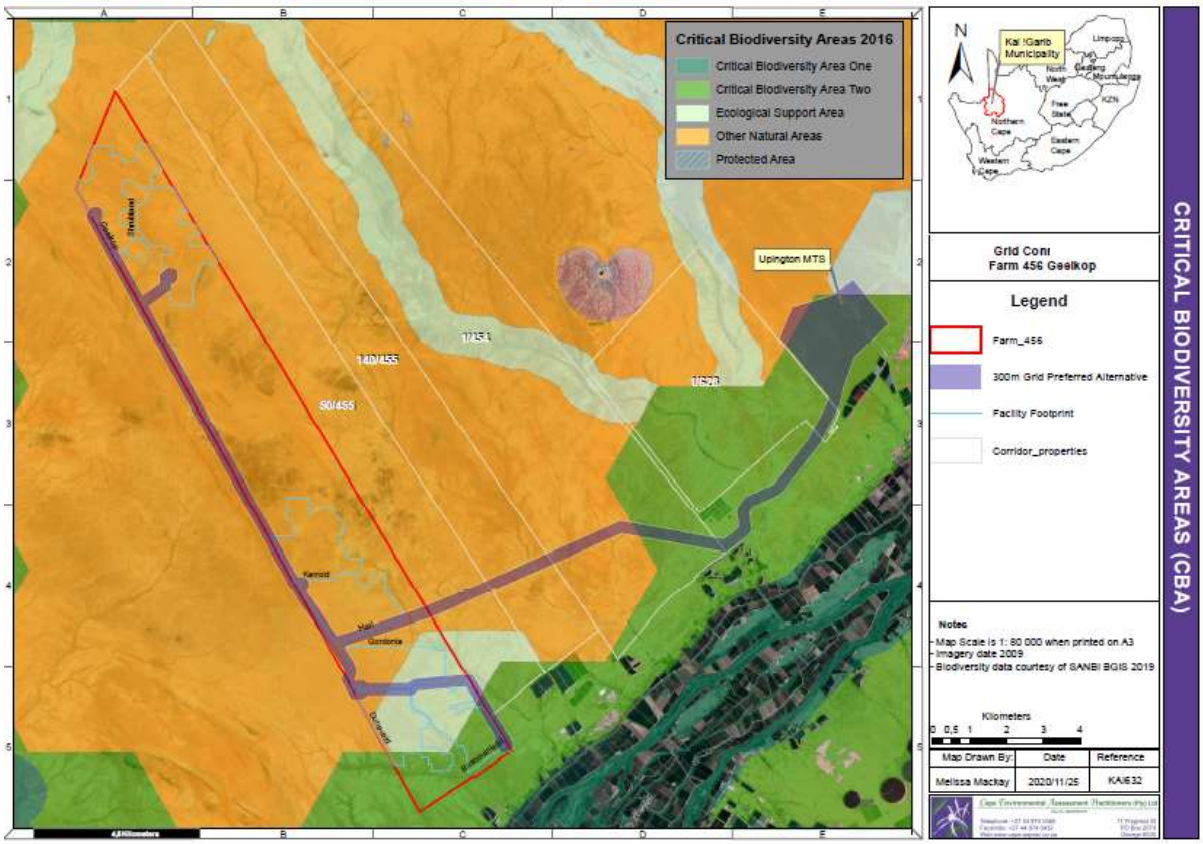


Figure 21: The study area for the Geel Kop Grid Connection Infrastructure in relation to the Northern Cape Critical Biodiversity Areas (2016).

3.4.3 White Paper on the Renewable Energy Policy of the Republic of South Africa (2003)

The White Paper on Renewable Energy Policy of 2003 supplements Government's predominant policy on energy as set out in the White Paper on the Energy Policy of the Republic of South Africa (DME, 1998). The policy recognises the potential of RE and aims to create the necessary conditions for the development and commercial implementation of RE technologies. The position of the White Paper on RE Policy is based on the integrated resource planning criterion of:

"Ensuring that an equitable level of national resources is invested in renewable technologies, given their potential and compared to investments in other energy supply options."

The White Paper on Renewable Energy Policy sets out Government's vision, policy principles, strategic goals and objectives for promoting and implementing Renewable Energy in South Africa. The country relies heavily on coal to meet its energy needs due to its abundant, and fairly accessible and affordable coal resources. However, massive RE resources that can be sustainable alternatives to fossil fuels, have so far remained largely untapped. The White Paper on Renewable Energy Policy fosters the uptake of Renewable Energy in the economy and has several objectives that include ensuring equitable resources are invested in renewable technologies; directing public resources for implementation of Renewable Energy technologies; introducing suitable fiscal incentives for Renewable Energy and; creating an investment climate for the development of the RE sector.

The White Paper on Renewable Energy Policy set a target of 10 000GWh to be generated from RE by 2013 to be produced mainly from biomass, wind, solar and small-scale hydro. The target was subsequently reviewed in 2009 during the RE summit of 2009. The objectives of the White Paper on Renewable Energy Policy are considered in six focal areas, namely; financial instruments, legal instruments, technology development, awareness raising, capacity building and education, and market

based and regulatory instruments. The policy supports the investment in Renewable Energy facilities as they contribute towards ensuring energy security through the diversification of energy supply, reducing GHG emissions and the promotion of Renewable Energy sources.

3.4.4 White Paper on the Energy Policy of the Republic of South Africa (1998)

The White Paper on Energy Policy places emphasis on the expansion of energy supply options to enhance South Africa's energy security. This can be achieved through increased use of renewable energy and encouraging new entries into the generation market. South Africa has an attractive range of cost-effective renewable resources, taking into consideration social and environmental costs. Government policy on renewable energy is thus concerned with meeting the following challenges:

- Ensuring that economically feasible technologies and applications are implemented.
- Ensuring that an equitable level of national resources is invested in renewable technologies, given their potential and compared to investments in other energy supply options.
- Addressing constraints on the development of the renewable industry.

The policy states that the advantages of Renewable Energy include; minimal environmental impacts during operation in comparison with traditional supply technologies, generally lower running costs, and high labour intensities. Disadvantages include; higher capital costs in some cases; lower energy densities; and lower levels of availability, depending on specific conditions, especially with sun and wind-based systems. Nonetheless, renewable resources generally operate from an unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future. The White Paper on Energy Policy therefore supports the advancement of Renewable Energy sources and ensuring energy security through the diversification of supply.

3.4.5 Integrated Energy Plan (IEP), 2016

The development of a National Integrated Energy Plan (IEP) was envisaged in the White Paper on the Energy Policy of the Republic of South Africa of 1998 and, in terms of the National Energy Act, 2008 (Act No. 34 of 2008), the Minister of Energy is mandated to develop and, on an annual basis, review and publish the IEP in the Government Gazette. The purpose of the IEP is to provide a roadmap of the future energy landscape for South Africa which guides future energy infrastructure investments and policy development.

The IEP notes that South Africa needs to grow its energy supply to support economi**c** expansion and in so doing, alleviate supply bottlenecks and supply-demand deficits. In addition, it is essential that all citizens are provided with clean and modern forms of energy at an affordable price. As part of the Integrated Energy Planning process, eight key objectives were identified, namely:

- Objective 1: Ensure security of supply;
- Objective 2: Minimise the cost of energy;
- Objective 3: Promote the creation of jobs and localisation;
- Objective 4: Minimise negative environmental impacts from the energy sector;
- Objective 5: Promote the conservation of water;
- Objective 6: Diversify supply sources and primary sources of energy;
- Objective 7: Promote energy efficiency in the economy; and
- Objective 8: Increase access to modern energy.

The IEP provides an assessment of current energy consumption trends within different sectors of the economy (i.e. agriculture, commerce, industry, residential and transport) and uses this information to identify future energy requirements, based on different scenarios. The scenarios are informed by different assumptions on economic development and the structure of the economy and consider the impact of key policies such as environmental policies, energy efficiency policies, transport policies and industrial policies, amongst others.

Based on this information the IEP then determines the optimal mix of energy sources and technologies to meet those energy needs in the most cost-effective manner for each of the scenarios. The associated environmental impacts, socio-economic benefits and macroeconomic impacts are also analysed. The IEP is therefore focused on determining the long-term energy pathway for South Africa, considering a multitude of factors which are embedded in the eight objectives.

As part of the analysis four key scenarios were developed, namely the Base Case, Environmental Awareness, Resource Constrained and Green Shoots scenarios:

- The Base Case Scenario assumes that existing policies are implemented and will continue to shape the energy sector landscape going forward. It assumes moderate economic growth in the medium to long term;
- The Environmental Awareness Scenario is characterised by more stringent emission limits and a more environmentally aware society, where a higher cost is placed on externalities caused by the supply of energy;
- The Resource Constrained Scenario in which global energy commodity prices (i.e. coal, crude oil and natural gas) are high due to limited supply;
- The Green Shoots Scenario describes an economy in which the targets for high economic growth and structural changes to the economy, as set out in the National Development Plan (NDP), are met.

The IEP notes that South Africa should continue to pursue a diversified energy mix which reduces reliance on a single or a few primary energy sources. In terms of RE, the document refers to wind and solar energy. The document does however appear to support solar over wind noting that solar PV and CSP with storage present excellent opportunities to diversify the electricity mix, to produce distributed generation and to provide off-grid electricity. Solar technologies also present the greatest potential for job creation and localisation. Incentive programmes and special focused programmes to promote further development in the technology, as well as solar roll-out programmes should be pursued.

3.4.6 Integrated Resource Plan for Electricity (2010-2030)

The Integrated Resource Plan (IRP) for Electricity 2010 – 2030 is a subset of the IEP and constitutes South Africa's national electricity plan. The primary objective of the IRP is to determine the long-term electricity demand and detail how this demand should be met in terms of generating capacity, type, timing and cost. The IRP also serves as input to other planning functions, including amongst others, economic development and funding, and environmental and social policy formulation.

The current iteration of the IRP led to the Revised Balanced Scenario (RBS) that was published in October 2010. Following a round of public participation which was conducted in November / December 2010, several changes were made to the IRP model assumptions. The document outlines the proposed generation new-build fleet for South Africa for the period 2010 to 2030. This scenario was derived based on a cost-optimal solution for new-build options (considering the direct costs of new build power plants), which was then "balanced" in accordance with qualitative measures such as local job creation.

The Policy-Adjusted IRP reflects recent developments with respect to prices for renewables. In addition to all existing and committed power plants, the plan includes 9.6GW of nuclear; 6.25GW of coal; 17.8GW of renewables; and approximately 8.9GW of other generation sources such as hydro, and gas.

3.4.7 National Development Plan 2030 (2012)

The National Development Plan (NDP) 2030 is a plan prepared by the National Planning Commission in consultation with the South African public which is aimed at eliminating poverty and reducing inequality by 2030. The NDP aims to achieve this by drawing on the energies of its people, growing and inclusive economy, building capabilities, enhancing the capacity of the state and promoting leaderships and partnerships throughout society. While the achievement of the objectives of the NDP requires progress on a broad front, three priorities stand out, namely:

- Raising employment through faster economic growth.
- Improving the quality of education, skills development and innovation.
- Building the capability of the state to play a developmental, transformative role.

In terms of the Energy Sector's role in empowering South Africa, the NDP envisages that, by 2030, South Africa will have an energy sector that promotes:

- Economic growth and development through adequate investment in energy infrastructure. The sector should provide reliable and efficient energy service at competitive rates, while supporting economic growth through job creation.
- Social equity through expanded access to energy at affordable tariffs and through targeted, sustainable subsidies for needy households.
- Environmental sustainability through efforts to reduce pollution and mitigate the effects of climate change.

The NDP aims to provide a supportive environment for growth and development, while promoting a more labour-absorbing economy. The proposed project will assist in reducing carbon emissions targets and creating jobs in the local area as well as assist in creating a competitive infrastructure based on terms of energy contribution to the national grid.

3.4.8 The New Growth Path Framework

The aim of the New Economic Growth Path Framework is to enhance growth, employment creation and equity. Central to the New Growth Path is a massive investment in infrastructure as a critical driver of jobs across the economy. In this regard the framework identifies investments in five key areas namely: energy, transport, communication, water and housing.

The New Growth Path also identifies five other priority areas as part of the programme, through a series of partnerships between the State and the private sector. The Green Economy as one of the five priority areas to create jobs, including expansions in construction and the production of technologies for solar, wind and biofuels. In this regard clean manufacturing and environmental services are projected to create 300 000 jobs over the next decade.

3.4.9 National Infrastructure Plan

The South African Government adopted a National Infrastructure Plan in 2012. The aim of the plan is to transform the economic landscape while simultaneously creating significant numbers of new jobs and strengthen the delivery of basic services. The plan also supports the integration of African economies. In terms of the plan Government will invest R827 billion over the next three years to build new and upgrade existing infrastructure. The aim of the investments is to improve access by South Africans to healthcare facilities, schools, water, sanitation, housing and electrification. The plan also notes that investment in the construction of ports, roads, railway systems, electricity plants, hospitals, schools and dams will contribute to improved economic growth.

As part of the National Infrastructure Plan, Cabinet established the Presidential Infrastructure Coordinating Committee (PICC). The Committee identified and developed 18 Strategic Integrated Projects (SIPs). The SIPs cover social and economic infrastructure across all nine provinces (with an emphasis on lagging regions) and consist of:

- Five geographically-focussed SIPs;
- Three spatial SIPs;
- Three energy SIPs;
- Three social infrastructure SIPs;
- Two knowledge SIPs;
- One regional integration SIP;
- One water and sanitation SIP.

The three energy SIPs that are related to the Geel Kop Grid Connection Infrastructure are SIP 8, 9 and 10.

Table 10: Strategic Infrastructure Projects applicable to or associated with the Geel Kop Grid Connection Infrastructure

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 (IRP 2010); Support bio-fuel production facilities.
SIP 9: Electricity generation to support socio-economic development
Accelerate the construction of new electricity generation capacity in accordance with the IRP 2010 to meet the needs of the economy and address historical imbalances; Monitor implementation of major projects such as new power stations: Medupi, Kusile and Ingula.
SIP 10: Electricity transmission and distribution for all
Expand the transmission and distribution network to address historical imbalances, provide access to electricity for all and support economic development. Align the 10-year transmission plan, the services backlog, the national broadband roll-out and the freight rail line development to leverage off regulatory approvals, supply chain and project development capacity.

3.4.10 Strategic Environmental Assessment (SEA) for Wind and Solar PV energy in South Africa

The Strategic Environmental Assessment (SEA) for wind and solar PV energy in South Africa (CSIR, 2013) identified eight (8) Renewable Development Zones (REDZs). The REDZs identified areas where large scale renewable energy facilities can be developed in in a manner that limits significant negative impacts on the environment while yielding the highest possible socio-economic benefits to the country. The Geel Kop Grid Infrastructure site is located within the Upington REDZ and Strategic Powerline Corridor (Northern Corridor), which was formally gazetted in 2018. The area has therefore been identified as suitable for the establishment of renewable energy facilities, specifically large-scale solar farms and their associated Infrastructure.

3.4.11 Conservation of Migratory Species of Wild Animals

Conservation of Migratory Species of Wild Animals (also known as CMS or the Bonn Convention) is an intergovernmental treaty and is the most appropriate instrument to deal with the conservation of terrestrial, aquatic and avian migratory species. The convention includes policy and guidelines with regards to the impact associated with man-made infrastructure. CMS requires that parties (South Africa is a signatory) take measures to avoid migratory species from becoming endangered (Art II, par. 1 and 2) and to make every effort to prevent the adverse effects of activities and obstacles that seriously impede or prevent the migration of migratory species i.e. powerlines (Art 111, par. 4b and 4c).

An Avifaunal Specialist has been appointed to consider the impact of the proposed Geel Kop Grid Connection Infrastructure. Birdlife Africa South Africa has also been given an opportunity to comment in this regard.

3.4.12 The Agreement on the Convention of African-Eurasian Migratory Water Birds

The Agreement on the Conservation of African-Eurasian Migratory Water birds (AEWA) is an intergovernmental treaty dedicated to the conservation of migratory water birds and their habitat across Africa, Europe, the Middle East Central Asia, Greenland and the Canadian Archipelago. The AEWA covers 255 species of birds ecologically dependent on wetlands for at least part of their annual cycle and is a legally binding agreement by all contracting parties (South Africa included) to guarantee the conservation of migratory water birds within their national boundaries through species and habitat protection and the management of human activities. As mentioned above, an Avifaunal Specialist has been appointed to consider the impact of the proposed Geel Kop Grid Connection Infrastructure (Annexure E1). Birdlife Africa South Africa has also been given an opportunity to comment in this regard.

3.4.13 Guidelines to minimise the impacts on birds of Solar Facilities and Associated Infrastructure in South Africa

The "Guidelines to minimise the impact on birds of Solar Facilities and Associated Infrastructure in South Africa" (Smit, 2012) is perhaps the most important (although not legally binding) document from an avifaunal impact perspective currently applicable to solar development in South Africa. The guidelines are published by BirdLife South Africa (BLSA) and detail the recommended procedure for conducting an avifaunal specialist study as well as list all the potential impacts of interactions between birds and solar facilities and associated infrastructure. We are aware of changes to the BLSA best-practise guidelines recently published at the Birds and Renewable Energy Forum in Johannesburg (2015) and although the revised requirements are still a work in progress and have not yet been ratified, they will inform this assessment where applicable. Please refer to Annexure E2 for a copy of the Avifaunal assessment undertaken for this project.

3.4.14 Environmental Impact Assessment Guideline for Renewable Energy Projects

The Minister of Environmental Affairs published the Environmental Impact Assessment Guideline for Renewable Energy in terms of section 24J of the National Environmental Management Act, 1998 (Act No. 107 of 1998) on 16 October 2016.

In pursuit of promoting the country's Renewable Energy development imperatives, the Government has been actively encouraging the role of Independent Power Producers (IPPs) to feed into the national grid. Through its REIPPPP, the DoE has been engaging with the sector to strengthen the role of IPPs in renewable energy development. Launched during 2011, the REIPPPP is designed to contribute towards a target of 3 725MW, and towards socio-economic and environmentally sustainable development, as well as to further stimulate the renewable industry in South Africa.

To facilitate the development of the first phase of IPPs in South Africa, these guidelines have been written to assist project planning, financing, permitting, and implementation for both developers and regulators. The guideline is principally intended for use by the following stakeholder groups:

- Public Sector Authorities (as regulator and/or competent authority);
- Joint public sector authorities and project funders, e.g., Eskom, IDC, etc.
- Private Sector Entities (as project funder/developer/consultant);
- Other interested and affected parties (as determined by the project location and/or scope).

This guideline aims to ensure that all potential environmental issues pertaining to renewable energy projects are adequately and timeously assessed and addressed as necessary to ensure sustainable roll-out of these technologies by creating a better understanding of the environmental approval process for renewable energy projects.

The guidelines list the following possible environmental impacts associated with the development of solar energy facilities (and in this instance the associated infrastructure).

Table 11: Potential environmental impacts of solar energy projects and associated infrastructure (Adapted from DEA, 2015) showing where they have been considered in this report

Impact Description	Relevant Legislation	Applicability to this project
Visual Impact	NEMA	Specialist input attached in Annexure E7.
Noise Impact (CSP)	NEMA	Not applicable, as CSP is not considered as a technology alternative.

Impact Description	Relevant Legislation	Applicability to this project
Land Use Transformation (fuel growth and production)	NEMA, NEMPAA, NHRA	Not Applicable to PV or associated infrastructure. Agricultural specialist input however attached in Annexure E4.
Impacts on Cultural Heritage	NEMA, NHRA	Heritage impact assessment attached in Annexure E5.
Impacts on Biodiversity –	NEMA, NEMBA, NEMPAA, NFA	Biodiversity specialist input attached in Annexure E1 and E2 (Ecology and Avifauna respectively)
Impacts on Water Resources –	NEMA, NEMICMA, NWA, WSA	The project will obtain water directly from the local municipality. A freshwater ecologist has assessed the potential impacts on freshwater resources (Annexure E3).
Hazardous Waste Generation (CSP and PV)	NEMA, NEMWA, HAS	No Hazardous waste will be generated as part of the Grid Infrastructure.
Electromagnetic Interference	NEMA	The nearest SKA station has been identified as Rem-Opt-9, at approximately 30km from the proposed Geel Kop Grid Connection Infrastructure.
Aircraft Interference	NEMA, MSA	The SA CAA have been automatically registered as an interested and affected party on this environmental process. There are no airports nor landing strips near the proposed Geel Kop Grid Connection Infrastructure.
Loss of Agricultural Land	SALA	Agricultural specialist input is attached in Annexure E4
Sterilisation of mineral resources	MPRDA	The Department of Mineral Resources has been registered as an I&AP on this environmental process.

Assuming an IPP project triggers the need for BA or S&EIR under the EIA regulations, included in the assessment process is the preparation of an environmental management programme (EMPr). Project-specific measures designed to mitigate negative impacts and enhance positive impacts should be informed by good industry practice and are to be included in the EMPr. Potential mitigation measures for solar energy projects include but are not limited to:

- Conduct pre-disturbance surveys as appropriate to assess the presence of sensitive areas, fauna, flora and sensitive habitats;
- Plan visual impact reduction measures such as natural (vegetation and topography) and engineered (berms, fences, and shades, etc.) screens and buffers;
- Utilise existing roads and servitudes as much as possible to minimise project footprint;
- Site projects to avoid construction too near pristine natural areas and communities;

- Locate developments away from important habitat for faunal species, particularly species which are threatened or have restricted ranges, and are collision-prone or vulnerable to disturbance, displacement and/or habitat loss;
- Fence sites as appropriate to ensure safe restricted access;
- Ensure dust abatement measures are in place during and post construction;
- Develop and implement a storm water management plan;
- Develop and implement waste management plan; and
- Re-vegetation with appropriate indigenous species to prevent dust and erosion, as well as establishment of alien species.

The recommendations of these guidelines have been explicitly considered in this Basic Assessment process and where necessary, additional specialist input has been obtained. Please see section 6 of this BAR for a full assessment of impacts.

3.4.15 Sustainability 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 must 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.*[24]

It is believed that the proposed Geel Kop solar facilities 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 lack of water and infrastructure.

Furthermore, the proposed grid connection infrastructure is directly linked to five alternative energy projects (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.

3.4.16 National Screening Tool, 2018

The results of the National Screening Tool Analysis are included in Annexure G9.

The submission of a report generated from the national web-based environmental screening tool, as contemplated in Regulation 16(1)(b)(v) of the Environmental Impact Assessment Regulations, 2014, published under Government Notice No. R982 in Government Gazette No. 38282 of 4 December 2014, as amended, came into effect as of 4 October 2019.

The report uses national datasets to identify site sensitivities and potential specialist studies that may be required for any particular development. Since the datasets are not necessarily ground truthed, there may be instances where the required specialist study is in actual fact not necessary. According to the Assessment Protocol for specialist involvement, if any part of the proposed development falls within an area of "very high" sensitivity, the requirements prescribed for such sensitivity must be undertaken.

Below is a list of the studies generated by the Screening Tool for the Geel Kop Grid Connection Infrastructure and the motivations as to whether or not the investigation has been done or is required.

Table 12: Results of Screening Tool Assessment

No.	Specialist assessment	✓ / ✗	Assessment Protocol Reasoning
1	Agricultural Impact Assessment	✓	Please refer to Appendix E4 in the Basic Assessment Report
2	Landscape/Visual Impact Assessment	✓	Please refer to Appendix E7 in the Basic Assessment Report
3	Archaeological and Cultural Heritage Impact Assessment	✓	Please refer to Appendix E5 in the Basic Assessment Report
4	Palaeontology Impact Assess	✓	Please refer to Appendix E6 in the Basic Assessment Report
5	Terrestrial Biodiversity Impact Assessment	✓	Please refer to appendix E1 in the Basic Assessment Report
6	Aquatic Biodiversity Impact Assessment	✓	Please Refer to Appendix E3 in the Basic Assessment Report
7	Avian Impact Assessment	✓	Please Refer to Appendix E2 in the Basic Assessment Report
8	Civil Aviation Assessment	x	The Civil Aviation Authority will be given an opportunity to provide comment in this regard. No additional studies undertaken.
9	RFI Assessment	x	SKAsa and SARAO will be approached for specific comment relating to the grid infrastructure.

[24] Refer to definition of "sustainable development" in section 1 of NEMA.

No.	Specialist assessment	✓ / ✗	Assessment Protocol Reasoning
10	Geotechnical Assessment	✓	The Council for Geological Science have confirmed that the proposed Geel Kop PV projects and the associated infrastructure are not proposed on any sensitive geological features. The following was confirmed in this regard. *"This office would like to confirm that the sites are underlain by a number of non-dolomitic Formations; the substation facilities are underlain by Reimvasmaak Gneiss and Gordonia Fm, Kalahari Group sediments. No dolomitic material is present in the area as shown on the 1: 250 000 geological map. This office therefore confirms that the area is regarded as non-dolomitic."*
11	Plant Species Assessment	✓	Please refer to appendix E1 in the Basic Assessment Report
12	Animal Species Assessment	✓	Please refer to appendix E1 in the Basic Assessment Report

4. PLANNING CONTEXT

The proposed Geel Kop Grid Connection Infrastructure is situated within a Gazetted Strategic Powerline Corridor, namely the Northern Strategic powerline corridor, and the establishment of this infrastructure is thus compliant with national strategic planning objectives.

Please refer to the discussions on planning context in the main facilities respective BARs for planning requirements for the facilities as a whole.

5. SITE DESCRIPTION AND ATTRIBUTES

The following sections provide a description of the natural environmental and built environment context of the affected land parcels, with focus on the affected properties for the proposed Geel Kop Grid Connection Infrastructure.

5.1 LOCATION & BUILT ENVIRONMENT

The target properties, Remaining Extent of Farm Geel Kop 456, Portion 5 of Farm Bloemsmond 455, Portion 14 of Farm Bloemsmond 455, Remainder of Farm Dyasonsklip 454, Remainder of Farm 638 Tungsten Lodge, Remaining Extent of Portion 35 of the Farm No 453 Mc Taggarts Camp, Remaining Extent (Portion 0) of the Farm No 636 and Olyvenhouts Drift Settlement Agricultural Holding Number 1080, are located in the ZF Mgcawu District (previously Siyanda District) of the Northern Cape Province, within the jurisdiction area of the Kai !Garib Local Municipality.

The proposed Geel Kop Grid Infrastructure is accessed and is situated directly north of the N14 between Upington and Keimoes.

No buildings, ruins or any other structures were noted on or within the direct proximity of the proposed grid infrastructure.

5.2 GEOLOGY & CLIMATE

The following information relating to geology and climate was obtained from the Agricultural Specialist; please refer to Appendix E5 for a full copy of his report.

5.2.1 Geology & Soils

The area lies in the Kalahari geological group of the Namaqualand metamorphic complex. This is the youngest of the geological groups formed in the past 65 million years. The lithology (mineralogical composition and texture of rocks) of this area consists of:

Sand

During a very dry period in Southern Africa some 100 000 years ago sand was transported from the Namib dessert by strong and continuous winds and distributed over the Kalahari.

Limestone

Limestone is a sedimentary rock consisting largely of calcium-carbonate, which is usually derived from the shells of minute marine or fresh-water animals. Sand, clay and minerals such as magnesia or iron oxide are also present.

Sedimentary and Volcanic rocks (parent material of soils) found in the area include Migmatite, Schist, Gneiss, Kinzigite and granite.

Soil

Calcic soils are prone to develop under the climatic conditions and geology of the area.

Calcic soils originate in arid climates with the accumulation of secondary lime, forming a distinctive horizon consisting chiefly of calcite. In calcic soils either hardpan carbonate or a soft carbonate horizon or (rarely) gypsic horizon dominates the morphology of the sub-soil.

AGIS indicates the typical profile for soils in this region as follows:

- Soils with minimal development, usually shallow, on hard or weathering rock, with or without intermittent diverse soils;
- Lime generally present in part or most of the landscape;
- Red and yellow well drained sandy soil with high base status;
- Freely drained, structure less soils;
- Favourable physical properties; and
- Soils may have restricted soil depth, excessive drainage, high erodibility and low natural fertility.

5.2.2 Climate

The region is classified as an arid zone with desert climate. Specific parameters are shown in the table below.

Table 13: Climatic parameters of associated with the Geel Kop Grid Infrastructure.

Rainfall	
Annual rainfall	0-200mm
Summer rainfall	<62.5mm
Winter rainfall	<62.5mm
Variation in rainfall	<62.5mm40 – 50 %
Temperature	
Mean maximum temperature	>35°C
January Temperature	>27.5°C
Mean Minimum Temperature	2-4°C
July Temperature	<7.5°C
Temperature range	>15°C
First frost expected	21-31 May
Last frost expected	01 – 10 September
Hours of sunshine	>80%
Evaporation	>2400mm
Humidity	<30%

5.2.3 Topography

The terrain type is labelled as Rolling or irregular plains with some relief and Level plains with some relief. The Slope is less than 5%.

5.3 BOTANICAL COMPOSITION OF THE SITE

Dr David Hoare of David Hoare Consulting (Pty) Ltd undertook a Botanical Impact Assessment which formed part of larger Ecological Impact Assessment Report. Please refer to the Ecological Impact Assessment attached in **Annexure E1** from which the following has been drawn.

5.3.1 Broad-Scale Vegetation Patterns

The study area is located in the Kalahari Karroid Shrubland (Least threatened), Bushmanland Arid Grassland (Least threatened) and Gordonia Duneveld (Least Threatened) vegetation types. The study area is not located in a threatened ecosystem. The Lower Gariep Alluvial Vegetation threatened ecosystem is located south of the study area.

Kalahari Karroid Shrubland vegetation type is endemic to the Northern Cape Province. The vegetation type is characteristic of forming belts alternating with belts of Gordonia Duneveld on plains northwest of Upington through Lutzputs and Noenieput to the Rietfontein/Mier area in the north. Other patches occur around Kakamas and north of Groblershoop. The unit is also found in the neighbouring Namibia. The vegetation can be described as low karroid shrubland on flat, gravel plains. Karoo-related and northern floristic elements such as shrubs meet here, indicating a transition to the Kalahari region and sandy soils. Altitude varies mostly from 700 - 1100 m.

The conservation target is set at 21% with very little statutorily conserved in the Augrabies Falls National Park. Erosion is very low (94%) (Mucina & Rutherford, 2012).

Table 14: Attributes of the Kalahari Karroid Shrubland vegetation type.

Name of vegetation type	Kalahari Karroid Shrubland
Code	NKb5
Conservation Target (percent of area) from NSBA	21%
Protected (percent of area) from NSBA	0.1%
Remaining (percent of area) from NSBA	99.2%
Description of conservation status from NSBA	Least threatened
Description of the Protection Status from NSBA	Hardly protected
Area (km^2) of the full extent of the Vegetation Type	8283.90
Name of the Biome	Nama-Karoo

The Bushmanland Arid Grassland vegetation type occurs only in the Northern Cape Province. It spans about one degree of latitude from around Aggeneys in the west to Prieska in the east. The southern border of the unit is formed by edges of the Bushmanland Basin while in the northwest this vegetation unit borders on desert vegetation (northwest of Aggeneys and Pofadder). The northern border (in the vicinity of Upington) and the eastern border (between Upington and Prieska) are formed with often intermingling units of Lower Gariep Broken Veld, Kalahari Karroid Shrubland and Gordonia Duneveld. Most of the western border is formed by the edge of the Namaqualand hills. Altitude varies mostly from 600–1200m. The conservation target is set at 21% with only small patches statutorily conserved in Augrabies Falls National Park and Goegab Nature Reserve. Very little of the area has been transformed. Erosion is very low (60%) and low (33%) (Mucina & Rutherford, 2012).

Table 15: Attributes of Bushmanland Arid Grassland

Name of vegetation type	Bushmanland Arid Grassland
Code as used in the Book - contains space	NKb3
Conservation Target (percent of area) from NSBA	21%
Protected (percent of area) from NSBA	0.4%
Remaining (percent of area) from NSBA	99.4%
Description of conservation status from NSBA	Least threatened
Description of the Protection Status from NSBA	Hardly protected
Area (km^2) of the full extent of the Vegetation Type	45478.96

Name of the Biome	Nama-Karoo

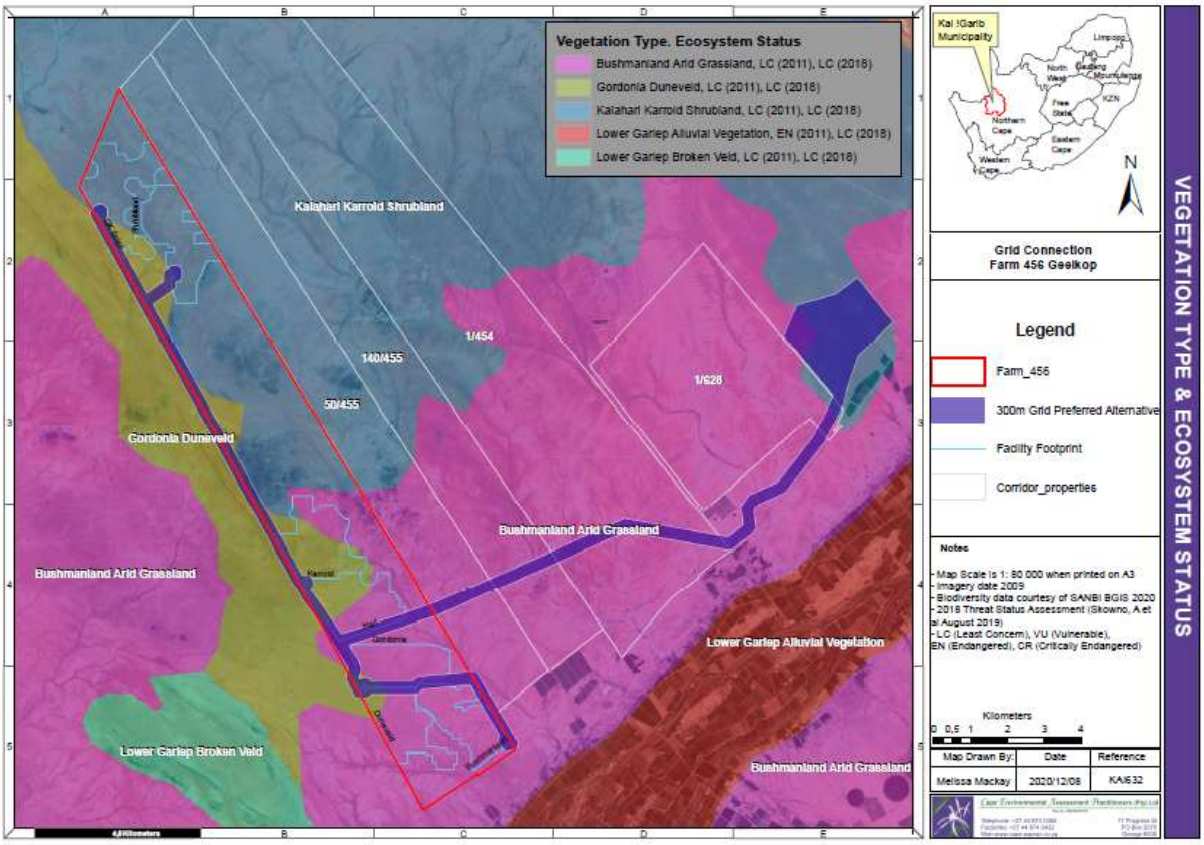


Figure 22: Regional vegetation types and conservation status in relation to the Geel Kop Grid Infrastructure. Only Lower Gariep Alluvial Vegetation is classified as endangered and does not occur within the study site.

5.3.2 Habitats & Plant Communities

The botanical specialist identified the following broad natural habitat units within the study area for the Geel Kop Grid Infrastructure.

1. Plains vegetation (dwarf karroid shrubland);
2. Dune ridges:
3. Rocky outcrops (high rock cover areas);
4. Hills vegetation (more diverse karoo with high rock cover);
5. Depressions (temporary pans);
6. Drainage lines; and
7. Dry stream beds and associated riparian vegetation.

The location of these habitat types within the Geel Kop Grid Infrastructure study area are shown in the Figure below.

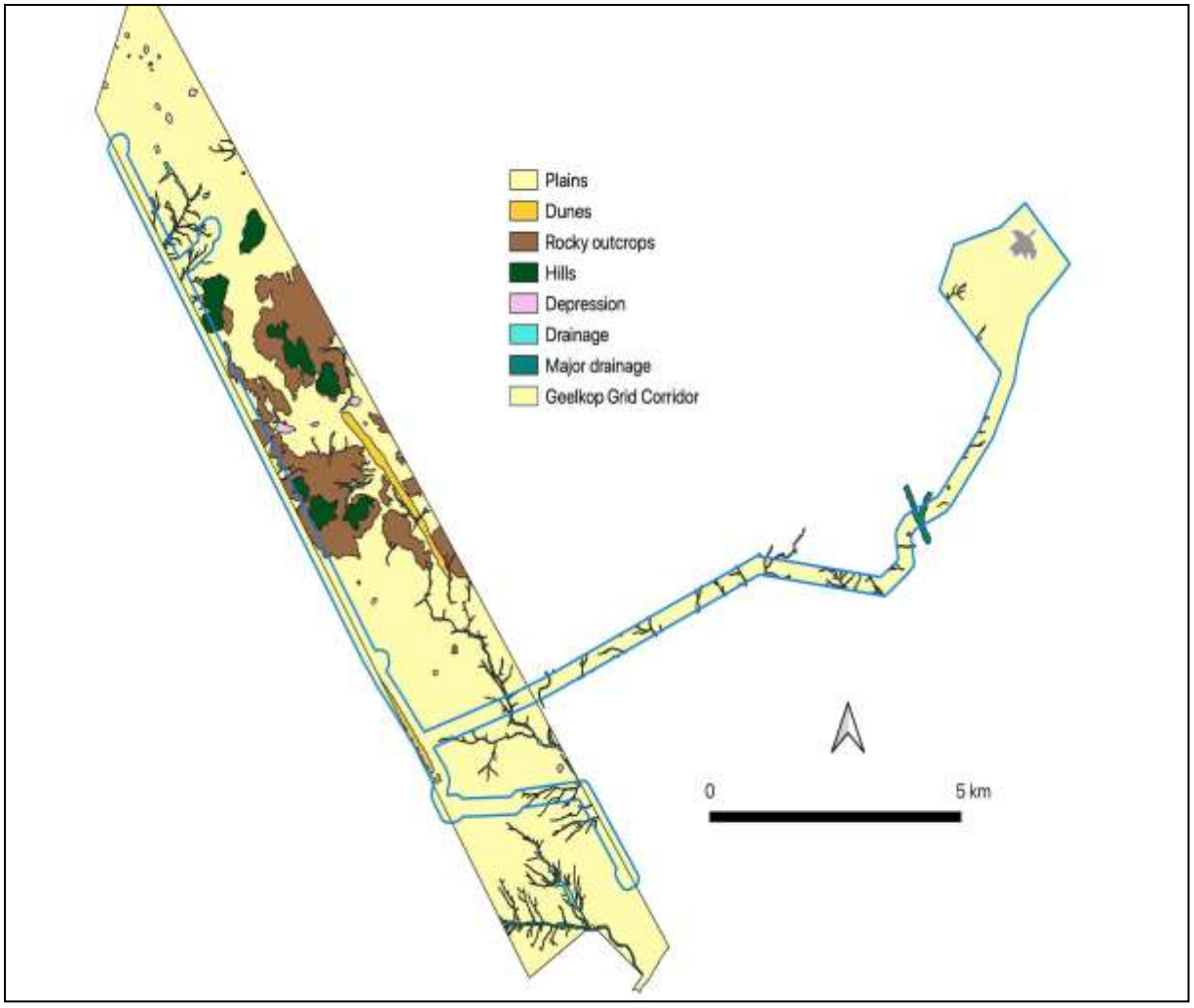


Figure 23: Habitat Types along Geel Kop Grid Infrastructure (Hoare, 2020)

These three habitat types are described in more detail in the following sub-sections.

5.3.2.1 Plains vegetation

The general study area is characterised by a low karroid dwarf shrubland, typical of one of the two regional vegetation types that converge here, Kalahari Karroid Shrubland, which is described as “Low karroid shrubland on flat, gravel plains”. A typical view of this vegetation is shown in the figure below.

Figure 24: Typical example of Plains vegetation (Hoare, 2020)

The general floristic character of this vegetation on site is fairly uniform across wide areas, often dominated by the same suite of species, including *Rhigosum trichototum, Caroxylon calluna, Justicia australis, Galenia africana, Limeum aethiopicum, Tribulus pterophorus, Indigofera alternans, Enneapogon cenchroides, Tragus berteronianus, Senegalia mellifera, Blepharis mitrata, Aptosimum spinescens, Aptosimum procumbens, Roepera lichtensteiniana, Stiparostis uniplumis* and *Eriocephalus sp*. However, any local variation in topography can lead to localized increase in richness associated with a more diverse species composition. Localised rock outcrops add habitat diversity.

5.3.2.2 Dry Drainage lines and Riparian vegetation

There is a network of dry stream beds throughout the lower-lying areas of the study area, with smaller streams eventually joining together to form larger systems further downstream. In the hilly areas these start as dry drainage lines, but these are not mapped as part of this unit since they reflect the characteristics of the surrounding vegetation rather than that of being a unique habitat. Where the dry streams occur as a unique habitat, they consist of a sandy or rocky bed, often unvegetated or sparsely vegetated, bordered by a line of shrubs or small trees. The smaller drainage areas are only recognizable by the increased density of more woody shrubs, such as *Rhigozum obovatum, Asparagus suaveolens* and *Lycium cinereum*, as well as *Senegalia mellifera*. As they increase in size, they tend to develop a channel of sand.

Figure 25: Typical Example of Drainage Lines and Riparian Vegetation (Hoare, 2020)

5.3.2.3 Drainage Lines

As the stream beds get larger, the riparian fringe becomes more pronounced, often containing some large trees of *Vachellia erioloba*, there is a continuum from the smallest streams to the larger “rivers”. Other species typical of these areas are *Senegalia mellifera, Asparagus suaveolens, Lycium cinereum, Boscia foetida*, and *Rhigosum trichotomum*.

Figure 26: Typical Habitat within Drainage Lines (Hoare, 2020)

The habitat contains a combination of bare rock and deeper sands, so it is able to support a flora that is adapted to these substrate conditions, in addition to the sporadic flooding and scouring that takes place in these habitats as a result of rare large rainfall events. The thorn trees (and other shrubs) occur here because they are able to root deeply to access underground water, a source that is not available to other terrestrial habitats. Although not necessarily floristically sensitive, the habitat that is derived under these ecological conditions is critically important for fauna, providing food and shelter as well as corridors for undetected movement. In times of drought, riparian areas may offer the only slightly green vegetation as a source of food. The deeper sands are important for burrowing animals and the shrubs and low trees offer shelter and browse.

Riparian habitats are disproportionately important in terms of the proportion of the area that they occupy in the landscape – they probably occupy 5-10% of the landscape in total but provide a unique and important habitat for both flora and fauna. The plant species occurring within these habitats are not necessarily rare in a global sense, but degradation of this interconnected system can cause floristic loss and change in areas far removed from any impact. Maintenance of regional vegetation patterns therefore is dependent on maintaining the health and functionality of this component of the landscape. For this reason, and for the utilitarian importance to fauna, the riparian vegetation is considered to be ecologically sensitive.

5.3.3 Listed and Protected Plant Species

The botanical specialist provided details of red listed plants, plants protected in terms of NEMBA, plants protected in terms of the Northern Cape Nature Conservation Act as well as trees protected in terms of the NFA.

5.3.3.1 Red List plant species of the study area

Lists of plant species previously recorded in the study area were obtained from the South African National Biodiversity Institute (SANBI) website (http://newposa.sanbi.org/). These are listed in Appendix 1 of the Ecology Impact Assessment. Additional species that could occur in similar habitats, as determined from database searches and literature sources, but have not been recorded in these grids are also listed by the specialist. There are seven species on this list that have a geographical distribution that could include the site.

The species on this list were evaluated to determine the likelihood of any of them occurring on site on the basis of habitat suitability. Of the species that are considered to occur within the geographical area under consideration, there is one threatened species that occurs in the study area, *Aloidendron dichotomum*. According to IUCN Ver. 3.1 (IUCN, 2001) this species is listed as Vulnerable. A total of 5 individuals were found on site within the footprint of proposed infrastructure or in close proximity to the boundary of these areas.

There are also two species listed as Near threatened (*Dinteranthus wilmotianus* and *Hoodia officinalis* subsp. *officinalis*) and two species listed as Declining (*Vachellia erioloba* and *Hoodia gordonii*) that could occur on site. A number of individuals of *Vachellia erioloba* were found on site. The other species were not found on site.

In summary, one Vulnerable plant species, *Aloidendron dichotomum*, and one Declining plant species, *Vachellia erioloba*, were found on site.

5.3.3.2 Protected plants (National Environmental Management: Biodiversity Act)

Plant species protected under the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) are listed in Appendix 6 of the Ecology Impact Assessment. None of the species on this list were found on site, although several have a geographical distribution that includes the site.

5.3.3.3 Protected plants (Northern Cape Nature Conservation Act)

Plant species protected under the Northern Cape Nature Conservation Act, 2009 (Act 9 of 2009) are listed in Appendix 5 of the Ecology Impact Assessment. One species on this list, *Hoodia gordonii*, is also protected according to the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) and has been discussed above. A number of species were found on site that are protected according to the Northern Cape Nature Conservation Act, 2009 (Act 9 of 2009). From the reconnaissance survey, this includes the following: *Aloidendron dichotomum* (Asphodolaceae), *Aloe claviflora* (Asphodolaceae), *Aloe gariepensis* (Asphodolaceae), *Avonia albissima* (Anacampserotaceae), *Boscia foetida*, *Boscia albitrunca* (protected Provincially as well as according to the National Forests Act), *Mesembryanthemum sp.* (Aizoaceae), *Ruschia* sp. (Aizoaceae), *Euphorbia braunsii*, and *Nerine laticoma* (Amaryllidaceae). Despite not being threatened, any impacts on these species will require a permit from the relevant authorities. There is a possibility that additional protected species occur on site that were not detected during the field survey. Note that many of these species are widespread and not of any conservation concern, but protected due to the fact that the Northern Cape Nature Conservation Act, 2009 (Act 9 of 2009) protects entire families of flowering plants irrespective of whether some members are rare or common. The implication is that a comprehensive list of species occurring within the footprint of the proposed infrastructure is required and a permit application submitted for any of those listed as protected.

5.3.3.4 Protected trees

Tree species protected under the National Forest Act are listed in Appendix 2 of the ecology impact assessment. Those that have a geographical distribution that includes the study area are *Vachellia erioloba* (Camel Thorn, Kameeldoring), *Vachellia haematoxylon* (Grey Camel Thorn, Vaalkameeldoring), *Boscia albitrunca* (Shepherd's Tree / Witgatboom / !Xhi) and *Euclea pseudebenus (*Ebony Tree, Ebbeboom).

The tree *Vachellia erioloba* occurs in dry woodland along watercourses in arid areas where underground water is present as well as on deep Kalahari sands. Two individuals of this species were found on site within proximity to the proposed footprint area of the solar array. They were associated with drainage areas / watercourses.

Vachellia haematoxylon occurs on deep Kalahari sand between dunes or along dry watercourses. No individuals were found on site or nearby.

Boscia albitrunca occurs in semi-desert areas and bushveld, often on termitaria, but is common on sandy to loamy soils and calcrete soils. A small number of individuals of this species were found on the property, both within very close proximity to drainage lines, but none were found within the footprint of the solar array.

Euclea pseudobenus occurs in semi-desert and desert areas, usually along watercourses and in depressions. It could occur in hills or on flats. Its main distribution is closer to the Richtersveld and into Namibia. No individuals have been sighted close to Keimoes, but specimens have been recorded in the grid south and west of Kakamas. No individuals were recorded on site.

In summary, two species of protected trees were found on site, namely *Vachellia erioloba* and *Boscia albitrunca*.

5.4 TERRESTRIAL FAUNAL COMPONENT OF THE SITE

Dr David Hoare undertook a Faunal Impact Assessment which formed part of larger Ecological Impact Assessment Report. Please refer to the Ecological Impact Assessment attached in **Annexure E1** from which the following has been drawn.

Vertebrate species (mammals, reptiles, amphibians) with a geographical distribution that includes the study area are listed in Appendix 4 of the Ecology Impact Assessment. All threatened (Critically Endangered, Endangered or Vulnerable) or near threatened vertebrate animals that could potentially occur in the study area and have habitat preference that includes habitats available in the study area, are discussed further below.

5.4.1 Mammals

There are 64 mammal species that have a geographical distribution that includes the study area, of which six (6) are listed in a conservation category of some level (see Appendix 3 of the Ecology Impact assessment), as follows: Black Rhinoceros (CR), Hartmann's Mountain Zebra (EN), Cape Clawless Otter (NT), Leopard (VU), Dent's Horseshoe Bat (NT), and Littledale's Whistling Rat (NT). This is a relatively moderate diversity of mammals compared to other parts of South Africa. Based on the natural state of the study area and surrounding areas, it is considered likely that many of these species could occur on site, especially the smaller species, such as various rodents, insectivores and small predators. Listed species with a geographical range that includes the site are discussed in more detail below to evaluate the potential for them to occur on site.

5.4.1.1 Black Rhinoceros

The Black Rhinoceros (*Diceros bicornis bicornis*), listed as Critically Endangered, has a geographical distribution that includes the study area. The species is confined to formal conservation areas as well as a few individuals held on private land. **Although the habitat on site is suitable for this species, it does not occur there and would not be found there unless deliberately introduced.**

5.4.1.2 Hartmann's Mountain Zebra

Hartmann's Mountain Zebra (*Equus zebra hartmannae*), listed as Endangered in South Africa and Vulnerable regionally, is found in Namibia, southern Angola and the north-west parts of the Northern Cape. Ii inhabits rugges, broken mountainous and escarpment areas up to 2000 m in elevation where there is a diversity of grasses and a perennial water source. It has not been recorded in the grid in which

the site is found or any nearby grids. The habitat on site is only marginally suited to this species. There is therefore a low likelihood of it being found on site. **The proposed development is therefore highly unlikely to have any negative effect on the species.**

5.4.1.3 Cape Clawless Otter

The Cape Clawless Otter (*Aonyx capensis*), listed as Least Concern in South Africa and Near Threatened regionally, is widely but patchily distributed throughout South Africa, and is also the most widely found otter in Africa. It is aquatic and seldom found far from permanent water, which needs to be fresh. They may be found in seasonal rivers in the Karoo, provided suitable-sized pools persist. The site is within the known distribution of this species but there are no historical records for the grid in which the site is found or any nearby grids. There is no suitable habitat for this species on site. **It is therefore considered highly unlikely that it occurs on site.**

5.4.1.4 Leopard

The Leopard (*Panthera pardus*), listed as Vulnerable, has a wide habitat tolerance, but with a preference for densely wooded areas and rocky areas. In montane and rocky areas of the Western and Northern Cape, they prey on dassies and klipspringers. They have large home ranges, but do not migrate easily, males having ranges of about 100 km^2 and females 20 km^2. It has been recorded in the grid in which the site is located, as well as nearby grids. There is a medium to high probability of this species occurring on site, in which case it would be at very low densities. **The proposed project could displace individuals but is unlikely to have a significant effect on overall population densities.**

5.4.1.5 Den't Horseshoe Bat

Dent's Horseshoe Bat (*Rhinolophus dentei*), listed as Near Threatened, is widely but patchily distributed in west and southern Africa. In southern Africa it is found in Namibia, western Botswana and northern parts of South Africa. The global distribution includes the study area, but known siting's in South Africa are restricted to the Ghaap Plateau (between Olifantshoek and Vryburg, down towards Kimberley and De Aar). It is associated with arid savannah habitats where suitable roosting sites occur, which restricts it to broken country with rocky outcrops or suitable caves. Colonies are largely dependent on caves, caverns, crevices in rocky outcrops, abandoned mines and similar habitats. It is were to occur on site, which is not very likely, it would probably only be found in the rocky outcrops to the north of the current site. **It is considered possible but unlikely that it could occur on site and individuals could be affected by activities on site.**

5.4.1.6 Littledale's Whistling Rat

Littledale's Whistling Rat (*Parotomys littledalei*), listed as Near Threatened, has a narrow distribution in the driest parts of southern Africa, from the western regions of South Africa north into Namibia and mostly along a narrow strip of desert. It has been recorded in the grid in which the site is located as well as two surrounding grids and some nearby grids. It is found in Desert and Karoo on sandy or gravel open plains. It tends to excavate burrow beneath a shrub, but will also construct stick nest at the base of a shrub. It is herbivorous, favouring leaves of *Zygophullum* and *Mesembryanthemaceae*. **It is considered possible and likely for it to occur in the study area and the proposed development could therefore affect this species**.

5.4.2 Reptiles

A total of 62 reptile species have a geographical distribution that includes the general study area in which the site is found (Alexander & Marais 2007, Bates et al. 2014, Branch 1988, Marais 2004, Tolley & Burger 2007). This is a fairly high potential diversity compared to average diversity in other parts of the country. Of the reptile species that could potentially occur in the study area, none are listed in a threat category.

There are therefore no reptile species of conservation concern that could potentially occur in the study area and that may therefore be affected by the proposed project

5.4.3 Amphibians

A total of only 9 frog species have a geographical distribution that includes the general study area in which the site is found (Du Preez & Carruthers 2009). Some of these species are only marginally present in the study area due to the fact that their distribution range ends close to the study area. Of the frog species that could potentially occur in the study area, none are listed in a threat category. Note that the Giant Bullfrog was previously listed as Near Threatened, but it is currently assessed as Least Concern, although still listed in legislation as protected.

It is concluded that the site contains habitat that is suitable for various frog species, although **no species of conservation concern are likely to occur in the study area**.

5.4.4 Protected animals

There are a number of animal species protected according to the National Environmental Management: Biodiversity Act (Act No. 10 of 2004). According to this Act, "*a person may not carry out a restricted activity involving a specimen of a listed threatened or protected species without a permit issued in terms of Chapter 7*". Such activities include any that are "*of a nature that may negatively impact on the survival of a listed threatened or protected species*". This implies that any negative impacts on habitats in which populations of protected species occur or are dependent upon would be restricted according to this Act.

Those species protected according to the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) that have a geographical distribution that includes the site are listed in Appendix 6 of the Ecology Impact Assessment. This includes the following species: White Rhinoceros (does not occur on site), Black Rhinoceros (does not occur on site), Hartmann's Mountain Zebra (unlikely to occur on site), Cape Clawless Otter (unlikely to occur on site), Leopard, Cape Fox, and Giant Bullfrog.

Due to habitat and forage requirements, and the fact that some species are restricted to game farms and/or conservation areas, only the Leopard, Cape Fox, and Giant Bullfrog have any likelihood of occurring on site. Two of these species are mobile animals (Leopard and Cape Fox) that are likely to move away in the event of any activities on site disturbing them. However, the Giant Bullfrog, if it occurs on site, may be dependent on a small patch of habitat within their range to exist there. They could therefore be affected by the proposed development of the project.

5.5 AVIFAUNAL COMPONENT OF THE STUDY SITE

An Avifaunal Impact Assessment, including pre-construction avifaunal monitoring was undertaken by Chris van Rooyen. Please refer to the Avifaunal Impact Assessment Report attached in Appendix E2 for a full copy of this report. The following details on the avifaunal component of the site are summarised from this specialist report. The section below describes species that could potentially occur on site as well as those physically observed during the pre-construction monitoring.

5.5.1 Southern African Bird Atlas 2

The SABAP 2 data indicate that a total of 203 bird species could potentially occur in the broader area – Appendix 2 in the Avifaunal Impact Assessment provides a comprehensive list of all the species, including those recorded during the pre-construction monitoring. Of the priority species potentially occurring in the broader area, 35 could potentially occur in the study area. Eight (8) of these are South African Red Data species, and 5 are globally Red listed. The probability of a priority species occurring in the study area is indicated in the table below.

Table 16: Priority species which could potentially occur in the study area (Van Rooyen, 2020)

Species	Taxonomic name	Status				Class				Habitat			Impact					
		SABAP2 full protocol reporting rate	Red Data Global	Red Data Regional	Endemic/near endemic - South Africa	Waterbird	Raptor	Probability of occurrence	Recorded during surveys	Arid shrubland and rocky outcrops	Arid grassland	Surface water: Pans	Collision: PV panels	Displacement: Disturbance PV	Displacement: Habitat loss PV	Entrapment in fences	Displacement: Disturbance grid construction	Electrocutions: substations and inverter stations
Abdim's Stork	*Ciconia abdimii*	9.66	LC	NT				Low		x		x		x	x	x	x	
African Sacred Ibis	*Threskiornis aethiopicus*	51.14				x		Low				x		x				
Barn Owl	*Tyto alba*	19.89					x	High		x	x			x			x	x
Black-eared Sparrowlark	*Eremopterix australis*	5.68			Near endemic			High	x	x	x	x	x	x	x			
Black-headed Heron	*Ardea melanocephala*	29.55				x		High			x	x		x	x			
Black-shouldered Kite	*Elanus caeruleus*	28.41					x	High		x	x	x		x	x		x	
Blacksmith Lapwing	*Vanellus armatus*	55.68				x		Medium				x		x				
Booted Eagle	*Aquila pennatus*	6.25					x	High		x	x	x		x	x		x	
Cattle Egret	*Bubulcus ibis*	61.36				x		Low		x	x	x		x				
Common Greenshank	*Tringa nebularia*	3.98				x		Low				x		x				
Common Ostrich	*Struthio camelus*	1.70						High		x	x	x		x	x		x	
Common Sandpiper	*Actitis hypoleucos*	2.27				x		Low				x		x				
Egyptian Goose	*Alopochen aegyptiacus*	59.66				x		High	x			x		x				x
Fiscal Flycatcher	*Sigelus silens*	15.34			Near endemic			High		x	x	x	x	x	x			
Greater Kestrel	*Falco rupicoloides*	3.98					x	High		x	x			x	x		x	x
Hamerkop	*Scopus umbretta*	31.25				x		Medium				x		x				
Karoo Korhaan	*Eupodotis vigorsii*	35.23	LC	NT				Very high	x	x	x			x	x	x	x	
Kori Bustard	*Ardeotis kori*	5.11	NT	NT				High	x	x	x	x		x	x	x	x	

Species	Taxonomic name	SABAP2 full protocol reporting rate	Red Data Global	Red Data Regional	Endemic/near endemic - South Africa	Waterbird	Raptor	Probability of occurrence	Recorded during surveys	Arid shrubland and rocky outcrops	Arid grassland	Surface water: Pans	Collision: PV panels	Displacement: Disturbance PV	Displacement: Habitat loss PV	Entrapment in fences	Displacement: Disturbance grid construction	Electrocutions: substations and inverter stations
Lanner Falcon	*Falco biarmicus*	10.80	LC	VU			x	High		x	x	x	x	x	x		x	x
Ludwig's Bustard	*Neotis ludwigii*	3.41	EN	EN				Medium	x	x				x	x	x	x	
Martial Eagle	*Polemaetus bellicosus*	2.27	VU	EN			x	High		x	x	x		x	x		x	x
Pearl-spotted Owlet	*Glaucidium perlatum*	2.27					x	Medium			x			x	x		x	
Pygmy Falcon	*Polihierax semitorquatus*	7.39					x	High		x	x	x	x	x	x		x	
Rock Kestrel	*Falco rupicolus*	6.82					x	High		x	x			x	x		x	
Secretarybird	*Sagittarius serpentarius*	1.14	VU	VU			x	Medium		x	x	x		x	x	x	x	
South African Shelduck	*Tadorna cana*	22.73				x		Medium				x		x				
Southern Pale Chanting Goshawk	*Melierax canorus*	15.34					x	Very high	x	x	x	x	x	x	x			x
Spotted Eagle-owl	*Bubo africanus*	2.27					x	High		x	x	x	x	x	x		x	x
Spur-winged Goose	*Plectropterus gambensis*	18.18				x		Medium				x		x				
Steppe Buzzard	*Buteo vulpinus*	2.27					x	Low		x	x	x		x	x			x
Tawny Eagle	*Aquila rapax*	0.00	VU	EN			x	High	x	x	x	x		x	x		x	x
Three-banded Plover	*Charadrius tricollaris*	38.07				x		Medium				x		x				
White-faced Duck	*Dendrocygna viduata*	13.64				x		Low				x		x	x			
Wood Sandpiper	*Tringa glareola*	7.95				x		Low				x		x				
Yellow-billed Duck	*Anas undulata*	9.66				x		Low				x		x	x			

5.5.2 Pre-construction surveys

On-site surveys were conducted from 25 - 29 February and again from 02 - 03 March 2020 (7 days in total).

The abundance of species recorded during the walk transects and focal points are displayed in the figures below. A total of 291 individual birds were counted at the 16 focal points in the course of the surveys.

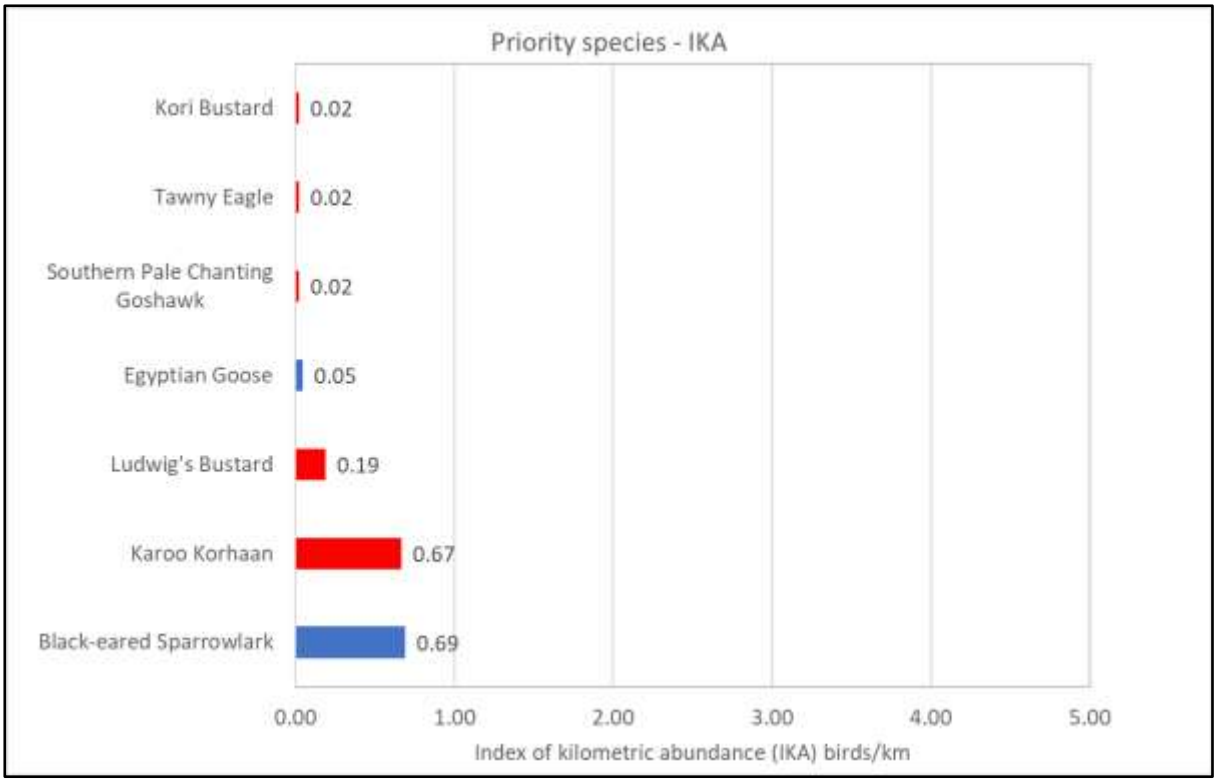


Figure 27: Index of kilometric abundance for all priority species recorded by means of walk transects during the surveys in the study area (van Rooyen, 2020)

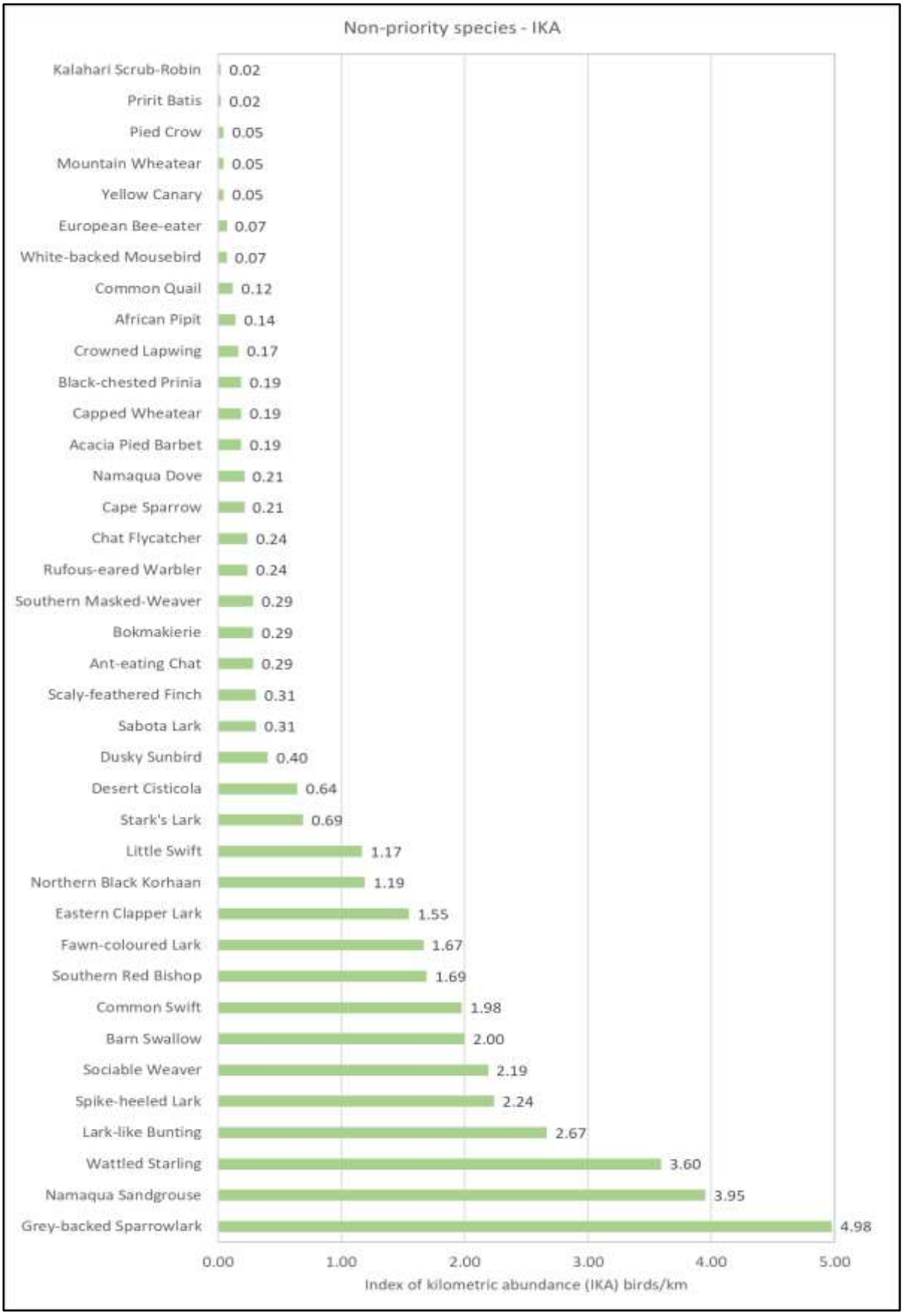


Figure 28: Index of kilometric abundance for all non-priority species recorded by means of walk transects during the surveys (van Rooyen, 2020)

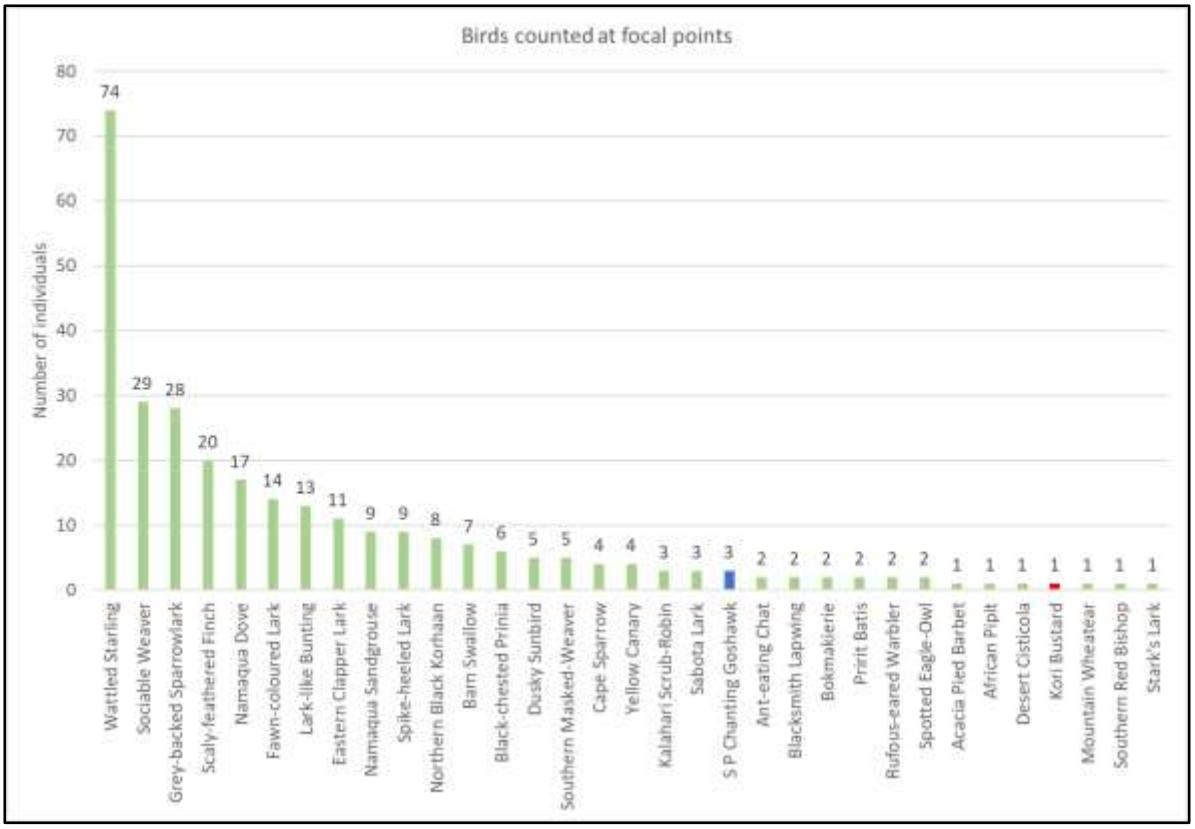


Figure 29: The variety and number of birds counted at focal points in the study area (van Rooyen, 2020)

5.6 AQUATIC COMPOSITION OF THE STUDY SITE

Dr Brian Colloty of EnviroSci (Pty) Ltd undertook a freshwater resource assessment for the proposed Geel Kop Grid Infrastructure. The section below details the aquatic composition of the project area, as determined during his study.

The proposed development occurs within the D73F catchment associated with alluvial systems of the Nama Karoo ecoregion. These mainstem watercourses are short tributaries of the Orange River (ca. 3 km from the development area), which are ephemeral in nature and did not contain any wetland elements within the development footprint. This lack of wetlands is an important consideration, as the study area has been highlighted in the Department of Environment Forestry and Fisheries (DEFF) Screen Tool.

Overall, these watercourses are largely in a natural state, when compared to those associated with the Orange River reach, which has modified floodplains and flows. Current and existing impacts occur in localised areas within the development area and includes existing tracks and evidence of grazing (small livestock).

No wetlands occur within the Grid connection corridor, but numerous portions of the corridor fall within the 500m WULA regulated Zone.

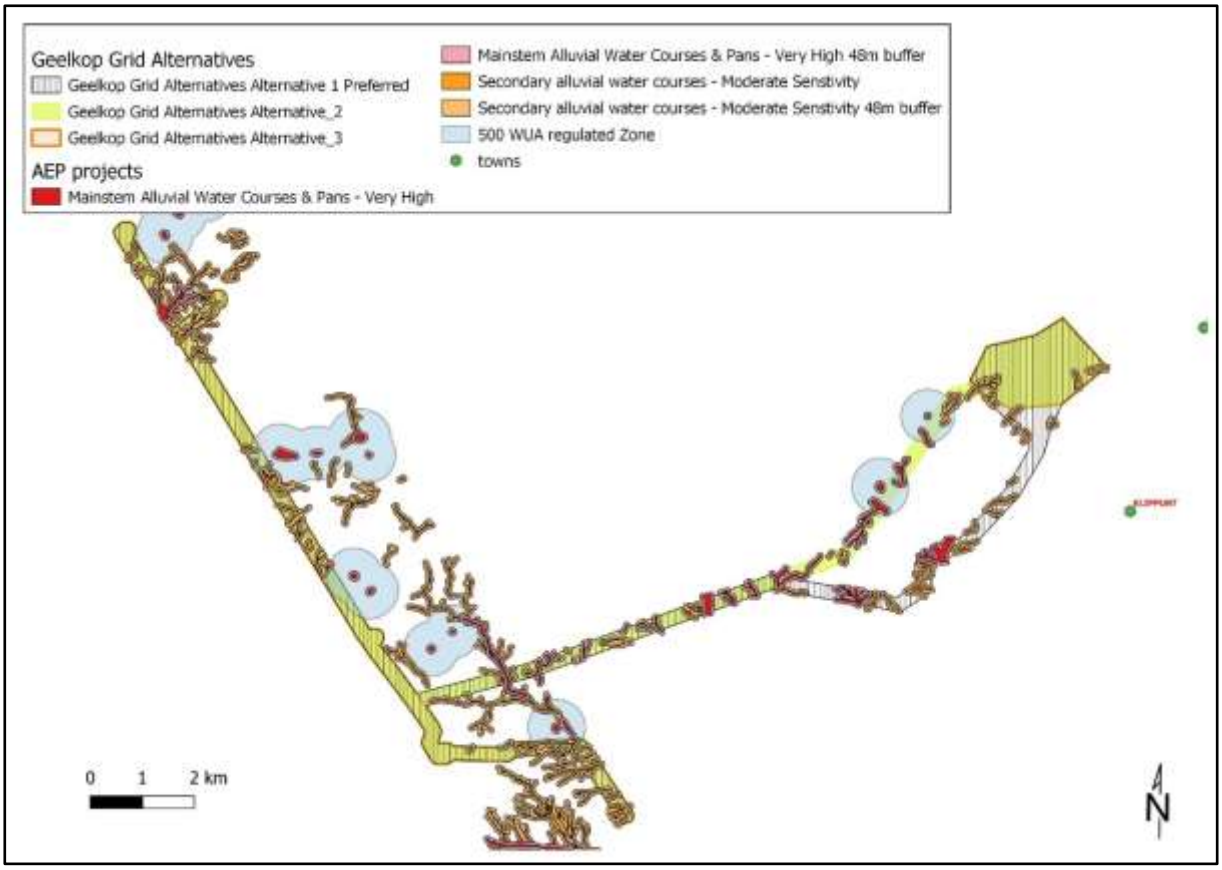


Figure 30: Delineated wetlands (pans) and watercourses in relation to the activities, with buffers, sensitivity ratings and the 500m regulated WULA zone

In terms of the National Freshwater Ecosystems Priority Areas (NFEPA) assessment, all the systems within the development area have been assigned a condition score of AB (Nel et al. 2011), indicating that they are largely intact and perform an ecological function. However, the development area systems are ephemeral and only carried water for a short periods as previously mentioned, thus the observed systems do not support any wide riparian zones and the vegetation associated with these watercourses were between 0.65 m and 16 m wide and contain mostly terrestrial species.

Fourteen woody plant species were found associated with the riparian and pan systems within the development area. Although none of these were obligate or facultative river/wetland species, they do show a preference for areas exposed to runoff. Species within the development area were dominated by *Vachellia erioloba* (Camel Thorn, Kameeldoring), *Vachellia haematoxylon* (Grey Camel Thorn), *Boscia foetida* (Stink Shepard's Tree) and *Euclea pseudebenus* (Ebony Tree), all protected under the National Forest Act.

The few grass or forbs species were successfully identified were all associated with the regional vegetation type, namely Bushmanland Arid Grassland.

The only obligate wetland plants observed were those found along the Orange River itself. Species observed included *Typha capensis, Phragmites australis, Prosopis glandulosa* and *Cyperus marginatus*. Notably the prevalence of *Prosopis*, an alien invasive tree species had increased between 2010 and this survey within the sites that had been visited previously by this report author. However, none of the project components would affect these species or habitats that they occur in, both from a hydrological and physical disturbance standpoint.

The National Freshwater Ecosystems Priority Areas (NFEPA) (Nel *et al*., 2011), also earmarked sub-quaternaries, based either on the presence of important biota (e.g. rare or endemic fish species) or conversely the degree of riverine degradation, i.e. the greater the catchment degradation the lower the

priority to conserve the catchment. The important catchments areas are then classified as Freshwater Ecosystems Priority Areas (FEPAs). Portions of the development area falls within a Fish FSA (Fish Support Area or Fish Sanctuary), associated with the Orange River. Although no permanent fish habitat occurs within the proposed development, Fish Sanctuaries are sub-quaternary catchments that are required to meet biodiversity targets for threatened and near threatened fish species indigenous to South Africa. Furthermore, Fish sanctuaries in sub-quaternary catchments associated with a river reach in good condition (A or B Ecological Category) were selected as FEPAs; the remaining fish sanctuaries became Fish Support Areas.

Fish Support Areas also include sub-quaternary catchments that are important for migration of threatened and near threatened fish species. Thus, any river reaches within Fish Support Areas need to be maintained in a condition that supports the associated populations of threatened fish species, which need not necessarily be an A or B ecological category.

5.7 SOCIO ECONOMIC CONTEXT

This section provides an overview of the spatial context of the Province, District Municipality, and Local Municipality within which the Geel Kop Grid Connection Infrastructure is proposed for development and provides the socio-economic basis against which potential issues can be identified.

5.7.1 Spatial Context of the Northern Cape Province

The Northern Cape Province is located in the north-western extent of South Africa and comprises South Africa's largest province; occupying an area 372 889km² in extent, equivalent to nearly a third (30.5%) of the country's total land mass. It is also South Africa's most sparsely populated province with a population of 1 145 861, and a population density of 3.1/km². It is bordered by the Provinces of Western Cape, and Eastern Cape Provinces to the south, and south-east; Free State, and North West Provinces to the east; Botswana and Namibia, to the north; and the Atlantic Ocean to the west. The Northern Cape is the only South African province which borders Namibia, and therefore plays an important role in terms of providing linkages between Namibia and the rest of South Africa. The Orange River is a significant feature and is also the main source of water in the Province, while also constituting the international border between the Northern Cape and Namibia.

The Northern Cape offers unique tourism opportunities including wildlife conservation destinations, natural features, historic sites, festivals, cultural sites, stars gazing, adventure tourism, agricultural tourism, ecotourism, game farms, and hunting areas, etc. The Province is home to the Richtersveld Botanical and Landscape World Heritage Site, which comprises a United Nations Educational, Scientific and Cultural Organisation (UNESCO) World Heritage Site under the World Heritage Convention. The Northern Cape is also home to 2 Transfrontier National Parks, namely the Kgalagadi Transfrontier Park, and the Richtersveld /Ai-Ais Transfrontier Park, as well as 5 national parks, and 6 provincial reserves.

The Northern Cape also plays a significant role in South Africa's science and technology sector, as it is home to the SKA, the SALT, and the MeerKAT.

The Northern Cape makes the smallest contribution to South Africa's economy (contributing only 2% to South Africa's Gross Domestic Product per region (GDP-R) in 2007). At 26% the mining sector is the largest contributor to the provincial GDP. The Northern Cape's mining industry is of national and international importance, as it produces approximately 37% of South Africa's diamond output, 44% of its zinc, 70% of its silver, 84% of its iron-ore, 93% of its lead and 99% of its manganese.

In 2007 the agricultural sector contributed 5.8% to the Northern Cape GDP per region which was equivalent to approximately R1.3 billion. The agricultural sector also employs approximately 19.5% of the total formally employed individuals (LED Strategy). The sector is experiencing significant growth in value-added activities, including game-farming; while food production and processing for the local and export market is also growing significantly (PGDS, July 2011). Approximately 96% of the land is used for stock farming; including beef cattle and sheep or goats, as well as game farming; while approximately

2% of the province is used for crop farming, mainly under irrigation in the Orange River Valley and Vaalharts Irrigation Scheme (LED Strategy).

5.7.2 Spatial Context of the District[25]

The ZF Mgcawu District Municipality (ZFMDM) consists of six Local Municipalities namely, Dawid Kruiper; Kai !Garib; //Khara Hais; Tsantsabane, !Kheis and Kgatelopele, and covers an area of more than 100 000 km^2 (almost 30% of the Northern Cape Province). Of this total, 65% (65 000 km^2) is made up of the Kalahari Desert, Kgalagadi Transfrontier Park and the former Bushman Land. The largest town in the region is Upington, which also functions as the district municipal capital. Following the municipal elections in 2011, Riemvasmaak (Sending and Vredesvallei) were included within the KGLM. The Riemvasmaak Community is located ~ 60 km west of Kakamas. Based on the Household Community Survey data the population of the ZFMDM was 252 692 in 2016 compared to 236 763 in 2011. The DLKM and KGLM are home to ~ 70 % of the ZFMDM population.

Table 17: Population of Local Municipalities within the ZFMDM

Local Municipality	Population	Percentage
Dawid Kruiper	107 161	42.4%
Kai !Garib	68 929	27.3%
Tsantsabane	39 345	15.6%
!Kheis	16 566	7.5%
Kgatelopele	20 691	8.2%

The Coloured population group make up the dominant group in the ZFMDM, DKLM and KGLM, followed by Black Africans and Whites. In terms of language, Afrikaans, followed by Setswana and IsiXhosa are the three main languages spoken in the area.

The ZFMDM accounts for ~ 30% of the Northern Cape economy. Agriculture plays a key role in the local economy and is strongly linked to irrigation along the Gariep River (Orange River). The Orange River is perennial with a flow which varies between 50 and 1800 cubic meter per second (cum/s) depending on the season. The flow of the river is largely controlled by the releases of the dams upstream, like the Bloemhof, Gariep and Van der Kloof dams. Agriculture in the ZFMDM is dominated by grape production for table grapes, which is mainly exported to Europe, as well as livestock and game farming.

The Orange River over area delivers a major part is that South Africa's table grape production. More than 90% of Africa's total dried vine fruit production is produced in the Northern Cape. The Orange River Wine Cellars Co-op, based in Upington, is the second largest winemaking cooperative in the world and has wine cellars in Groblershoop, Grootdrink, Upington, Keimoes and Kakamas.

Livestock farming occurs mainly on large farms where farming is extensive. Most of the farms are privately owned. The central parts of the region consist mainly of semi-desert areas and are therefore, with a few exceptions, mainly suitable for extensive livestock farming. In terms of employment, the most important economic sectors are Agriculture, followed by Community, Social and Personal, and Private Households.

Tourism represents one of the most important economic sectors in the Northern Cape as well as within the ZFMDM. In this regard the ZFMDM IDP indicates that tourism is the fastest growing component of the economy. Key tourism assets include the world renowned Kgalagadi Transfrontier Park, Augrabies National Park and Pitskop Nature Reserve near Upington.

Minerals and mining also play an important role in the local economy of the ZFMDM. Key mining activities include copper and zinc of Areachap north of Upington. Various small concentrations of calcite, lead, fluorspar, barite, wolfram and amethyst. Salt is also being mined at two pans, namely Groot

[25] ZF Mgcawu District Municipality

Witpan, 95 km northwest of Upington and at Witpan, 115km northwest of Upington. In terms of social well-being the ZFMDM's greatest social challenges are illiteracy, poverty and low education levels.

5.7.3 Spatial context of the Local Municipality[26]

The proposed facility is in the KGLM, a category-B municipality[27]. The municipality is approximately 7 445 km² in size (~7.2% of the ZFMDM) and is bordered to the north, south and west by a District Management Area (NCDMA08) and in the east by the //Khara Hais and !Kheis Local Municipalities. In terms of land use, the Kai !Garib Local Municipality is largely rural and agricultural with three urban/semi-urban nodes at Kakamas, the designated administrative center of the municipality, Keimoes and Kenhardt.

The Orange River (Gariep River) plays a key role in the day to day life of most of the inhabitants in the KGLM and is critical to the area's economic well-being. The main towns of Kakamas and Keimoes are situated amid an intensive irrigation farming community stretching from Groblershoop in the east up to Blouputs in the west. Farming includes crops such as vineyards, pecan nut- and citrus plantations. Local areas within the KGLM where intensive irrigation is undertaken include Blouputs, Eksteenskuil, Riemvasmaak and Cannon Island.

The KGLM also has two unique trust communities that in many ways' functions differently than other communities. The first is Riemvasmaak which is located ~ 60 km west from Kakamas and falls with Ward 1 of the municipality. The Riemvasmaak community consists of ~ 250 households and were forcefully removed from their land in 1973 and returned in 1994. The Riemvasmaak Community Trust is divided in two sections namely Vredesvallei and Mission.

Of relevance to the proposed development is the second Trust community, the Blocuso Trust Community, which consists of 3 farms, namely, Bloemsmond, Curriescamp and Soverby. These farms are in Ward 8, ~ 10 km north east of Keimoes. The community of Bloemsmond is located immediately to the south of the site. The farms were handed over to the three families by Queen Victoria in 1886. However, the properties were forcefully resold to white farmers in 1914 and the previous owners became farm workers. The Independent church of Gordonia under the leadership of Ds Saul Damon bought back the farms between 1914 and 1934. In 2000 the government assisted the 466 families on the three farms to buy the farms from the church. The communities established the Blocuso Trust and used the government subsidies to buy the farms and provide basic services like electricity and clean water. Since the Blocuso Trust was established the government have provided the trust with great assistance in terms of infrastructure projects.

The Municipal Area is divided into 9 wards. The proposed grid connection infrastructure is in Ward 8.

Table 18: List of Wards in the KGLM

Ward	Areas
1	Augrabies, Noudonsies, Zeekoeisteek, Blouput Riemvasmaak
2	Cillie, Marchand, Perde-eiland, Omdraai
3	Kakamas Dorp, Alheit, Bloukamp, Truterkamp
4	Kromhout Boerdery, Kakamas Oos (Langverwag), Neus
5	Lennertsville, Koms, Keimoes Dorp, Akasia Park
6	Gardenia, Whalsig, Noodkamp, Vaaldriehoek
7	Lutzburg, Friersdale, Warmsand, Eenduin, Swartbooisberg, Bloemsmond,
8	Eksteenskuil Eilande, Soverby, McTaggerscamp, Curriescamp, Blaauwsekop, Kanoneiland
9	Kenhardt, Southern Farms

[26] Kai !Garib

[27] A category-B municipality is defined as a municipality that shares executive and legislative authority in its area with a category- C municipality within whose area it falls.

6. IMPACT ASSESSMENT

This section was of the report was completed with input from the following specialists:

- Terrestrial Ecology (Dr David Hoare, 2020)
- Avifauna (Mr Chris van Rooyen, 2020)
- Botany (Dr David Hoare, 2020)
- Freshwater Ecology (Dr Brian Colloty, 2020)
- Agricultural (Lubbe, 2020)
- Palaeontology (Professor Marion Bamford, 2020)
- Archaeology and Heritage (Mr Jaco van der Walt, 2020)
- Visual (Mr Jon Marshall, 2020)
- Socio Economic (Mr Tony Barbour, 2020)

The impacts will firstly be discussed per specialist discipline and then summarised in the impact summary and statement below[28].

6.1 ASSESSMENT METHODOLOGY

All possible impacts need to the assessed – the **direct, in-direct as well as cumulative impacts**. Impact criteria should include the following:

- **Nature of the impact:** impacts associated with the proposed Geel Kop Grid Connection Infrastructure have been described in terms of whether they are negative or positive and to what extent.
- **Duration of impacts: Impact were assessed in terms of their anticipated duration:**
    - Short term (e.g. during the construction phase)
    - Medium term (e.g. during part or all of the operational phase)
    - Permanent (e.g. where the impact is for all intents and purposes irreversible)
    - Discontinuous or intermittent (e.g. where the impact may only occur during specific climatic conditions or during a particular season of the year)
- **Intensity or magnitude: The size of the impact (if positive) or its severity (if negative):**
    - Low, where the receiving environment (biophysical, social, economic, cultural etc) is negligibly affected or where the impact is so low that the remedial action is not required;
    - Medium, where the receiving environment (biophysical, social, economic, cultural etc) is altered, but not severely affected, and the impact can be remedied successfully; and
    - High, where the receiving environment (biophysical, social, economic, cultural etc) would be substantially (i.e. to a very large degree) affected. If a negative impact, could lead to irreplaceable loss of a resource and/or unacceptable consequences for human wellbeing.
- **Probability: Should describe the likelihood of the impact occurring indicated as:**
    - Improbable, where the possibility of the impact is very low either because of design or historic experience;

[28] The assessment tables reflected in this section are those of the preferred site alternative. Please see the discussion in section 2.4 above for discussion on the impacts associated with alternatives (namely alternative collector substation position and alternative connection to the national grid).

- Probable, where there is a distinct possibility that the impact will occur;
- Highly probable, where it is most likely that the impact will occur; or
- Definite, where the impact will occur regardless of any prevention measures.

- **Significance: The significance of impacts can be determined through a synthesis of the assessment criteria. Significance can be described as:**
  - Low, where it would have negligible effect on the receiving environment (biophysical, social, economic, cultural etc), and on the decision;
  - Medium, where it would have a moderate effect on the receiving environment (biophysical, social, economic, cultural etc), and should influence the decision;
  - High, where it would have, or there would be a high risk of, a large effect on the receiving environment (biophysical, social, economic, cultural etc). These impacts should have a major influence on the decision;
  - Very high, where it would have, or there would be a high risk of, an irreversible negative impact on the receiving environment (biophysical, social, economic, cultural etc) and irreplaceable loss of natural capital/resources or a major positive effect on human well-being. Impacts of very high significance should be a central factor in decision-making.
  - Provision should be made for with and without mitigation scenarios.
- **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
- **Consequence**: **What will happen if the impact occurs**
  - Insignificant, where the potential consequence of an identified impact will not cause detrimental impact to the receiving environment;
  - Significant, where the potential consequence of an identified impact will cause detrimental impact to the receiving environment.
  - Provision must be made for with and without mitigation scenarios.

The impacts should also be assessed in terms of the following aspects:

- **Status of the impact**

  The specialist should determine whether the impacts are negative, positive or neutral ("cost – benefit" analysis). The impacts are to be assessed in terms of their effect on the project and the environment. For example, an impact that is positive for the proposed development may be negative for the environment. It is important that this distinction is made in the analysis.

- **Cumulative impact**

  Consideration must be given to the extent of any accumulative impact that may occur due to the proposed development. Such impacts must be evaluated with an assessment of similar developments planned and 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.

  Care must be taken to ensure that where cumulative impacts can occur that these impacts are considered and categorised as **additive** (incremental or accumulative); **interactive**, **sequential** or **synergistic**.

Based on a synthesis of the information contained in the above-described procedure, the specialists assessed the potential impacts in terms of the 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.

6.2 IDENTIFICATION OF IMPACTS TO BE ASSESSED

The potential key impacts[29] identified and assessed by the various specialists (more details on the significance and ratings of these impacts are provided in section 6.4 – 6.11 below and in the attached specialist reports). This section summaries the key impacts that were identified by the specialists (i.e. those impacts requiring further assessment).

6.2.1 Ecological Impacts Assessed

- Vegetation clearing for construction could impact indigenous species as well as riparian and terrestrial plant communities. Vegetation clearing will also lead to **habitat loss** for fauna and potentially the loss of sensitive faunal species, habitats and ecosystems within the remaining natural areas;
- Presence and operation of construction machinery on site. This will create a physical impact as well as generate noise, pollution and other forms of disturbance at the site. Disturbance could affect faunal species;
- Increased human presence can lead to faunal conflict;
- The presence of the development could disrupt the connectivity of the landscape;
- Collisions and Electrocutions;
- Human-animal conflict can occur;
- Alien clearing will improve the ecology and habitat of the area; and
- Transformation of intact habitat could disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations.

6.2.2 Freshwater Impacts Assessed

- Disturbance to riparian habitat;
- Disturbance to watercourse bed and banks;
- Sedimentation of downstream watercourses;
- Water Quality Impacts; and
- Alien plant introduction.

6.2.3 Heritage Impacts Assessed

- Impact on scenic routes during construction;
- Impacts on the heritage resources;

[29] This section provides a list of the key impacts assessed and has grouped similar impacts in certain instances.

- Impact on scenic routes;
- Impact of new structures on cultural landscape and character; and
- Change to the rural character.

6.2.4 Archaeological Impacts Assessed

- Disturbance to surface and sub-surface sediments.

6.2.5 Visual Impacts Assessed

- Visual scarring because of new development, clearing vegetation and construction works;
- Change in the rural visual character of the site;
- Visual impact on key visual receptors and secondary visual receptors;
- Potential visual massing,
- Visibility from sensitive receptors;
- Visual intrusion of lighting at night; and
- Socio-economic upliftment.

6.2.6 Socio-Economic Impacts Assessed

- Creation of business and employment opportunities;
- Impacts associated with the presence of construction workers on site;
- Security and safety impacts associated with the presence of construction workers;
- Noise, dust and safety impacts associated with construction related activities and the movement of heavy vehicles;
- Impact on rural sense of place and character of the area; and
- Crime levels and pressure on local services.

6.3 SITE CONSTRAINTS AND POTENTIAL RISKS & IMPACTS

The following spatial site-specific constraints were identified by various specialists and the EAP during the initial stage of the environmental process.

Table 19: Summary of potential site constraints identified during the initial phase of the BAR Process and which are assessed in the section below.

Specialist Discipline	Site Constraints
Flora:	Sensitive vegetation associated with the koppies, water courses and pans.
Fauna	Sensitive habitat associated with the koppies, water courses and pans.
Avifauna	Habitat and Avifaunal Flight paths associated with the koppies
Agricultural	No specific spatial constraints identified.
Heritage	Presence of ephemeral Archaeology scatters.
Palaeontology	No specific spatial constraints identified.
Visual	Scenic Receptors (water courses and Koppies).

6.4 ECOLOGICAL IMPACTS

An Ecological Assessment (encompassing Terrestrial Fauna and Botany) was undertaken by Dr David Hoare. A copy of this assessment is attached in **Annexure E1** from which the following is summarised.

6.4.1 Ecological Impacts during Construction

The tables below depict the assessment of construction phase impacts (pre and post mitigation) on ecological resources.

Table 20: Loss and/or fragmentation of indigenous natural vegetation.

Environmental parameter	Indigenous natural vegetation	
Issue/Impact/Environmental Effect/Nature	Loss, degradation or fragmentation of vegetation.	
Extent	The impact will affect natural vegetation on site.	
Probability	If the project is authorized then the impact will definitely happen.	
Reversibility	Irreversible in human timeframes, since construction of roads and other hard surfaces completely remove vegetation and modify the substrate upon which it grows. Secondary vegetation in disturbed areas will probably never resemble the original vegetation found on site.	
Irreplaceable loss of resources	Significant loss of resources will occur within the footprint of the proposed infrastructure since vegetation clearing is required prior to installation of infrastructure.	
Duration	The impact will be permanent (mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient)	
Cumulative effect	Medium cumulative impact. Added to existing impacts on natural habitat from activities in the general region as well as the nearby similar RE projects, the current project will cause additional loss of vegetation, the cumulative effect of which will be medium.	
Intensity/magnitude	High. The functional integrity of vegetation on site will be compromised to some degree (especially in the sense that the quality, integrity and functionality of CBA areas will be affected, which can be limited to some extent by implementation of mitigation measures.	
Significance rating	Medium-Low negative impact expected.	
	Pre-mitigation impact rating	**Post-mitigation impact rating**
Extent	1 (Site)	1 (Site)
Probability	4 (Definite)	4 (Definite)
Reversibility	4 (Irreversible)	4 (Irreversible)
Irreplaceable loss	2 (Marginal loss of resources)	2 (Marginal loss of resources)
Duration	4 (Permanent)	4 (Permanent)
Cumulative effect	3 (Medium)	2 (Low)
Intensity/magnitude	2 (Medium)	1 (Low)
Significance rating	**-36 (medium negative)**	**-34 (medium-low negative)**
Mitigation measures	It is not possible to completely avoid impacts on indigenous vegetation for this project. The following mitigation measures would help to limit impacts: - Restrict impact to development footprint only and limit disturbance spreading into surrounding areas. - As far as possible, locate infrastructure within areas that have been previously disturbed or in areas with lower sensitivity scores. - Avoid sensitive features and habitats when locating infrastructure. - Cross streams and other linear features at right angles, where possible, and also near their end-points or where there are natural breaks in the feature. - Vegetation to be brush cut and only in exceptional circumstances completely cleared. - Compile a Rehabilitation Plan. - Compile an Alien Plant Management Plan, including monitoring, to ensure minimal impacts on surrounding areas. - Where possible, access roads should be located along existing farm, access and district roads.	

	- Access to sensitive areas outside of development footprint should not be permitted during construction. - Undertake monitoring to evaluate whether further measures would be required to manage impacts.

Table 21: Loss of individuals of protected plants.

Environmental parameter	Protected plants, as per NEM:BA or NCNCA or listed plants	
Issue/Impact/Environmental Effect/Nature	Loss of individuals occurring within the footprint of construction.	
Extent	The impact will affect local populations or individuals of the affected species.	
Probability	Based on the list of species that are protected or listed, the impact is certain to happen.	
Reversibility	Partly reversible. Where necessary, individuals can be rescued or else cultivated to replace lost specimens.	
Irreplaceable loss of resources	Marginal loss of resources could occur. The species that are likely to occur on site are likely to be relatively common throughout their range and they have very wide geographical ranges.	
Duration	The impact will be medium-term.	
Cumulative effect	Low cumulative impact. Cumulative effects will not be significant.	
Intensity/magnitude	Low. Loss of some individuals will be insignificant compared to the number that probably occur in nearby natural areas.	
Significance rating	Low negative impact expected.	
	Pre-mitigation impact rating	**Post-mitigation impact rating**
Extent	1 (Site)	1 (Site)
Probability	3 (Probable)	2 (Possible)
Reversibility	4 (Irreversible)	4 (Irreversible)
Irreplaceable loss	2 (Marginal loss of resources)	1 (No loss of resources)
Duration	4 (Permanent	2 (Medium-term)
Cumulative effect	2 (Low)	1 (Negligible)
Intensity/magnitude	2 (Medium	1 (Low)
Significance rating	**-32 (medium negative)**	**-12 (low negative)**
Mitigation measures	A number of protected species were found on site. The following mitigation measures would help to avoid and limit impacts: **It is a legal requirement to obtain permits for specimens that will be lost.** - A detailed pre-construction walk-through survey will be required during a favourable season to locate any additional individuals of protected plants. This survey must cover the footprint of all approved infrastructure, including internal access roads. - If possible, plants should be conserved *in situ*, along with an appropriate buffer zone around them. Consideration should be given to shifting infrastructure to avoid such plants, especially the Vulnerable *Aloidendron dichotomum.* If this is not possible, then the following measures may be implemented: - Plants lost to the development can be rescued and planted in appropriate places in rehabilitation areas. This will reduce the irreplaceable loss of resources as well as the cumulative effect. - A Plant Rescue Plan must be compiled to be approved by the appropriate authorities.	

Table 22: Loss of faunal habitat and refugia.

Environmental parameter	Fauna of conservation concern (Leopard, Littledale's Whistling Rat)	
Issue/Impact/Environmental Effect/Nature	Displacement of individuals.	
Extent	The impact will affect individuals on site and possibly in immediately surrounding areas.	
Probability	The impact may possibly happen.	
Reversibility	Partly reversible with time.	
Irreplaceable loss of resources	No or low loss of resources will occur.	
Duration	The impact will be short-term (construction phase).	
Cumulative effect	Low cumulative impact. Cumulative effects will be minor.	
Intensity/magnitude	Low. May impact on population processes.	
Significance rating	Low negative impact expected.	
	Pre-mitigation impact rating	**Post-mitigation impact rating**
Extent	1 (Site)	1 (Site)
Probability	3 (Probable)	3 (Probable)
Reversibility	3 (Barely reversible)	3 (Barely reversible)
Irreplaceable loss	2 (Marginal)	2 (Marginal)
Duration	4 (Permanent)	4 (Permanent)
Cumulative effect	2 (Low)	2 (Low)
Intensity/magnitude	2 (Medium)	1 (Medium)
Significance rating	**-30 (medium negative)**	**-15 (low negative)**
Mitigation measures	- Restrict impact to development footprint only and limit disturbance spreading into surrounding areas. - Limit clearing of natural habitat designated as sensitive, especially rocky outcrops, cliffs and riparian habitats. - All mitigation measures that apply to "Loss and/or fragmentation of indigenous natural vegetation" also apply here.	

Table 23: Mortality of fauna.

Environmental parameter	Fauna	
Issue/Impact/Environmental Effect/Nature	Loss of individuals.	
Extent	The impact will affect individuals on site.	
Probability	The impact will probably happen to some extent.	
Reversibility	Completely reversible. Impact is reversible with mitigation measures.	
Irreplaceable loss of resources	Marginal loss of resources will occur.	
Duration	The impact will be short-term (during construction phase only).	
Cumulative effect	Negligible cumulative impact.	
Intensity/magnitude	Low. Barely perceptible impact on population processes.	
Significance rating	Low negative impact expected.	
	Pre-mitigation impact rating	**Post-mitigation impact rating**
Extent	1 (Site)	1 (Site)
Probability	3 (Probable))	2 (Possible))
Reversibility	1 (Completely reversible)	1 (Completely reversible)
Irreplaceable loss	2 (Marginal)	2 (Marginal)
Duration	1 (Short-term)	1 (Short-term)
Cumulative effect	1 (Negligible)	1 (Negligible)
Intensity/magnitude	1 (Low)	1 (Low)
Significance rating	**-9 (low negative)**	**-8 (low negative)**
Mitigation measures	The following mitigation measures would help to avoid or limit impacts: - Access to sensitive areas outside of development footprint should not be permitted during construction. - Speed limits should be set for all roads on site, as well as access roads to the site. Strict enforcement of speed limits	

	should occur – install speed control measures, such as speed humps, if necessary. - Night driving should be strictly limited and, where absolutely required, lower speed limits should apply for night driving. - Pre-construction walk-through on construction front must be undertaken to move any individual animals, such as tortoises, prior to construction. - No dogs or other pets should be allowed on site. - Personnel on site should undergo environmental induction training, including the need to abide by speed limits, the increased risk of collisions with wild animals on roads in rural areas. - If electric fences are to be constructed, these should be erected according to the standars of Nature Conservation authorities. - Proper waste management must be implemented, ensuring no toxic or dangerous substances are accessible to wildlife. This should also apply to stockpiles of new and used materials to ensure that they do not become a hazard.

Table 24: Displacement of terrestrial fauna.

Environmental parameter	Mobile fauna of conservation concern (Honey Badger, Black-footed Cat, Leopard, Cape Fox and Grey Rhebok)	
Issue/Impact/Environmental Effect/Nature	Displacement of individuals.	
Extent	The impact will affect individuals on site and possibly in immediately surrounding areas.	
Probability	The impact may possibly happen.	
Reversibility	Partly reversible with time.	
Irreplaceable loss of resources	No or low loss of resources will occur.	
Duration	The impact will be short-term (construction phase).	
Cumulative effect	Low cumulative impact. Cumulative effects will be minor.	
Intensity/magnitude	Low. May impact on population processes.	
Significance rating	Low negative impact expected.	
	Pre-mitigation impact rating	**Post-mitigation impact rating**
Extent	1 (Site)	1 (Site)
Probability	2 (Possible)	2 (Possible)
Reversibility	2 (Partly reversible)	2 (Partly reversible)
Irreplaceable loss	1 (None)	1 (None)
Duration	1 (Short-term)	1 (Short-term)
Cumulative effect	1 (Low)	1 (Low)
Intensity/magnitude	1 (Low)	1 (Low)
Significance rating	**-8 (low negative)**	**-8 (low negative)**
Mitigation measures	- Restrict impact to development footprint only and limit disturbance spreading into surrounding areas. - Access to sensitive areas outside of development footprint should not be permitted during construction. - No speeding on access roads – install speed control measures, such as speed humps, if necessary - No hunting of protected species. - Personnel to be educated about protection status of species, including distinguishing features to be able to identify protected species. - Report any sitings to conservation authorities.	

Table 25: Increased poaching and illegal collecting.

Environmental parameter	Any plants and/or animals that are attractive to collectors and/or poachers	
Issue/Impact/Environmental Effect/Nature	Loss of individuals / populations.	
Extent	The impact will affect individuals on site.	
Probability	The impact may possibly happen.	
Reversibility	Partly reversible with time.	
Irreplaceable loss of resources	Low to marginal loss of resources will occur.	
Duration	The impact will be permanent (duration of the life of the roads).	
Cumulative effect	Medium cumulative impact. Cumulative effects will be minor.	
Intensity/magnitude	Medium. May impact on population processes.	
Significance rating	Low negative impact expected.	
	Pre-mitigation impact rating	**Post-mitigation impact rating**
Extent	1 (Site)	1 (Site)
Probability	2 (Possible)	2 (Possible)
Reversibility	2 (Partly reversible)	2 (Partly reversible)
Irreplaceable loss	2 (Low)	2 (Low)
Duration	4 (Permanent)	4 (Permanent)
Cumulative effect	2 (Low)	1 (Low)
Intensity/magnitude	2 (Low)	1 (Low)
Significance rating	**-26 (low negative)**	**-12 (low negative)**
Mitigation measures	- Personnel to be educated about protection status of species, including distinguishing features, to be able to identify protected species. - Implement strict access control for the site. - No hunting of protected species. - Report any illegal collection to conservation authorities.	

Table 26: Vegetation damage due to dust deposition.

Environmental parameter	Vegetation	
Issue/Impact/Environmental Effect/Nature	Dust deposition, resulting in reduced physiological fitness of plants / vegetation.	
Extent	The impact will affect vegetation on site and in all areas with access roads leading to site.	
Probability	The impact will almost certainly happen.	
Reversibility	Partly reversible with time.	
Irreplaceable loss of resources	Low to marginal loss of resources will occur.	
Duration	The impact will be permanent (duration of the life of the roads) for access roads (although only subject to high traffic volumes during construction, and short-term for construction areas.	
Cumulative effect	Medium cumulative impact. Cumulative effects will be minor.	
Intensity/magnitude	Medium. May impact on population processes.	
Significance rating	Low negative impact expected.	
	Pre-mitigation impact rating	**Post-mitigation impact rating**
Extent	2 (Local)	2 (Local)
Probability	3 (Probable)	3 (Probable)
Reversibility	2 (Partly reversible)	2 (Partly reversible)
Irreplaceable loss	2 (Low)	2 (Low)
Duration	1 (Short-term)	1 (Short-term)
Cumulative effect	3 (Medium)	2 (Low)
Intensity/magnitude	2 (Medium)	1 (Low)
Significance rating	**-26 (low negative)**	**-12 (low negative)**
Mitigation measures	- No speeding on access roads – install speed control measures, such as speed humps, if necessary, and penalties for non-compliance.	

	- Undertake dust fall-out monitoring and manage, where necessary.

Table 27: Establishment and spread of declared weeds.

Environmental parameter	Vegetation and habitat	
Issue/Impact/Environmental Effect/Nature	Loss of habitat due to invasion by alien plants	
Extent	The impact will affect habitat on site and possibly in immediately surrounding areas.	
Probability	The impact will probably happen in the absence of control measures.	
Reversibility	Partly reversible in the absence of control measures. Completely reversible if mitigation measures applied. Preventative measures will stop the impact from occurring.	
Irreplaceable loss of resources	Marginal to significant loss of resources will occur. Uncontrolled invasion can affect all nearby natural habitats.	
Duration	The impact will be long-term.	
Cumulative effect	Medium cumulative impact. Cumulative effects will be minor.	
Intensity/magnitude	Medium. Severe invasion can alter the functioning of natural ecosystems.	
Significance rating	Low negative impact expected.	
	Pre-mitigation impact rating	**Post-mitigation impact rating**
Extent	1 (Site)	1 (Site)
Probability	3 (Probable)	2 (Possible)
Reversibility	2 (Partly)	2 (Partly)
Irreplaceable loss	3 (Significant)	2 (Marginal)
Duration	3 (Long-term)	3 (Long-term)
Cumulative effect	3 (Medium)	2 (Low)
Intensity/magnitude	2 (Medium)	1 (Low)
Significance rating	**-30 (medium negative)**	**-12 (low negative)**
Mitigation measures	It is possible to avoid impacts due to alien plant invasions by undertaking the following mitigation measures: - Compile and implement an alien management plan, which highlights control priorities and areas and provides a programme for long-term control. This should include any areas within proximity to the project that may be affected by the project, or that could have an influence on invasion by alien invasive plants into the property. - Undertake regular monitoring to detect alien invasions early so that they can be controlled. - Implement control measures.	

Table 28: Changes in behavioural patterns of animals.

Environmental parameter	Mobile fauna	
Issue/Impact/Environmental Effect/Nature	Displacement of individuals or changes to community structure.	
Extent	The impact will affect individuals on site and possibly in immediately surrounding areas.	
Probability	The impact may possibly happen.	
Reversibility	Partly reversible with time.	
Irreplaceable loss of resources	No or low loss of resources will occur.	
Duration	The initial impact will be short-term (construction phase).	
Cumulative effect	Low cumulative impact. Cumulative effects will be minor.	
Intensity/magnitude	Low. May impact on population processes.	
Significance rating	Low negative impact expected.	
	Pre-mitigation impact rating	**Post-mitigation impact rating**
Extent	1 (Site)	1 (Site)
Probability	2 (Possible)	2 (Possible)
Reversibility	2 (Partly reversible)	2 (Partly reversible)

Irreplaceable loss	1 (None)	1 (None)
Duration	1 (Long-term)	1 (Short-term)
Cumulative effect	1 (Low)	1 (Low)
Intensity/magnitude	1 (Low)	1 (Low)
Significance rating	**-8 (low negative)**	**-8 (low negative)**
Mitigation measures	- Avoid development of designated sensitive habitats. - Access to sensitive areas outside of development footprint should not be permitted during construction. - Personnel to be educated about environmental sensitivities and issues on site. - Report any sitings to conservation authorities. - Appropriate lighting should be installed to minimize impacts on nocturnal animals. - Construction activities should not be undertaken at night. - Noise and light pollution should be managed according to guidelines from the noise specialist study.	

Table 29: Increased runoff and erosion.

Environmental parameter	Vegetation and habitat	
Issue/Impact/Environmental Effect/Nature	Runoff and erosion	
Extent	The impact will affect habitat on site.	
Probability	The impact will probably happen in the absence of control measures.	
Reversibility	Partly reversible in the absence of control measures. Completely reversible if mitigation measures applied. Preventative measures will stop the impact from occurring.	
Irreplaceable loss of resources	Marginal to significant loss of resources will occur. Uncontrolled erosion can affect all downslope natural habitats.	
Duration	The impact will be long-term.	
Cumulative effect	Medium cumulative impact. Cumulative effects will be minor.	
Intensity/magnitude	Medium. Severe erosion can locally alter the functioning of natural ecosystems and cause additional loss of vegetation.	
Significance rating	Low negative impact expected.	
	Pre-mitigation impact rating	**Post-mitigation impact rating**
Extent	1 (Site)	1 (Site)
Probability	3 (Probable)	2 (Possible)
Reversibility	2 (Partly)	2 (Partly)
Irreplaceable loss	3 (Significant)	2 (Marginal)
Duration	3 (Long-term)	3 (Long-term)
Cumulative effect	3 (Medium)	2 (Low)
Intensity/magnitude	2 (Medium)	1 (Low)
Significance rating	**-30 (medium negative)**	**-12 (low negative)**
Mitigation measures	- Compile and implement a stormwater management plan, which highlights control priorities and areas and provides a programme for long-term control. - Undertake regular monitoring to detect erosion features early so that they can be controlled. - Implement control measures. - Avoid building on or near steep or unstable slopes. - Construct proper culverts, bridges and/or crossings at drainage-line crossings, and other attenuation devices to limit overland flow.	

6.4.2 Ecological Impacts during Operation

The tables below depict the assessment of operational phase impacts (pre and post mitigation) on ecological resources.

Table 30: Continued disturbance of indigenous natural vegetation.

Environmental parameter	Indigenous natural vegetation
Issue/Impact/Environmental Effect/Nature	Loss or degradation of vegetation.
Extent	The impact will affect natural vegetation on site.
Probability	Continued disturbance will probably happen.
Reversibility	Partly reversible, on condition no additional vegetation clearing takes place.
Irreplaceable loss of resources	Marginal loss of resources will occur adjacent to the footprint of the proposed infrastructure since this is the most likely location of operational activities.
Duration	The impact will be long-term (will continue or last for the entire operational life of the project)
Cumulative effect	Medium cumulative impact. Added to existing impacts on natural habitat from activities on site, will cause additional loss of vegetation, the cumulative effect of which will be medium.
Intensity/magnitude	Medium. The quality, use and integrity of vegetation on site will be compromised to some degree, which can be limited to some extent by implementation of mitigation measures.
Significance rating	Medium negative impact expected.

	Pre-mitigation impact rating	**Post-mitigation impact rating**
Extent	1 (Site)	1 (Site)
Probability	3 (Probable)	3 (Probable)
Reversibility	2 (Partly reversible)	2 (Partly reversible)
Irreplaceable loss	2 (Marginal loss of resources)	2 (Marginal loss of resources)
Duration	3 (Long-term)	3 (Long-term)
Cumulative effect	3 (Medium)	3 (Medium)
Intensity/magnitude	2 (Medium)	1 (Low)
Significance rating	**-28 (low negative)**	**-14 (low negative)**
Mitigation measures	- No additional clearing of vegetation should take place without a proper assessment of the environmental impacts and authorization from relevant authorities. - If any additional infrastructure needs to be constructed, for example overhead powerlines, communication cables, etc., then these must be located next to existing infrastructure, and clustered to avoid dispersed impacts. - No driving of vehicles off-road. - Implement Alien Plant Management Plan, including monitoring, to ensure minimal impacts on surrounding areas. - Access to sensitive areas outside of development footprint should not be permitted during operation. - Surface runoff and erosion must be properly controlled and any issues addressed as quickly as possible.	

Table 31: Mortality of fauna during operation.

Environmental parameter	Fauna, including those of conservation concern (Leopard, and Cape Fox)
Issue/Impact/Environmental Effect/Nature	Mortaility of individuals due to secondary effects.
Extent	The impact will affect individuals on site and possibly in immediately surrounding areas.
Probability	The impact may possibly happen.
Reversibility	Partly reversible with time.
Irreplaceable loss of resources	Low loss of resources will occur.
Duration	The impact will be long-term (operation phase).
Cumulative effect	Low cumulative impact. Cumulative effects will be minor.

Intensity/magnitude	Medium. May impact on population processes.	
Significance rating	Low negative impact expected.	
	Pre-mitigation impact rating	**Post-mitigation impact rating**
Extent	1 (Site)	1 (Site)
Probability	2 (Possible)	2 (Possible)
Reversibility	2 (Partly reversible)	2 (Partly reversible)
Irreplaceable loss	2 (Marginal)	1 (None)
Duration	3 (Long-term)	3 (Long-term)
Cumulative effect	2 (Low)	2 (Low)
Intensity/magnitude	2 (Medium)	1 (Low)
Significance rating	**-24 (low negative)**	**-11 (low negative)**
Mitigation measures	- Personnel and vehicles to avoid sensitive habitats. - No speeding on access roads – install speed control measures, such as speed humps, if necessary - No illegal collecting of any individuals, particularly the Armadillo Girdled Lizard. - No hunting of protected species or hunting of any other species without a valid permit. - Personnel to be educated about protection status of species, including distinguishing features to be able to identify protected species. - Report any sitings to conservation authorities. - Prevent unauthorised access to the site – project roads provide access to remote areas that were not previously easily accessible for illegal collecting or hunting.	

Table 32: Continued establishment and spread of declared weeds.

Environmental parameter	Vegetation and habitat	
Issue/Impact/Environmental Effect/Nature	Loss of habitat due to invasion by alien plants	
Extent	The impact will affect habitat on site and possibly in immediately surrounding areas.	
Probability	The impact will probably happen in the absence of control measures.	
Reversibility	Partly reversible in the absence of control measures. Completely reversible if mitigation measures applied. Preventative measures will stop the impact from occurring.	
Irreplaceable loss of resources	Marginal to significant loss of resources will occur. Uncontrolled invasion can affect all nearby natural habitats.	
Duration	The impact will be long-term.	
Cumulative effect	Medium cumulative impact. Cumulative effects will be minor.	
Intensity/magnitude	Medium. Severe invasion can alter the functioning of natural ecosystems.	
Significance rating	Low negative impact expected.	
	Pre-mitigation impact rating	**Post-mitigation impact rating**
Extent	1 (Site)	1 (Site)
Probability	3 (Probable)	2 (Possible)
Reversibility	2 (Partly)	2 (Partly)
Irreplaceable loss	3 (Significant)	2 (Marginal)
Duration	3 (Long-term)	3 (Long-term)
Cumulative effect	3 (Medium)	2 (Low)
Intensity/magnitude	2 (Medium)	1 (Low)
Significance rating	**-30 (medium negative)**	**-12 (low negative)**
Mitigation measures	- Compile and implement an alien management plan, which highlights control priorities and areas and provides a programme for long-term control. - Undertake regular monitoring to detect alien invasions early so that they can be controlled. - Implement control measures. - Do NOT use any alien plants during rehabilitation.	

Table 33: Increased runoff and erosion.

Environmental parameter	Vegetation and habitat	
Issue/Impact/Environmental Effect/Nature	Runoff and erosion	
Extent	The impact will affect habitat on site.	
Probability	The impact will probably happen in the absence of control measures.	
Reversibility	Partly reversible in the absence of control measures. Completely reversible if mitigation measures applied. Preventative measures will stop the impact from occurring.	
Irreplaceable loss of resources	Marginal to significant loss of resources will occur. Uncontrolled erosion can affect all downslope natural habitats.	
Duration	The impact will be long-term.	
Cumulative effect	Medium cumulative impact. Cumulative effects will be minor.	
Intensity/magnitude	Medium. Severe erosion can locally alter the functioning of natural ecosystems and cause additional loss of vegetation.	
Significance rating	Low negative impact expected.	
	Pre-mitigation impact rating	**Post-mitigation impact rating**
Extent	1 (Site)	1 (Site)
Probability	3 (Probable)	2 (Possible)
Reversibility	2 (Partly)	2 (Partly)
Irreplaceable loss	3 (Significant)	2 (Marginal)
Duration	3 (Long-term)	3 (Long-term)
Cumulative effect	3 (Medium)	2 (Low)
Intensity/magnitude	2 (Medium)	1 (Low)
Significance rating	**-30 (medium negative)**	**-12 (low negative)**
Mitigation measures	- Compile and implement a stormwater management plan, which highlights control priorities and areas and provides a programme for long-term control. - Undertake regular monitoring to detect erosion features early so that they can be controlled. - Implement control measures. - Avoid building on or near steep or unstable slopes. - Construct proper culverts, bridges and/or crossings at drainage-line crossings, and other attenuation devices to limit overland flow.	

Table 34: Changes in behavioural patterns of animals.

Environmental parameter	Mobile fauna	
Issue/Impact/Environmental Effect/Nature	Displacement of individuals or changes to community structure.	
Extent	The impact will affect individuals on site and possibly in immediately surrounding areas.	
Probability	The impact may possibly happen.	
Reversibility	Partly reversible with time.	
Irreplaceable loss of resources	No or low loss of resources will occur.	
Duration	The initial impact will be short-term (construction phase).	
Cumulative effect	Low cumulative impact. Cumulative effects will be minor.	
Intensity/magnitude	Low. May impact on population processes.	
Significance rating	Low negative impact expected.	
	Pre-mitigation impact rating	**Post-mitigation impact rating**
Extent	1 (Site)	1 (Site)
Probability	2 (Possible)	2 (Possible)
Reversibility	2 (Partly reversible)	2 (Partly reversible)
Irreplaceable loss	1 (None)	1 (None)
Duration	1 (Long-term)	1 (Short-term)
Cumulative effect	1 (Low)	1 (Low)
Intensity/magnitude	1 (Low)	1 (Low)

Significance rating	**-8 (low negative)**	**-8 (low negative)**
Mitigation measures	- Personnel to be educated about environmental sensitivities and issues on site. - Report any sitings to conservation authorities. - Appropriate lighting should be installed to minimize impacts on nocturnal animals. - Noise and light pollution should be managed according to guidelines from the noise specialist study.	

6.4.3 Ecological Impacts during Decommissioning

The tables below depict the assessment of decommissioning phase impacts (pre and post mitigation) on ecological resources.

Table 35: Disturbance of indigenous natural vegetation.

Environmental parameter	Indigenous natural vegetation	
Issue/Impact/Environmental Effect/Nature	Loss or degradation of vegetation.	
Extent	The impact will affect natural vegetation on site.	
Probability	Continued disturbance will probably happen.	
Reversibility	Partly reversible, on condition no additional vegetation clearing takes place.	
Irreplaceable loss of resources	Marginal loss of resources will occur adjacent to the footprint of the proposed infrastructure since this is the most likely location of operational activities.	
Duration	The impact will be medium-term (until rehabilitation has succeeded in establishing perennial vegetation cover)	
Cumulative effect	Medium cumulative impact. Added to existing impacts on natural habitat from activities on site, will cause additional loss of vegetation, the cumulative effect of which will be medium.	
Intensity/magnitude	Medium. The quality, use and integrity of vegetation on site will be compromised to some degree, which can be limited to some extent by implementation of mitigation measures.	
Significance rating	Medium negative impact expected.	
	Pre-mitigation impact rating	**Post-mitigation impact rating**
Extent	1 (Site)	1 (Site)
Probability	3 (Probable)	3 (Probable)
Reversibility	2 (Partly reversible)	2 (Partly reversible)
Irreplaceable loss	2 (Marginal loss of resources)	2 (Marginal loss of resources)
Duration	2 (Medium-term)	2 (Medium-term)
Cumulative effect	3 (Medium)	2 (Low)
Intensity/magnitude	2 (Medium)	1 (Low)
Significance rating	**-26 (low negative)**	**-12 (low negative)**
Mitigation measures	- No additional clearing of vegetation should take place without a proper assessment of the environmental impacts and authorization from relevant authorities. - If any additional infrastructure needs to be constructed, for example overhead powerlines, communication cables, etc., then these must be located next to existing infrastructure, and clustered to avoid dispersed impacts. - No driving of vehicles off-road. - Implement Alien Plant Management Plan, including monitoring, to ensure minimal impacts on surrounding areas. - Access to sensitive areas outside of development footprint should not be permitted during operation. - Surface runoff and erosion must be properly controlled and any issues addressed as quickly as possible.	

Table 36: Mortality of fauna during decommissioning.

Environmental parameter	Fauna, including those of conservation concern (Leopard, and Cape Fox)	
Issue/Impact/Environmental Effect/Nature	Mortaility of individuals due to secondary effects.	
Extent	The impact will affect individuals on site and possibly in immediately surrounding areas.	
Probability	The impact may possibly happen.	
Reversibility	Partly reversible with time.	
Irreplaceable loss of resources	Low loss of resources will occur.	
Duration	The impact will be long-term (operation phase).	
Cumulative effect	Low cumulative impact. Cumulative effects will be minor.	
Intensity/magnitude	Medium. May impact on population processes.	
Significance rating	Low negative impact expected.	
	Pre-mitigation impact rating	**Post-mitigation impact rating**
Extent	1 (Site)	1 (Site)
Probability	2 (Possible)	2 (Possible)
Reversibility	2 (Partly reversible)	2 (Partly reversible)
Irreplaceable loss	2 (Marginal)	1 (None)
Duration	3 (Long-term)	3 (Long-term)
Cumulative effect	2 (Low)	2 (Low)
Intensity/magnitude	2 (Medium)	1 (Low)
Significance rating	**-24 (low negative)**	**-11 (low negative)**
Mitigation measures	- Personnel and vehicles to avoid sensitive habitats. - No speeding on access roads – install speed control measures, such as speed humps, if necessary - No illegal collecting of any individuals, particularly the Armadillo Girdled Lizard. - No hunting of protected species or hunting of any other species without a valid permit. - Personnel to be educated about protection status of species, including distinguishing features to be able to identify protected species. - Report any sitings to conservation authorities. - Prevent unauthorised access to the site – project roads provide access to remote areas that were not previously easily accessible for illegal collecting or hunting.	

Table 37: Displacement of terrestrial fauna.

Environmental parameter	Mobile fauna of conservation concern	
Issue/Impact/Environmental Effect/Nature	Displacement of individuals.	
Extent	The impact will affect individuals on site and possibly in immediately surrounding areas.	
Probability	The impact may possibly happen.	
Reversibility	Partly reversible with time.	
Irreplaceable loss of resources	No or low loss of resources will occur.	
Duration	The impact will be short-term (construction phase).	
Cumulative effect	Low cumulative impact. Cumulative effects will be minor.	
Intensity/magnitude	Low. May impact on population processes.	
Significance rating	Low negative impact expected.	
	Pre-mitigation impact rating	**Post-mitigation impact rating**
Extent	1 (Site)	1 (Site)
Probability	2 (Possible)	2 (Possible)
Reversibility	2 (Partly reversible)	2 (Partly reversible)
Irreplaceable loss	1 (None)	1 (None)
Duration	1 (Short-term)	1 (Short-term)

Cumulative effect	1 (Low)	1 (Low)
Intensity/magnitude	1 (Low)	1 (Low)
Significance rating	**-8 (low negative)**	**-8 (low negative)**
Mitigation measures	- Restrict impact to development footprint only and limit disturbance spreading into surrounding areas. - Access to sensitive areas outside of infrastructure footprint should not be permitted during construction. - No speeding on access roads – install speed control measures, such as speed humps, if necessary - No hunting of protected species. - Personnel to be educated about protection status of species, including distinguishing features to be able to identify protected species. - Report any sitings to conservation authorities.	

Table 38: Vegetation damage due to dust deposition.

Environmental parameter	Vegetation	
Issue/Impact/Environmental Effect/Nature	Dust deposition, resulting in reduced physiological fitness of plants / vegetation.	
Extent	The impact will affect vegetation on site and in all areas with access roads leading to site.	
Probability	The impact will almost certainly happen.	
Reversibility	Partly reversible with time.	
Irreplaceable loss of resources	Low to marginal loss of resources will occur.	
Duration	The impact will be of short-term duration for access roads (only subject to high traffic volumes during decommissioning).	
Cumulative effect	Medium cumulative impact. Cumulative effects will be minor.	
Intensity/magnitude	Medium. May impact on population processes.	
Significance rating	Low negative impact expected.	
	Pre-mitigation impact rating	**Post-mitigation impact rating**
Extent	2 (Local)	2 (Local)
Probability	3 (Probable)	3 (Probable)
Reversibility	2 (Partly reversible)	2 (Partly reversible)
Irreplaceable loss	2 (Low)	2 (Low)
Duration	1 (Short-term)	1 (Short-term)
Cumulative effect	3 (Medium)	2 (Low)
Intensity/magnitude	2 (Medium)	1 (Low)
Significance rating	**-26 (low negative)**	**-12 (low negative)**
Mitigation measures	- No speeding on access roads – install speed control measures, such as speed humps, if necessary, and penalties for non-compliance. - Excessive dust can be controlled by spraying water onto areas affected by construction and/or vehicle traffic or using other suitable dust-control measures.	

Table 39: Continued establishment and spread of declared weeds.

Environmental parameter	Vegetation and habitat
Issue/Impact/Environmental Effect/Nature	Loss of habitat due to invasion by alien plants
Extent	The impact will affect habitat on site and possibly in immediately surrounding areas.
Probability	The impact will probably happen in the absence of control measures.
Reversibility	Partly reversible in the absence of control measures. Completely reversible if mitigation measures applied. Preventative measures will stop the impact from occurring.

Irreplaceable loss of resources	Marginal to significant loss of resources will occur. Uncontrolled invasion can affect all nearby natural habitats.	
Duration	The impact will be long-term.	
Cumulative effect	Medium cumulative impact. Cumulative effects will be minor.	
Intensity/magnitude	Medium. Severe invasion can alter the functioning of natural ecosystems.	
Significance rating	Low negative impact expected.	
	Pre-mitigation impact rating	**Post-mitigation impact rating**
Extent	1 (Site)	1 (Site)
Probability	3 (Probable)	2 (Possible)
Reversibility	2 (Partly)	2 (Partly)
Irreplaceable loss	3 (Significant)	2 (Marginal)
Duration	3 (Long-term)	3 (Long-term)
Cumulative effect	3 (Medium)	2 (Low)
Intensity/magnitude	2 (Medium)	1 (Low)
Significance rating	**-30 (medium negative)**	**-12 (low negative)**
Mitigation measures	- Implement an alien management plan, which highlights control priorities and areas and provides a programme for long-term control. - Undertake regular monitoring to detect alien invasions early so that they can be controlled. Post-decommissioning monitoring should continue for an appropriate length of time to ensure that future problems are avoided. - Do NOT use any alien plants during any rehabilitation that may be required.	

Table 40: Increased runoff and erosion.

Environmental parameter	Vegetation and habitat	
Issue/Impact/Environmental Effect/Nature	Runoff and erosion	
Extent	The impact will affect habitat on site.	
Probability	The impact will probably happen in the absence of control measures.	
Reversibility	Partly reversible in the absence of control measures. Completely reversible if mitigation measures applied. Preventative measures will stop the impact from occurring.	
Irreplaceable loss of resources	Marginal to significant loss of resources will occur. Uncontrolled erosion can affect all downslope natural habitats.	
Duration	The impact will be long-term.	
Cumulative effect	Medium cumulative impact. Cumulative effects will be minor.	
Intensity/magnitude	Medium. Severe erosion can locally alter the functioning of natural ecosystems and cause additional loss of vegetation.	
Significance rating	Low negative impact expected.	
	Pre-mitigation impact rating	**Post-mitigation impact rating**
Extent	1 (Site)	1 (Site)
Probability	3 (Probable)	2 (Possible)
Reversibility	2 (Partly)	2 (Partly)
Irreplaceable loss	3 (Significant)	2 (Marginal)
Duration	3 (Long-term)	3 (Long-term)
Cumulative effect	3 (Medium)	2 (Low)
Intensity/magnitude	2 (Medium)	1 (Low)
Significance rating	**-30 (medium negative)**	**-12 (low negative)**
Mitigation measures	- Implement a stormwater management plan, which highlights control priorities and areas and provides a programme for long-term control. - Following decommissioning, undertake regular monitoring for an appropriate length of time to detect erosion features early so that they can be controlled.	

	- Implement any control measures that may become necessary. - Avoid undertaking any activities on or near steep or unstable slopes.

Table 41: Changes in behavioural patterns of animals.

Environmental parameter	Mobile fauna	
Issue/Impact/Environmental Effect/Nature	Displacement of individuals or changes to community structure.	
Extent	The impact will affect individuals on site and possibly in immediately surrounding areas.	
Probability	The impact may possibly happen.	
Reversibility	Partly reversible with time.	
Irreplaceable loss of resources	No or low loss of resources will occur.	
Duration	The initial impact will be short-term (construction phase).	
Cumulative effect	Low cumulative impact. Cumulative effects will be minor.	
Intensity/magnitude	Low. May impact on population processes.	
Significance rating	Low negative impact expected.	
	Pre-mitigation impact rating	**Post-mitigation impact rating**
Extent	1 (Site)	1 (Site)
Probability	2 (Possible)	2 (Possible)
Reversibility	2 (Partly reversible)	2 (Partly reversible)
Irreplaceable loss	1 (None)	1 (None)
Duration	1 (Long-term)	1 (Short-term)
Cumulative effect	1 (Low)	1 (Low)
Intensity/magnitude	1 (Low)	1 (Low)
Significance rating	**-8 (low negative)**	**-8 (low negative)**
Mitigation measures	- Avoid disturbance of designated sensitive habitats. - Access to sensitive areas outside of infrastructure footprint should not be permitted during decommissioning. - Personnel to be educated about environmental sensitivities and issues on site. - Appropriate lighting should be installed to minimize impacts on nocturnal animals. - Project activities should not be undertaken at night. - Noise and light pollution should be managed according to guidelines from the noise specialist study. - No dangerous pits, trenches, etc. should remain on site after rehabilitation.	

6.4.4 Cumulative Ecological Impacts

The tables below depict the assessment of cumulative impacts (pre and post mitigation) on ecological resources.

Table 42: Cumulative impacts on natural vegetation.

Environmental parameter	Indigenous natural vegetation
Issue/Impact/Environmental Effect/Nature	Loss, degradation and/or fragmentation of indigenous natural vegetation.
Extent	The impact will affect natural vegetation on site and in surrounding areas.
Probability	Loss and/or disturbance of vegetation will definitely happen for all of the projects.
Reversibility	In all projects, loss of vegetation is effectively irreversible, since construction of roads and other hard surfaces completely removes vegetation and modifies the substrate upon which it grows. For all the projects, the secondary vegetation in disturbed areas will probably never resemble the original vegetation found on site.
Irreplaceable loss of resources	For each project, there will locally be marginal to significant loss of resources. Assessed over a wider area (the combined footprint of all

	projects), there will probably only be marginal loss of resources (in relation to all biodiversity resources within the area).	
Duration	The impact will be permanent.	
Cumulative effect	Medium cumulative impact. Added to existing impacts on natural habitat from activities on site, will cause additional loss of vegetation, the cumulative effect of which will be medium.	
Intensity/magnitude	Medium. At the very minimum, the projects together will alter the quality, use and integrity of vegetation in the area, but the system (vegetation) will continue to function in a moderately modified way and maintain general integrity..	
Significance rating	Medium negative impact expected.	
	Pre-mitigation impact rating	**Post-mitigation impact rating**
Extent	2 (District)	2 (District)
Probability	4 (Definite)	4 (Definite)
Reversibility	4 (Irreversible)	4 (Irreversible)
Irreplaceable loss	2 (Marginal loss of resources)	2 (Marginal loss of resources)
Duration	4 (Permanent)	4 (Permanent)
Cumulative effect	3 (Medium)	2 (Low)
Intensity/magnitude	2 (Medium)	2 (Medium)
Significance rating	**-38 (medium negative)**	**-36 (medium negative)**
Mitigation measures	At a regional level, the only possible mitigation is to limit the number of projects, or else limit the scope of individual projects. These decisions are a function of competent authorities and not of the proponent. The following decisions would then apply[30]: - Limit projects to specific zones, for example the Upington REDZ - Limit development within biodiversity zones, especially CBA1 areas.	

Table 43: Loss of individuals of threatened and protected plants.

Environmental parameter	Protected plants, as per NEM:BA or NCNCA or listed plants
Issue/Impact/Environmental Effect/Nature	Loss of individuals occurring within the footprint of construction.
Extent	The impact will affect local populations or individuals of the affected species. The large number of projects taken together make this a regional effect.
Probability	Based on the list of species that are protected or listed, the impact is certain to happen to protected plants and probable for threatened plants.
Reversibility	Partly reversible. Where necessary, individuals can be rescued or else cultivated to replace lost specimens. Unfortunately, this is probably not feasible for threatened plants, which means the impact is barely reversible / irreversible for such species.
Irreplaceable loss of resources	Marginal loss of resources could occur for protected plants and significant loss of resources for threatened plants. The protected species that are likely to occur on site are likely to be relatively common throughout their range and they have very wide geographical ranges. With a number of projects, however, the chances of threatened species being affected increases.
Duration	The impact will be medium-term for protected plants and possibly permanent for threatened plants.
Cumulative effect	Medium cumulative impact. Cumulative effects will be minor.

[30] These two mitigation measures suggested by the ecological specialist have already been achieved through the site and alternatives selection process.

Intensity/magnitude	Possibly medium for protected plants and very high for threatened plants. Loss of some individuals will be insignificant compared to the number that probably occur in nearby natural areas.	
Significance rating	Low negative impact expected.	
	Pre-mitigation impact rating	**Post-mitigation impact rating**
Extent	2 (Local)	2 (Local)
Probability	4 (Definite)	4 (Definite)
Reversibility	2 (Partly reversible)	2 (Partly reversible)
Irreplaceable loss	2 (Marginal loss of resources)	2 (Marginal loss of resources)
Duration	2 (Medium-term)	2 (Medium-term)
Cumulative effect	3 (Medium)	2 (Low)
Intensity/magnitude	2 (Medium)	2 (Medium)
Significance rating	**-30 (medium negative)**	**-28 (low negative)**
Mitigation measures	- It is a legal requirement to obtain permits for specimens that will be lost. - Undertake a detailed pre-construction walk-through survey will be required during a favourable season to locate any additional individuals of protected plants. This survey must cover the footprint of all approved infrastructure, including internal access roads. - Plants lost to the development can be rescued and planted in appropriate places in rehabilitation areas. This will reduce the irreplaceable loss of resources as well as the cumulative effect. - A Plant Rescue Plan must be compiled to be approved by the appropriate authorities. - Where large populations of affected species of high value are encountered, consideration should be given to shifting infrastructure to avoid such areas. - No authorization should be given that results in the loss of populations of threatened plants. Infrastructure should be relocated and a suitable buffer zone maintained around such populations. An ecological management plan must be compiled for such areas.	

Table 44: Cumulative impacts on ecological processes.

Environmental parameter	Landscape-level ecological processes	
Issue/Impact/Environmental Effect/Nature	Disruption, disturbance or alteration of ecological processes	
Extent	The large number of projects taken together make this a regional effect.	
Probability	Based on the number and the nature of the projects (mostly solar-energy projects), the impact may possibly happen.	
Reversibility	Partly reversible, where disruptions to specific processes can be identified and rectified.	
Irreplaceable loss of resources	Significant loss of resources could potentially occur , but it is more likely that marginal loss of resources will happen.	
Duration	The impact will be long-term to permanent, depending on the process and the specific impact.	
Cumulative effect	Medium cumulative impact. Cumulative effects will be minor.	
Intensity/magnitude	Based on the nature and number of projects and the ecological process affected, the impact is most likely to be of medium intensity.	
Significance rating	Low negative impact expected.	
	Pre-mitigation impact rating	**Post-mitigation impact rating**
Extent	2 (Local)	2 (Local)
Probability	2 (Possible)	4 (Definite)
Reversibility	2 (Partly reversible)	2 (Partly reversible)
Irreplaceable loss	3 (Significant loss of resources)	2 (Marginal loss of resources)

Duration	2 (Medium-term)	2 (Medium-term)
Cumulative effect	3 (Medium)	2 (Low)
Intensity/magnitude	2 (Medium)	2 (Medium)
Significance rating	**-30 (medium negative)**	**-28 (low negative)**
Mitigation measures	The following mitigation measures would help to understand impacts: - Limit projects to specific zones, for example the Upington REDZ. - Limit development within biodiversity zones, especially CBA1 areas.	

6.4.5 Concluding Statement Terrestrial Ecology

At the site-specific scale, some sensitivities have been identified, primarily related to natural habitat, but also to some individual species. Many of these can be minimised or avoided with the application of appropriate mitigation or management measures, including, in some cases, slight shifts of infrastructure positions (to be done at detailed design phase). There will be residual impacts, primarily on natural habitat. **The amount of habitat that will be lost to the project is insignificant compared to the area in hectares of the regional vegetation type that occurs on site and over the entire geographical range of the vegetation type**. In most cases, the exact location of important biodiversity features have been identified in the field and suggestions made to relocate proposed infrastructure to avoid these. The current layout plan has already taken these suggestions into account. From this perspective it is unlikely that the proposed project will have an unacceptable impact on the natural environment regardless of the alternative approved. Based on the analysis provided in this report, the conclusion is that the project should be authorised (inclusive of all project alternatives).

6.5 AVIFAUNAL IMPACTS

An Avifaunal Impact Assessment was undertaken by Mr Chris van Rooyen. A copy of this assessment is attached in **Annexure E2** from which the following is summarised.

6.5.1 Avifaunal Impacts during Construction

The table below depicts the assessment of construction phase impacts (pre and post mitigation) on Avifauna.

Table 45: Assessment of construction phase avifaunal impacts associated with displacement of priority species.

Aspect/Activity	Displacement of priority species due to construction activities associated with the substations/switching stations and 132kV grid infrastructure
Type of Impact (i.e. Impact Status)	Direct
Potential Impact	Temporary displacement of priority species. Potential priority species which could be affected are: - Karoo Korhaan - Kori Bustard - Secretarybird - Northern Black Korhaan - Namaqua Sandgrouse - Spotted Eagle-owl - Helmeted Guineafowl - Ludwig's Bustard
Status	Negative
Mitigation Required	- Construction activity should be restricted to the immediate footprint of the infrastructure.

	- Access to the remainder of the site should be strictly controlled to prevent unnecessary disturbance of avifauna. - Measures to control noise should be applied according to current best practice in the industry. - Maximum use should be made of existing access roads and the construction of new roads should be kept to a minimum. - A walk-through must be conducted by the avifaunal specialist when the final pole positions have been determined, to assess whether there are any Red List species breeding in the vicinity of the final alignment, which could be displaced by the construction activities. Should this be the case, appropriate measures must be put in place if possible, to prevent the displacement of the breeding birds, through the timing of construction activities.
Impact Significance (Pre-Mitigation)	Low (Level 4)
Impact Significance (Post-Mitigation)	Very Low (Level 5)
I&AP Concern	No

6.5.2 Avifaunal Impacts during operation

The table below depicts the assessment of operational phase impacts (pre and post mitigation) on Avifauna.

Table 46: Assessment of operational phase avifaunal impacts associated with electrocution.

Aspect/Activity	Electrocution on the 132kV poles, and in the onsite substations/switching stations
Type of Impact (i.e. Impact Status)	Direct
Potential Impact	Electrocution of priority species. Potential priority species which could be affected are: - Spotted Eagle-owl - Helmeted Guineafowl - Barn Owl - Black-headed Heron - Booted Eagle - Egyptian Goose - Martial Eagle - Spur-winged Goose - Tawny Eagle - Greater Kestrel - Lanner Falcon - Southern Pale Chanting Goshawk - Steppe Buzzard - Pied Crow
Status	Negative
Mitigation Required	- With regards to the infrastructure within the yard, the hardware is too complex to recommend any mitigation for electrocution at this stage. It is instead recommended that if any impacts are recorded once operational, site specific mitigation should be applied reactively. - It is recommended that the 7611/7622/T2002 intermediate pole is avoided.
Impact Significance (Pre-Mitigation)	Low (Level 4)
Impact Significance (Post-Mitigation)	Very Low (Level 5)
I&AP Concern	No

Table 47: Assessment of operational phase avifaunal impacts associated with collisions

Aspect/Activity	Mortality of priority species due to collisions with the 132kV grid connection

Type of Impact (i.e. Impact Status)	Direct
Potential Impact	Mortality of priority species. Potential priority species which could be affected are: - Black-headed Heron - Booted Eagle - Egyptian Goose - Martial Eagle - Spur-winged Goose - Tawny Eagle - Karoo Korhaan - Kori Bustard - Secretarybird - Northern Black Korhaan - Namaqua Sandgrouse - Ludwig's Bustard - Abdim's Stork - Cattle Egret - South African Shelduck - White-faced Duck - Yellow-billed Duck
Status	Negative
Mitigation Required	- The preferred option from an avifaunal impact perspective is Alternative 2, because it follows the existing McTaggerts/Oasis 132kV powerline. This will reduce the impact significantly because it restricts the length of line which will constitute a new impact from 35km to 19km.updated Alternative 1 is however acceptable from an avifaunal perspective. - Eskom approved bird flight diverters should be installed on the full span length on the earthwire (according to Eskom guidelines - five metres apart). Light and dark colour devices must be alternated so as to provide contrast against both dark and light backgrounds respectively. These devices must be installed as soon as the conductors are strung.
Impact Significance (Pre-Mitigation)	Moderate (Level 3)
Impact Significance (Post-Mitigation)	Low (Level 4)
I&AP Concern	No

6.5.3 Avifaunal Impacts during Decommissioning

The table below depicts the assessment of operational phase impacts (pre and post mitigation) on Avifauna.

Table 48: Assessment of decommissioning phase avifaunal impacts associated with displacement of priority species.

Aspect/Activity	Displacement of priority species due to de-commissioning activities associated with the substations/switching stations and 132kV grid infrastructure
Type of Impact (i.e. Impact Status)	Direct
Potential Impact	Temporary displacement of priority species. Potential priority species which could be affected are: Karoo Korhaan Kori Bustard Secretarybird Northern Black Korhaan Namaqua Sandgrouse Spotted Eagle-owl

	Helmeted Guineafowl-owl Ludwig's Bustard
Status	Negative
Mitigation Required	- De-commissioning activities should be restricted to the immediate footprint of the infrastructure. - Access to the remainder of the site should be strictly controlled to prevent unnecessary disturbance of avifauna. - Measures to control noise should be applied according to current best practice in the industry. - Maximum use should be made of existing access roads and the construction of new roads should be kept to a minimum. - A walk-through must be conducted by the avifaunal specialist to assess whether there are any breeding Red List species, which could be displaced by the de-commissioning activities. Should this be the case, appropriate measures must be put in place if possible, to prevent the displacement of the breeding birds, through the timing of activities.
Impact Significance (Pre-Mitigation)	Low (Level 4)
Impact Significance (Post-Mitigation)	Very Low (Level 5)
I&AP Concern	No

6.5.4 Cumulative Avifaunal Impacts

The table below depicts the assessment of cumulative impacts (pre and post mitigation) on Avifauna.

Table 49: Assessment of cumulative avifaunal impacts associated with priority species.

Aspect/Activity	The incremental impact of the proposed grid connection on priority avifauna, added to the impacts of other past, present or reasonably foreseeable future activities.
Type of Impact (i.e. Impact Status)	Direct
Potential Impact	Displacement due to disturbance associated with the construction and de-commissioning of the 132kV grid connection and associated infrastructure Electrocutions in the poles, onsite substation/ switching station. Collisions with the 132kV grid connection
Status	Negative
Mitigation Required	Please refer to all the proposed mitigation measures as listed in the preceding tables in Section 6 for all the impacts and all the phases
Impact Significance (Pre-Mitigation)	Moderate (3)
Impact Significance (Post-Mitigation)	Low (2)
I&AP Concern	None to date

6.5.5 Concluding statement Avifauna

It is estimated that a total of 203 bird species could potentially occur in the broader area. Of the priority species potentially occurring in the broader area, 26 could potentially occur in the study area. Eight of these are South African Red List species, and three are globally Red listed.

The proposed project will have the following potential impacts on avifauna:

- Displacement due to disturbance associated with the construction of the substations/switching stations, grid connection and associated infrastructure.
- Electrocutions in the on-site substation/switching stations
- Collisions with the 132kV grid connection
- Displacement due to disturbance associated with the decommissioning of the substations/switching stations, grid connection and associated infrastructure.

In terms of an average, the pre-mitigation significance of all potential impacts identified in this specialist study was assessed as halfway between **Low** and **Moderate**, and the post-mitigation significance is

assessed as Low to Very Low, leaning more towards **Very Low**. The avifaunal specialist therefore recommended that the activity be authorised, on condition that the proposed mitigation measures as detailed in the EMPr are strictly implemented

6.6 AGRICULTURAL IMPACTS

Mr Christo Lubbe undertook a specialist assessment of the potential impacts of the Geel Kop Grid Connection Infrastructure on the agricultural environment. A copy of this assessment is attached in Annexure E4.

The agricultural specialist identified the following potential impacts associated with the Geel Kop Grid Connection Infrastructure:

- Loss of agricultural land
- Erosion and change of drainage patterns
- Pollution

An assessment of these impacts for the various phases of the development are included below.

6.6.1 Agricultural Impacts during construction

The agricultural impacts during the construction phase of the Geel Kop Grid Connection Infrastructure are assessed in the table below:

Table 50: Assessment of construction phase agricultural impacts.

Nature: Soil pollution with contaminants during the construction phase may take place, including spillages of hydrocarbon (fuel oil) and cement. This is possible during the construction of the substation infrastructure.		
	Without mitigation	**With mitigation**
Extent	Local	Local
Duration	Medium Term	Very short
Magnitude	Low	Minor
Probability	Probable	Probable
Significance	**Low**	**Low**
Status (Positive or negative)	Negative	Negative
Reversibility	Partly reversible	Fully reversible
Irreplaceable loss of Resources	Yes	Yes
Can impacts be mitigated?	Yes	
Mitigation:	See section 7 of this BAR for a summary of mitigation measures.	
Cumulative impacts:	No, site-bound	
Residual Risks:	Yes, it is impossible to clear the affected area completely.	
Nature: Loss of agricultural land as a result of the Grid Connection Infrastructure		
	Without mitigation	**With mitigation**
Extent	Local – Regional	Local
Duration	Long-term	Long-term
Magnitude	Moderate	Low
Probability	Probable	Improbable
Significance	**Medium**	**Low**
Status (Positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of Resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:	See section 7 of this BAR for a summary of mitigation measures.	
Cumulative impacts:	Low	
Residual Risks:	No, after decommissioning this impact will be reversed when rehabilitation has been completed.	

Nature: The construction of the Grid Connection Infrastructure will cause impairment of the land capability with the potential risk of erosion		
	Without mitigation	**With mitigation**
Extent	Local	Local
Duration	Short term	Short term
Magnitude	Low	Low
Probability	Probable	Probable
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	
Mitigation:	See section 7 of this BAR for a summary of mitigation measures.	
Cumulative impacts:	No cumulative impacts are expected to occur, as all impacts will be site bounded.	
Residual Risks:	No. Affected areas will be rehabilitated, as the impact will only be applicable during construction phase.	
Nature: The establishment of the Grid Connection infrastructure may alter drainage patterns with construction and cause erosion		
	Without mitigation	**With mitigation**
Extent	Local	Local
Duration	Long term	Long term
Magnitude	Low	Low
Probability	Probable	Probable
Significance	**Low**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	
Mitigation	See section 7 of this BAR for a summary of mitigation measures.	
Cumulative impacts:	No, all impacts will be site bounded.	
Residual Risks:	No. Affected areas will be rehabilitated when operation has ceased.	

6.6.2 Agricultural Impacts during operation

The agricultural impacts during the operational phase of the Geel Kop Grid Connection Infrastructure are assessed in the table below:

Table 51: Assessment of agricultural Impacts during the operation phase.

Nature: Soil pollution with contaminants during the operational phase may take place, including spillages of hydrocarbon (fuel oil) and cement. This is possible during the maintenance of the facility – particularly relating to the Transformer Oils.		
	Without mitigation	**With mitigation**
Extent	Local	Local
Duration	Long Term	Long Term
Magnitude	Low	Minor
Probability	Probable	Probable
Significance	**Low**	**Low**
Status (Positive or negative)	Negative	Negative
Reversibility	Partly reversible	Fully reversible
Irreplaceable loss of Resources?	Yes	Yes
Can impacts be mitigated?	Yes	
Mitigation:	See section 7 of this BAR for a summary of mitigation measures	
Cumulative impacts:	No, site-bound	
Residual Risks:	Yes, It is impossible to clear the affected area completely.	
Nature: Loss of Agricultural Land as a result of establishment of the Grid infrastructure.		
	Without mitigation	**With mitigation**
Extent	Local – Regional	Local
Duration	Long-term	Long-term

Magnitude	Moderate	Low
Probability	Probable	improbable
Significance	**Medium**	**Low**
Status (Positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of Resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation:	See section 7 of this BAR for a summary of mitigation measures	
Cumulative impacts:	Low	
Residual Risks:	No, after decommissioning this impact will be reversed when rehabilitation has been completed.	

6.6.3 Agricultural Impacts during closure and decommissioning

The agricultural impacts during the closure and decommissioning phase of the Geel Kop Grid Connection Infrastructure are assessed in the table below:

Table 52: Assessment of agricultural Impacts during the closure and decommissioning phase.

Nature: Soil pollution with contaminants during the decommissioning phase may take place, including spillages of hydrocarbon (fuel oil) and cement. This is possible during the decomissioning of substation infrastructure.		
	Without mitigation	**With mitigation**
Extent	Local	Local
Duration	Medium Term	Very short
Magnitude	Low	Minor
Probability	Probable	Probable
Significance	Low	Low
Status (Positive or negative)	Negative	Negative
Reversibility	Partly reversible	Fully reversible
Irreplaceable loss of Resources?	Yes	Yes
Can impacts be mitigated?	Yes	
Mitigation:	See section 7 of this BAR for a summary of mitigation measures	
Cumulative impacts:	No, site-bound	
Residual Risks:	Yes, It is impossible to clear the affected area completely	

6.6.4 Cumulative agricultural impacts

Numerous renewable energy projects have been built along the Gariep buffer, inter alia on the two neighboring farms Dyasonsklip and Mc Taggarts camp.

Figure 31: Renewable Energy Projects proposed within the Gariep Buffer (Lubbe, 2020)

The following cumulative impacts were identified by the agricultural specialist.

- Loss of agricultural land
- Altering drainage patterns
- Changing agricultural character to industrial

Table 53: Assessment of cumulative agricultural Impacts of the Geel Kop Grid Connection Infrastructure

Nature: The quantity of available soil for agricultural production decreases as result of the footprints of these facilities. The quality of soil decreases in the way the construction of these structures alters the workability of the soil. This includes the physical deformation in the soil profile.		
	Overall impact of proposed project considered in isolation	**Cumulative impact of the projects in the area**
Extent	Local – Regional	Regional
Duration	Long Term	Long Term
Magnitude	Low	Moderate
Probability	Probable	Probable
Significance	**Low**	**Medium**
Status (Positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of Resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation:	See section 7 of this BAR for a summary of mitigation measures	
Nature: Clearing of vegetation increases flow speed and a lower infiltration tempo increases silt transport.		
	Overall impact of proposed project considered in isolation	**Cumulative impact of the projects in the area**
Extent	Local	Regional
Duration	Long Term	Long Term
Magnitude	low	Low
Probability	Improbable	Probable
Significance	**Low**	**Medium**
Status (Positive or negative)	Negative	Negative
Reversibility	Low	Low

Irreplaceable loss of Resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation:	See section 7 of this BAR for a summary of mitigation measures	

6.6.5 Conclusion and recommendation of agricultural specialist

The agricultural specialist has confirmed with reference to applicable sections of the Regulations for Renewable Energy in terms of Act 70 of 1970 and Act 43 of 1983, it can be stated that the proposed site will not suffer major agricultural impacts by the development.

The grid connection infrastructure is to be constructed on soil with low agricultural value, classified unsuited for cultivation. The limiting environmental conditions further restrict its use to grazing, woodland or wildlife.

The findings of this study indicate that the proposed grid connection infrastructure will have minimal impacts on agriculture, locally and on site, and will have very little influence on the current commercial farming.

The land is currently used for livestock farming. The infrastructure required for such practice is still intact, but due to conditions not in control of the farmer, farming practice has changed from small stock to a small herd of cattle. Theft and insufficient control of predation on livestock made small stock farming uneconomical.

The alignment of the Geel Kop grid connection infrastructure will have a low impact on the agricultural resources if the required mitigation measures are applied.

The development site is located in the zone for Renewable Energy Development and the Agricultural Combined Sensitivity rated as low.

From an agricultural and land use perspective, the application should be authorised.

6.7 HERITAGE IMPACTS

A detailed Heritage impact Assessment was undertaken by HCAC for the proposed Geel Kop Grid Infrastructure. A copy of this assessment is attached in Appendix E5 from which the following is summarised.

The powerline corridors will traverse areas where heritage find spots were recorded. The find spots include isolated Stone Age scatters and sufficient mitigation has been recommended to mitigate this aspect.

6.7.1 Heritage Impacts during Construction

The Heritage impacts during the construction phase of the Geel Kop Grid Connection Infrastructure are assessed in the table below:

Table 54. Impacts on Built Environment Resources

Nature:	During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove heritage resources from its original position.	
	Without mitigation	**With mitigation (Preservation/ excavation of site)**
Extent	Site specific (1)	Site specific (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**30 (Medium)**	**20 (Low)**
Status (positive or negative)	Negative	Negative

Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	yes	Yes
Can impacts be mitigated?	Yes.	Yes
Mitigation:	- It is recommended that the wagon road that traverses the Geel Kop Farm at Site 1 is memorialised with a commemorative plaque, indicating the location of the old wagon road and a short history of the site as recommended in the Gordonia PV HIA (Van der Walt 2020) and no further action is required as part of the grid application; - The final alignment must be subjected to a walk down prior to development; - A chance find procedure must be implemented for the project	
Residual Impacts:	If sites are destroyed this results in the depletion of the record of the area and even though surface features can be avoided or mitigated, there is a chance that completely buried sites would still be impacted but this cannot be quantified. However, if sites are recorded and preserved or mitigated this adds to the record of the area.	

Table 55: Impacts on Archaeological heritage resources.

Nature.	During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological material or objects	
	Without mitigation	**With mitigation (Preservation/ excavation of site)**
Extent	Site specific (1)	Site specific (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**30 (Medium)**	**20 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	yes	Yes
Can impacts be mitigated?	Yes, a chance find procedure should be implemented.	Yes
Mitigation:	- A Chance Find Procedure should be implemented for the project during the pre-construction and construction phase; - Avoidance of Waypoint 119; - Compilation of a Development Heritage Management Plan for the Geel Kop PV project prior to construction; - The final alignment must be subjected to a walk down prior to development.	
Residual Impacts:	If sites are destroyed this results in the depletion of archaeological record of the area and even though surface features can be avoided or mitigated, there is a chance that completely buried sites would still be impacted but this cannot be quantified. However, if sites are recorded and preserved or mitigated this adds to the record of the area.	

Table 56. Impact on recorded Stone Cairns

Nature.	***:*** During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position stone cairns that, although unlikely, could represent burial sites	
	Without mitigation	**With mitigation (Preservation/ excavation of site)**
Extent	Site specific (1)	Site specific (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Moderate (6)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	**36 (Medium)**	**20 (Low)**

Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	Yes
Mitigation:	- Waypoint 111 should be preserved *in situ* with a 30 m buffer and the area should be monitored during construction by the ECO. - A Chance Find Procedure and Development Heritage Management plan should be implemented for the project prior to construction.	
Residual Impacts:	If sites are destroyed this results in the depletion of archaeological record of the area and even though surface features can be avoided or mitigated, there is a chance that completely buried sites would still be impacted but this cannot be quantified. However, if sites are recorded and preserved or mitigated this adds to the record of the area.	

The figure below depicts the location of all the heritage sites within the grid connection corridor. It is recommended that a chance find procedure be implemented in proximity to all of these features.

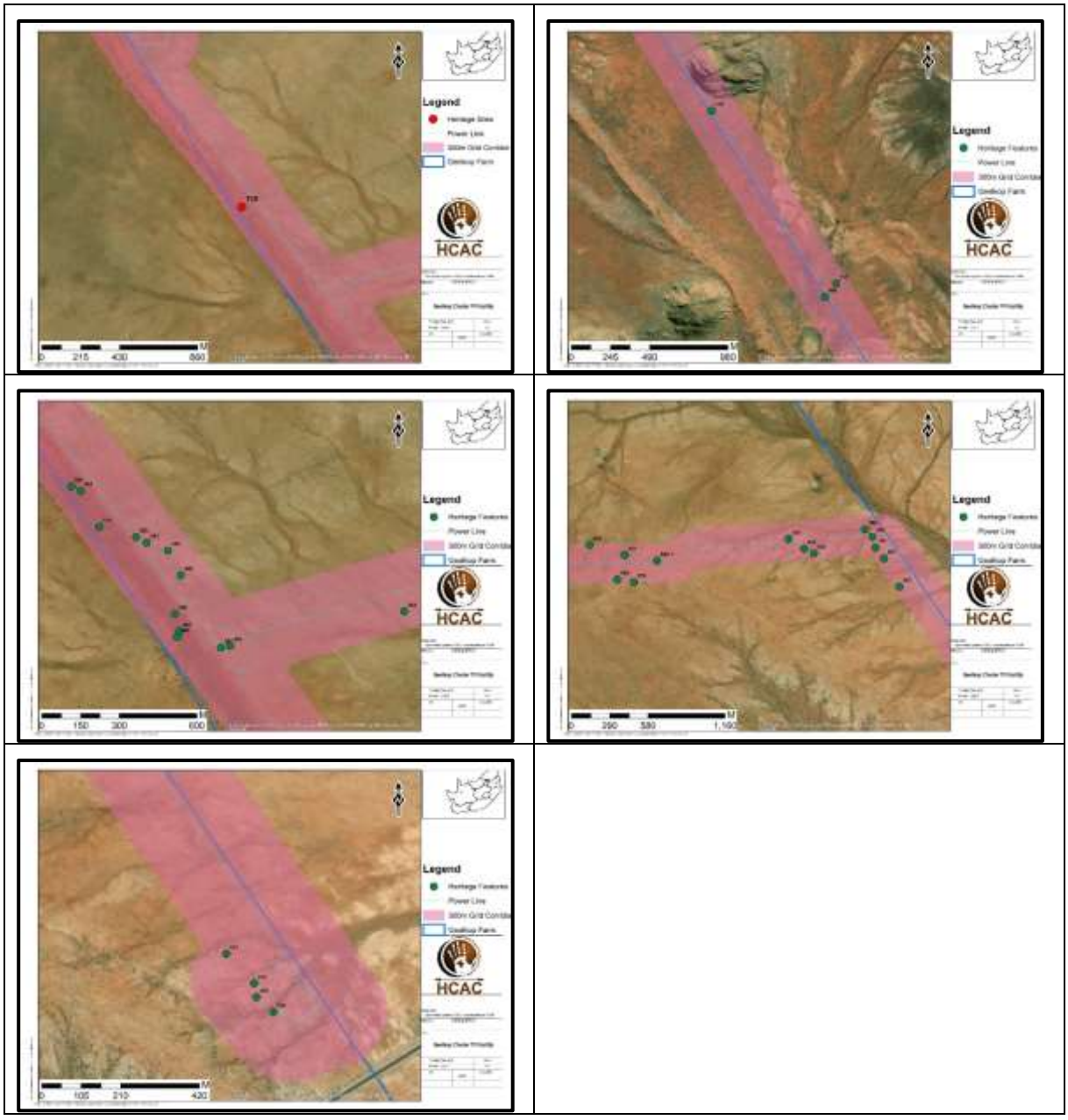


Figure 32. Heritage Features in relation to the Geel Kop Grid connection infrastructure

6.7.2 Heritage impacts during operation

No impact is envisaged for the recorded heritage resources during this phase.

6.7.3 Cumulative heritage impacts

Cumulative impacts occur from the combination of effects of various impacts on heritage resources. The importance of identifying and assessing cumulative impacts is that the whole is greater than the sum of its parts. The area is rich in terms of the number of archaeological features present. These features are of low to medium significance. From a cumulative perspective, it is anticipated that the development of the Geel Kop Grid will not result in a whole-scale change to the heritage character of the area as the development will not impact on any significant heritage resources and is in line with other developments in the area.

Table 57. Cumulative impacts of the project on Heritage Resources

Nature:	The development of the project and other renewable energy developments within the area may result in disturbance of surfaces and/or sub-surfaces and may destroy, damage, alter, or remove from its original position archaeological material or objects	
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Minor (2)	Minor (2)
Probability	Very Improbable (1)	Very Improbable (1)
Significance	**8 (Low)**	**8 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	No resources were recorded	No resources were recorded.
Can impacts be mitigated?	NA	NA
Confidence in findings	High	High

6.7.4 Conclusion and recommendations of Heritage Specialist.

Key findings of the study include:

- The Geel Kop Grid components and Alternatives were assessed and all are considered to be acceptable from a heritage point of view. The proposed 132kV Power line would have a relatively small impact on Stone Age sites as highlighted by Sampson (1985). Due to the relatively small impact of the pylons the recorded sites can be retained *in-situ* within the development.
- Two features relating to the built environment were recorded including a wagon road and water reservoir.
- Thirty-two Stone Age features were recorded. No further mitigation is required for the find spots as they are scattered too sparsely to be of significance apart from noting their presence in this report. No impact is expected on Waypoint 119 by the project.
- No formal graves were recorded but graves can occur anywhere on the landscape. Two stone cairns of unknown purpose were recorded at Waypoint 111 and, although unlikely, these features could represent graves and should be avoided;
- If any graves are located in future they should ideally be preserved *in-situ* or alternatively relocated according to existing legislation;
- According to the SAHRA paleontological sensitivity map the area is of moderate paleontological sensitivity. The paleontological component was addressed in independent studies for the respective PV Facilities (Bamford 2020). The study recommended that a Fossil Chance Find Protocol should be added to the EMPr: if fossils are found once excavations

have commenced then they should be rescued and a palaeontologist called to assess and collect a representative sample.

The impact of the proposed project on heritage resources is considered acceptable with the correct mitigation measures in place such as *in-situ* preservation. It is therefore recommended that the proposed project can commence based on the following recommendations as part of the EMPr and based on the approval of SAHRA.

- Avoidance of Waypoint 111 and Waypoint 119;
- The final alignment must be subjected to a walk down prior to development;
- A chance find procedure must be implemented for the project as outlined below

The impact of the proposed project on heritage resources is considered to be of low significance. Therefore, the project is considered to be acceptable from a heritage perspective and no further pre-construction mitigation in terms of archaeological resources is required based on approval from SAHRA. Furthermore, the socio-economic benefits also outweigh the possible impacts of the development with the correct mitigation measures (i.e. chance find procedure) implemented for the project.

6.7.4.1 Chance Find Procedures

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

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

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

6.8 PALAEONTOLOGICAL IMPACTS

Professor Marion Bamford undertook a desktop paleontological assessment of the proposed Geel Kop Grid Connection Infrastructure. A copy of this assessment is included in **Annexure E6**. The potential impacts on Palaeontological resources identified in the specialist study are summarised below.

The potential impacts on Palaeontological resources identified in the specialist study are summarised below. Any potential impacts on Palaeontological resources would occur during the construction phase.

Table 58: Impact on Palaeontological Resources

Severity/Nature	Low	Volcanic rocks do not preserve fossils, Sands of the Gordonia Fm might cover palaeo-pans or palaeo-springs. To date there are no records from this site and none is visible on Google Earth so it is very unlikely that fossils occur on the site. The impact would be very unlikely.

Duration	Permanent	Where manifest, the impact will be permanent.
Spatial scale	Localised	Since only the possible fossils within the area would be fossils from any pans or springs, if present. The spatial scale will be localised within the site boundary.
Probability	Unlikely	It is extremely unlikely that any fossils would be found in the loose sand or stabilised dunes close to the site. Nonetheless, a Fossil Chance Find protocol should be added to the eventual EMPr.

Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are either much too old and of volcanic origin to contain fossils, in this locality, the Vyfbeker Metamorphic suite granitic gneiss. The Gordonia Formation or Kalahari sands do not preserve fossils but might cover palaeo-pans or palaeo-springs, however, none is visible from imagery. Since there is an extremely small chance that fossils might be below the sands, a Fossil Chance Find Protocol has been added to this report. Taking account of the defined criteria, the potential impact to fossil heritage resources is extremely low.

6.8.1 Conclusion and Recommendations of Palaeontology Specialist

Based on experience and the lack of any previously recorded fossils from the area, no fossils occur in the volcanic Vyfbeker Metamorphic Suite. It is extremely unlikely that any fossils would be preserved in the Aeolian sands of the Quaternary Gordonia Formation. There is a very small chance that fossils may occur beneath the sands, if any have been trapped in palaeo-pans or palaeo-dunes, although no such feature is evident. Nonetheless, a Fossil Chance Find Protocol should be added to the EMPr: if fossils are found once excavations have commenced then they should be rescued and a palaeontologist called to assess and collect a representative sample.

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6.9 VISUAL IMPACTS

Mr Jon Marshall of Environmental Planning and design, undertook a detailed visual impact assessment of the proposed Geel Kop Grid Connection Infrastructure. A copy of this assessment is attached in Annexure E7 of the BAR and a summary thereof is provided below.

The specialist identified the following potential visual impacts that will require assessment:

- The proposed development could change the character and sense of place of the landscape setting;
- The proposed development could change the character of the landscape as seen from the N14;
- The proposed development could change the character of the landscape as seen from the R359;
- The proposed development could change the character of the landscape as seen from the un-surfaced Lutzputs Road to the north and east;
- The proposed development could change the character of the landscape as seen from local homesteads and settlements;
- Lighting impacts.

These potential impacts identified by the specialist are summarized in the Tables below.

Table 59: Assessment of impact on landscape change

Nature:	Change in character and sense of place of the landscape setting	
	Without mitigation	**With mitigation**

Extent	Site and immediate surroundings	Site and immediate surroundings
Duration	Long term	Long term
Magnitude	Minor to Low	Minor to Low
Probability	Probable	Probable
Significance	**Low**	**Low**
Status	Neutral	Neutral
Reversibility	High	High
Irreplaceable loss	Perceived irreplacable loss	No irreplaceable loss
Can impacts be mitigated?	Yes,	N/A
Mitigation / Management:	- Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude; - Ensure that vegetation is not unnecessarily removed during the construction period; - Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities; - Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources; and - Align power line as far from identified receptors as possible within the identified corridor	
Cumulative Impacts:	The proposed project will intensify the general influence of development and specifically solar projects and associated infrastructure in the area. The overall cumulative impact is assessed as having a medium significance, however, the contribution of the proposed project to this cumulative impact is assessed as low. See appendix IV.	
Residual Risks:	The residual risk relates to loss of natural vegetation cover being obvious on decommissioning of the proposed project. It is therefore critical that effective rehabilitation is undertaken.	

Table 60: Impact of change in character of the landscape as seen from the N14.

Nature of impact:	Change in character of the landscape as seen from the N14.	
	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings	Site and immediate surroundings
Duration	Long term	Long term
Magnitude	Power Line Small to minor Substations Low	Power Line Small to minor Substations Low
Probability	Power Line Improbable Substations Probable	Power Line Improbable Substations Probable
Significance	Power Line **Low** Substations **Medium**	Power Line **Low** Substations **Medium**
Status	Power Line Neutral Substations Negative.	Power Line Neutral Substations Negative
Reversibility	High	High
Irreplaceable loss	Perceived irreversible loss	No irreplaceable loss
Can impacts be mitigated?	Yes	
Mitigation / Management: **.**	- Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude. - Ensure that vegetation is not unnecessarily removed during the construction period - Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.	

	- Align power line as far from identified receptors as possible within the identified corridor. - Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities.
Cumulative Impacts:	The proposed project will extend the general influence of development and specifically solar projects in the area. The overall cumulative impact is assessed as having a medium significance. The contribution of the proposed project to this cumulative impact was also assessed as having a medium significance. See appendix IV.
Residual Risks:	The residual risk relates to loss of natural vegetation cover being obvious on decommissioning of the proposed project. It is therefore critical that effective rehabilitation is undertaken.

Table 61: Impact of change in character of the landscape as seen from the R359.

Nature of impact:	Change in character of the landscape as seen from the R359.	
	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings	Site and immediate surroundings
Duration	Long term	Long term
Magnitude	Small	Small
Probability	Very improbable	Very improbable
Significance	**Low**	**Low**
Status	Neutral impact.	Neutral Impact
Reversibility	High	High
Irreplaceable loss	No irreplaceable loss.	No irreplaceable loss.
Can impacts be mitigated?	Yes .	
Mitigation / Management: - .	- Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude. - Ensure that vegetation is not unnecessarily removed during the construction period. - Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilitiesReduce the construction period as far as possible through careful logistical planning and productive implementation of resources. - Align power line as far from identified receptors as possible within the identified corridors	
Cumulative Impacts:	The overall cumulative impact is assessed as having a medium significance. The contribution of the proposed project to this cumulative impact is assessed as low.	
Residual Risks:	The residual risk relates to loss of natural vegetation cover being obvious on decommissioning of the proposed project. It is therefore critical that effective rehabilitation is undertaken.	

Table 62: Assessment of change in character of the landscape as seen from the Lutzputs Road.

Nature of impact:	Change in character of the landscape as seen from the Lutzputs Road.	
	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings	Site and immediate surroundings
Duration	Long term	Long term
Magnitude	Small	Small
Probability	Very Improbable	Very Improbable
Significance	**Low**	**Low**
Status	Neutral	Neutral
Reversibility	High	High
Irreplaceable loss	No irreplaceable loss.	No irreplaceable loss.
Can impacts be mitigated?	Yes	

Mitigation / Management:	- Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources. - Align power line as far from identified receptors as possible within the identified - Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude. - Ensure that vegetation is not unnecessarily removed during the construction period. - Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities.
Cumulative Impacts:	The overall cumulative impact is assessed as having a medium significance. The contribution of the proposed project to this cumulative impact is assessed as low.
Residual Risks:	The residual risk relates to loss of natural vegetation cover being obvious on decommissioning of the proposed project. It is therefore critical that effective rehabilitation is undertaken.

Table 63: Assessment of change in character of the landscape as seen from local homesteads and settlements.

Nature of impact:	Change in character of the landscape as seen from local homesteads and settlements.	
	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings	Site and immediate surroundings
Duration	Long term	Long term
Magnitude	Small to Minor	Small to Minor
Probability	Probable	Probable
Significance	**Low**	**Low**
Status	Neutral to negative	Neutral to negative
Reversibility	High	High
Irreplaceable loss	No irreplaceable loss	No irreplaceable loss
Can impacts be mitigated?	Yes	
Mitigation / Management:	- Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources. - Align power line as far from identified receptors as possible within the identified - Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude. - Ensure that vegetation is not unnecessarily removed during the construction period. - Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities.	
Cumulative Impacts: .	The cumulative impact of solar projects and associated infrastructure was assessed as low. The contribution of this project to cumulative impacts was also assessed as low.	
Residual Impacts:	The residual risk relates to the infrastructure being left in place on decommissioning of the solar project. It is therefore critical that effective rehabilitation is undertaken.	

Table 64: Assessment of visual impact of operational, safety and security lighting of the facility at night on observers.

Nature of impact:	Visibility of operational, safety and security lighting of the facility at night	
	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings	Site
Duration	Long term	Long term
Magnitude	Low	Small to minor
Probability	Definite	Improbable
Significance	**Medium**	**Low**
Status	Negative	Neutral
Irreplaceable loss	No irreplaceable loss	No irreplaceable loss
Reversibility	High	High
Can impacts be mitigated?	Yes	

Mitigation / Management:	- Use low key lighting around buildings and operational areas that is triggered only when people are present. - Plan to utilise infra-red security systems or motion sensor triggered security lighting; - Ensure that lighting is focused on the development with no light spillage outside the site; - Ensure that flood lighting for night time repair work is on a separate circuit and is turned off when not required; and - Keep lighting low, no tall mast lighting should be used.
Cumulative Impact:	There is potential for security lighting and operational lighting associated with solar energy projects and associated infrastructure to further impact on the area but with mitigation the contribution of this project to possible cumulative impacts is likely to be of low significance.
Residual Risks:	No residual risk has been identified.

6.9.1 Conclusion and recommendation of Visual Specialist

Visual impacts associated with the proposed grid connection development infrastructure are generally likely to be low. The impact on motorists on the N14 associated with the Bushmanland Collector Substation that is assessed as having a medium significance. This impact will extend over approximately 5km of the road. Given the transformed nature of the landscape due to its REDZ status, this impact is likely to be similar to that experienced on other sections of the road.

Therefore from a landscape and visual impact perspective, there is no reason why the proposed project should not be authorised.

6.10 FRESHWATER ECOLOGY IMPACTS

Dr Brian Colloty, undertook a detailed freshwater ecology assessment of the proposed Geel Kop Grid Connection Infrastructure. A copy of this assessment is attached in **Annexure E3** of the BAR and a summary thereof is provided below.

The freshwater specialist identified the following impacts on freshwater resources:

- Loss of Very High Sensitivity systems, namely the mainstem alluvial water course and pans through physical disturbance although the proposed layout could avoid any of these systems.
- Impact on secondary alluvial water courses (Moderate Sensitivity), through physical disturbance
- Impact on all riparian and wetland systems through the possible increase in surface water runoff from the substations and any access tracks on riparian form and function through hydrological changes
- Increase in sedimentation and erosion
- Risks on the aquatic environment due to water quality impacts
- Cumulative impacts

These identified impacts are assessed in the Tables below.

Table 65: Impact of loss of high sensitivity systems through physical disturbance.

Nature	Loss of Very High Sensitivity systems, namely the mainstem alluvial water course and pans through physical disturbance although the proposed layout could avoid any of these systems.	
	Without mitigation	**With mitigation**
Extent	High	Local
Duration	Long-term	Long-term
Magnitude	High	Low
Probability	Definite	Probable
Significance	**High**	**Low**
Status (positive or negative)	Negative	Negative

Reversibility	Medium	Medium
Irreplaceable loss of resources	No	No
Can impacts be mitigated	Yes	
Mitigation:	- The layout planning must take cognisance of the sensitivity layers as shown in the aquatic report, to avoid these areas or cross such areas using existing tracks / roads or where the impacts would be low or can easily be mitigated. - All pylons should be placed further than 32m from watercourses. - Where new access tracks are required, they should avoid aquatic features, but if these are required, specific walk downs should be conducted to find a suitable crossing position and erosion control implemented. - This must be coupled to a post authorisation walkdown of the line once the final tower positions and access points are known so that new impacts don't arise and effective site-specific mitigation and recommendations can be provided. - A pre-construction walkthrough with an aquatic specialists is recommended and they can assist with the development of the stormwater management plan and Aquatic Rehabilitation and Monitoring plan, coupled to micro-siting of the final layout. All alien plant re-growth, which is currently low within the greater region must be monitored and should it occur, these plants must be eradicated within the project footprints and especially in areas near the proposed crossings. *Prosopis* (alien invasive riparian tree) is prevalent, thus care in transporting any material, while ensuring that such materials is free of alien seed, coupled with pre and post alien clearing must be stipulated in the EMPr.	
Cumulative impacts:	When compared to the surrounding transmission lines (roads and infrastructure - operational), this impact would be negligible as they have shown limited impacts have occurred when compared to other land use activities within the region	
Residual impacts:	Possible impact on the remaining catchment due to changes in run-off characteristics in the development area is unlikely.	

Table 66: Impact on secondary alluvial water courses.

Nature:	Impact on secondary alluvial water courses (Moderate Sensitivity), through physical disturbance.	
	Without mitigation	**With mitigation**
Extent	Local	Local
Duration	Long-term	Long-term
Magnitude	Low	Low
Probability	Definite	Probable
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources	No	No
Can impacts be mitigated	Yes	
Mitigation:	- The layout planning must take cognisance of the sensitivity layers, to avoid these areas or cross such areas using existing tracks / roads or where the impacts would be low or can easily be mitigated. Where new access tracks are required, they should avoid aquatic features, but if these are required, specific walk downs should be conducted to find a suitable crossing position and erosion control implemented. This must be coupled to a post authorisation walkdown of the line once the final tower positions and access points are known so that new impacts don't arise and effective site-specific mitigation and recommendations can be provided. - A pre-construction walkthrough with an aquatic specialists is recommended and they can assist with the development of the stormwater management plan and Aquatic Rehabilitation and Monitoring plan, coupled to micro-siting of the final layout. - All alien plant re-growth, which is currently low within the greater region must be monitored and should it occur, these plants must be eradicated	

	within the project footprints and especially in areas near the proposed crossings. Prosopis (alien invasive riparian tree) is prevalent, thus care in transporting any material, while ensuring that such materials is free of alien seed, coupled with pre and post alien clearing must be stipulated in the EMPr.
Cumulative impacts:	When compared to the surrounding transmission lines (roads and infrastructure - operational), this impact would be negligible as they have shown limited impacts have occurred when compared to other land use activities within the region
Residual impacts:	Possible impact on the remaining catchment due to changes in run-off characteristics in the development area is unlikely.

Table 67: Impacts of surface water runoff.

Nature:	Impact on riparian systems through the possible increase in surface water runoff on riparian form and function.	
	Without mitigation	**With mitigation**
Extent	Local	Local
Duration	Long-term	Long-term
Magnitude	Low	Low
Probability	Definite	Probable
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources	No	No
Can impacts be mitigated	Yes	
Mitigation	- The layout planning must take cognisance of the sensitivity layers, to avoid these areas or cross such areas using existing tracks / roads or where the impacts would be low or can easily be mitigated. - Where new access tracks are required, specific walk downs should be conducted to find the ideal crossing position and erosion control implemented. This must be coupled to a post authorisation walkdown of the line once the final tower positions and access points are known so that new impacts don't arise and effective site-specific mitigation and recommendations can be provided. - A pre-construction walkthrough with an aquatic specialists is recommended and they can assist with the development of the stormwater management plan and Aquatic Rehabilitation and Monitoring plan, coupled to micro-siting of the final layout. - The stormwater management plan must be developed post EA, detailing the structures and actions that must be installed to prevent the increase of surface water flows directly into any natural systems. - Stormwater systems must be inspected on an annual basis to ensure these are functional. - Effective stormwater management must include measures to slow, spread and deplete the energy of concentrated flows thorough effective stabilisation (gabions and Reno mattresses) and the re-vegetation of any disturbed areas - Transmission lines – Any areas disturbed during the operations of the transmission line, including the access tracks must be inspected on an annual basis for signs of erosion or scour. Where these are identified efforts to stabilise the areas *(with reno mattresses, Gabions, Vegetation other suitable intervention) should be immediately implemented and monitored.	
Cumulative impacts:	When compared to the surrounding transmission lines (roads and infrastructure - operational), this impact would be negligible as they have shown limited impacts have occurred when compared to other land use activities within the region	

Residual impacts:	Possible impact on the remaining catchment due to changes in run-off characteristics in the development area is unlikely

Table 68: Impacts of increased sedimentation and erosion.

Nature:	Increase in sedimentation and erosion within the development footprint. An increase in hard surface areas, and or roads that require stormwater management increases runoff from a site through the concentration of surface water flows. These higher volume flows, with increased velocity can result in downstream erosion and sedimentation if not managed.	
	Without mitigation	**With mitigation**
Extent	Local	Local
Duration	Long-term	Long-term
Magnitude	Low	Low
Probability	Definite	Probable
Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources	No	No
Can impacts be mitigated	Yes	
Mitigation:	- The stormwater management plan must be developed post EA, detailing the structures and actions that must be installed to prevent the increase of surface water flows directly into any natural systems. - Stormwater systems must be inspected on an annual basis to ensure these are functional. - Effective stormwater management must include measures to slow, spread and deplete the energy of concentrated flows thorough effective stabilisation (gabions and Reno mattresses) and the re-vegetation of any disturbed areas - Transmission lines – Any areas disturbed during the operations of the transmission line, including the access tracks must be inspected on a annual basis for signs of erosion or scour. Where these are identified efforts to stabilise the areas *(with reno mattresses, Gabions, Vegetation other suitable intervention) should be immediately implemented and monitored.	
Cumulative impacts:	Downstream erosion and sedimentation of the downstream systems and farming operations. During flood events, the unstable banks (eroded areas) and sediment bars (sedimentation downstream) already deposited downstream will be washed into the Orange River, although currently no direct connections with the Orange River, extreme high flows do enter the river from the development area.	
Residual impacts:	Possible impact on the remaining catchment due to changes in run-off characteristics in the development area.	

Table 69: Impact on localised water quality

Nature:	Impact on localised surface water quality. During both preconstruction, construction and to a limited degree the operational activities, chemical pollutants (hydrocarbons from equipment and vehicles, cleaning fluids, cement powder, wet cement, shutter-oil, etc.) associated with site-clearing machinery and construction activities, as well as maintenance activities, could be washed downslope via the ephemeral systems.	
	Without mitigation	**With mitigation**
Extent	Local	Local
Duration	Long-term	Long-term
Magnitude	Low	Low
Probability	Definite	Probable

Significance	**Medium**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources	No	No
Can impacts be mitigated	Yes (high)	
Mitigation:	- All construction materials including fuels and oil should be stored in demarcated areas that are contained within berms / bunds to avoid spread of any contamination. Washing and cleaning of equipment should also be done in berms or bunds, in order to trap any cement and prevent excessive soil erosion. Mechanical plant and bowsers must not be refuelled or serviced within or directly adjacent to any channel. It is therefore suggested that all construction camps, lay down areas, batching plants or areas and any stores should be more 45 m from a watercourse and wetland. Chemicals used for construction must be stored safely on site and surrounded by bunds. Chemical storage containers must be regularly inspected so that any leaks are detected early; - Occurrences of erosion and sedimentation must be monitoring during construction and addressed as soon as possible to avoid losing this material into the drainage lines. - Littering and contamination of water sources during construction must be prevented by effective construction camp management; - Emergency plans must be in place in case of spillages onto road surfaces and water courses; - No stockpiling should take place within a water course; - All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds; - Stockpiles must be located away from river channels; - The construction camp and necessary ablution facilities meant for construction workers must be beyond the 48 m buffer described previously	
Cumulative impacts:	None as no direct connection between the development area and Orange River remains	
Residual impacts:	Residual impacts will be negligible after appropriate mitigation.	

Table 70: Assessment of overall cumulative impacts on freshwater resources.

Nature:	Cumulative Impacts	
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local	Local
Duration	Long-term	Long-term
Magnitude	Low	Low
Probability	Probable	Definite
Significance	**Low**	**Medium**
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources	No	No
Can impacts be mitigated	Yes (high)	
Mitigation	Development and implementation of rehabilitation plan post Environmental Authorisation, i.e. Once the final tower positions and road layout have been finalised and the walk down post approval has been completed. All mitigation measures provided in the forgoing impact assessment tables should be implemented.	

Residual impacts:	Residual impacts will be negligible after appropriate mitigation.

6.10.1 Conclusion and Recommendations of freshwater specialist.

In summary, the proposed corridor for the facility would not have a direct impact on the following:

- Any Very High sensitivity areas identified by the DEA Screening Tool if these areas are avoided by the transmission line towers and any new access tracks
- Mainstem rivers and Pans that do contain functioning aquatic environments that received a Very High sensitivity rating as indicated in Figure 8.

Therefore, based on the results of this report, the significance of the remaining impacts assessed for the aquatic systems after mitigation would be LOW. Thus, based on the findings of this study no objection to the authorisation of any of the proposed activities is made at this point based on the current layout as provided by the developer.

This report also indicates the watercourses and pans within 500m of the development area. Any activities within these areas, the buffers or 500m from the wetland boundary will require a Water Use license under Section 21 c and i of the National Water Act (Act 36 of 1998).

As the proposed activities have the potential to create erosion, the following recommendations are reiterated:

- Vegetation clearing should occur in a phased manner in accordance with the construction programme to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment, and suitable dust and erosion control mitigation measures should be included in the EMP to mitigate.
- All construction materials including fuels and oil should be stored in demarcated areas that are contained within berms / bunds to avoid spread of any contamination / leaks outside of any delineated waterbodies and their buffers. Washing and cleaning of equipment should also be done in berms or bunds, to trap any cement / hazardous substances and prevent excessive soil erosion. Mechanical plant and bowsers must not be refuelled or serviced within or directly adjacent to any channel.
- It is also advised that an Environmental Control Officer (ECO), with a good understanding of the local flora be appointed during the construction phase. The ECO should be able to make clear recommendations with regards to the re-vegetation of the newly completed / disturbed areas along aquatic features, using selected species detailed in this report.
- All alien plant re-growth must be monitored and should these alien plants reoccur these plants should be re-eradicated. The scale of the operation does however not warrant the use of a Landscape Architect and / or Landscape Contractor.
- It is further recommended that a comprehensive rehabilitation plan be implemented from the project onset within watercourse areas (including buffers) to ensure a net benefit to the aquatic environment. This should from part of the suggested walk down as part of the final EMP preparation preconstruction.

6.11 SOCIAL IMPACTS

Mr Tony Barbour undertook a Social Impact Assessment of the proposed Geel Kop Grid Connection Infrastructure. A copy of this assessment is included in **Annexure E8** and the following summary is provided in this regard. This proposed grid connection infrastructure is directly linked to and inseverable from the seven solar PV projects (on the Remaining Extent of Farm Geel Kop 456) and as such, the Social Impact Assessment considers the grid connection infrastructure as part of the greater Renewable Energy projects.

The social specialist divided his assessment into the following sections which are discussed separately below.

- Assessment of compatibility with relevant policy and planning context;
- Assessment of social issues associated with the construction phase;
- Assessment of social issues associated with the operational phase;
- Assessment of social issues associated with the decommissioning phase;
- Assessment of the no go alternative; and
- Assessment of cumulative impacts.

6.11.1 Assessment of social impacts associated with policy and planning.

The findings of the review indicate that renewable, including solar energy which includes the associated infrastructure, is strongly supported at a national, provincial and local level.

6.11.2 Assessment of social impacts associated with the construction phase

The social specialist identified both positive and negative impacts associated with the construction phase, these impacts were identified as follows:

- Creation of employment and business opportunities, and opportunity for skills development and on-site training (Positive Impact);
- Impacts associated with the presence of construction workers on local communities;
- Impacts related to the potential influx of job-seekers;
- Increased risks to livestock and farming infrastructure associated with the construction related activities and presence of construction workers on the site;
- Increased risk of grass fires associated with construction related activities;
- Noise, dust and safety impacts of construction related activities and vehicles; and
- Impact on productive farmland.

An assessment of these identified social impacts during construction are included in the tables below.

Table 71: Assessment of positive social impacts during the construction phase

Nature: Creation of employment and business opportunities during the construction phase		
	Without Mitigation	**With Enhancement**
Extent	Local – Regional	Local – Regional
Duration	Short term	Short term
Magnitude	Moderate	High
Probability	Highly probable	Highly probable
Significance	**Medium**	**Medium**
Status	Positive	Positive
Reversibility	N/A	N/A
Irreplaceable loss of resources?	N/A	N/A
Can impact be enhanced?	Yes	
Enhancement:	see section 7 of the BAR dealing with suggested mitigation measures	
Cumulative impacts:	Opportunity to up-grade and improve skills levels in the area.	
Residual impacts:	Improved pool of skills and experience in the local area.	

Table 72: Assessment of negative social impacts during the construction phase

Nature: Potential impacts on family structures and social networks associated with the presence of construction workers		
	Without Mitigation	**With Mitigation**
Extent	Local	Local
Duration	Short term for community as a whole	Short term for community as a whole
Magnitude	Moderate for the community as a whole	Low for community as a whole
Probability	Probable	Probable
Significance	**Medium for the community as a whole**	**Low for the community as a whole**
Status	Negative	Negative
Reversibility	No in case of HIV and AIDS	No in case of HIV and AIDS
Irreplaceable loss of resources?	Yes, if people contract HIV/AIDS. Human capital plays a critical role in communities that rely on farming for their livelihoods	Yes, if people contract HIV/AIDS. Human capital plays a critical role in communities that rely on farming for their livelihoods
Can impact be mitigated?	Yes, to some degree. However, the risk cannot be eliminated	
Mitigation:	See mitigation measures reflected in section 7 of the BAR.	
Cumulative impacts:	Impacts on family and community relations that may, in some cases, persist for a long period of time. Also in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their families and the community.	
Residual impacts:	Same as cumulative impacts assessed above	
Assessment of No Go option	There is no impact as the current status quo would be maintained. The potential positive impacts on the local economy associated with the additional spending by construction workers in the local economy will also be lost.	
Nature: Potential impacts on family structures, social networks and community services associated with the influx of job seekers		
	Without Mitigation	**With Mitigation**
Extent	Local	Local
Duration	Permanent (For job seekers that stay on the town)	Permanent (For job seekers that stay on the town)
Magnitude	Minor	Minor
Probability	Probable	Probable
Significance	**Low**	**Low**
Status	Negative	Negative
Reversibility	No in case of HIV and AIDS	No in case of HIV and AIDS
Irreplaceable loss of resources?	Yes, if people contract HIV/AIDS. Human capital plays a critical role in	Yes, if people contract HIV/AIDS. Human capital plays a critical role in

	communities that rely on farming for their livelihoods	communities that rely on farming for their livelihoods
Can impact be mitigated?	Yes, to some degree. However, the risk cannot be eliminated	
Mitigation:	See section 7 of the BAR for a summary of the mitigation measures.	
Cumulative impacts:	Impacts on family and community relations that may, in some cases, persist for a long period of time. Also in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their families and the community.	
Residual impacts:.	Same as cumulative impacts assessed above	
Assessment of No-Go option	There is no impact as it maintains the current status quo.	

Nature: Potential risk to safety of scholars, farmers and farm workers, livestock and damage to farm infrastructure associated with the presence of construction workers on site		
	Without Mitigation	**With Mitigation**
Extent	Local	Local
Duration	Short term	Short term
Magnitude	Medium	Low
Probability	Probable	Probable
Significance	**Medium**	**Low**
Status	Negative	Negative
Reversibility	Yes, compensation paid for stock losses and damage to farm infrastructure etc.	Yes, compensation paid for stock losses and damage to farm infrastructure etc.
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	
Mitigation:	See section 7 of the BAR for a summary of the Mitigation Measures.	
Cumulative impacts:	No**,** provided losses are compensated for.	
Residual impacts:	See cumulative impacts above.	
Assessment of No-Go option	There is no impact as it maintains the current status quo.	

Nature: Potential loss of livestock, crops and houses, damage to farm infrastructure and threat to human life associated with increased incidence of grass fires		
	Without Mitigation	**With Mitigation**
Extent	Local	Local
Duration	Short term	short term
Magnitude	Moderate due to reliance on agriculture for maintaining livelihoods (6)	Low
Probability	Probable	Probable
Significance	**Medium**	**Low**
Status	Negative	Negative

Reversibility	Yes, compensation paid for stock and crop losses etc.	Yes, compensation paid for stock and crop losses etc.
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	
Mitigation:	See section 7 of the BAR for a summary of mitigation measures.	
Cumulative impacts:	No, provided losses are compensated for.	
Residual impacts:	See cumulative impacts.	
Assessment of No-Go option	There is no impact as it maintains the current status quo.	
Nature: Potential noise, dust and safety impacts associated with movement of construction related traffic to and from the site		
	Without Mitigation	**With Mitigation**
Extent	Local	Local
Duration	Short Term	Short Term
Magnitude	Medium	Minor
Probability	Probable	Probable
Significance	**Medium**	**Low**
Status	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	
Mitigation:	See section 7 of the BAR for a summary of Mitigation measures	
Cumulative impacts:	If damage to local farm roads is not repaired then this will affect the farming activities in the area and result in higher maintenance costs for vehicles of local farmers and other road users. The costs will be borne by road users who were not responsible for the damage. Dust impacts to vineyards could also impact on future contracts.	
Residual impacts:	See cumulative impacts above.	
Assessment of No-Go option	There is no impact as it maintains the current status quo.	
Nature: The activities associated with the construction phase, such as establishment of access roads and the construction camp, movement of heavy vehicles and preparation of foundations for the powerlines will damage farmlands and result in a loss of farmlands for grazing.		
	Without Mitigation	**With Mitigation**
Extent	Local	Local
Duration	Long term-permanent if disturbed areas are not effectively rehabilitated	Short term if damaged areas are rehabilitated
Magnitude	Medium	Minor
Probability	Probable	Highly Probable
Significance	**Medium**	**Low**
Status	Negative	Negative

Reversibility	Yes, disturbed areas can be rehabilitated.	Yes, disturbed areas can be rehabilitated.
Irreplaceable loss of resources?	Yes, loss of farmland. However, disturbed areas can be rehabilitated	Yes, loss of farmland. However, disturbed areas can be rehabilitated
Can impact be mitigated?	Yes, however, loss of farmland cannot be avoided	
Mitigation:	See below	
Cumulative impacts:	Overall loss of farmland could affect the livelihoods of the affected farmers, their families, and the workers on the farms and their families. However, disturbed areas can be rehabilitated.	
Residual impacts:	See cumulative impacts.	
Assessment of No-Go option	There is no impact as it maintains the current status quo.	

6.11.3 Assessment of social Impacts Associated with the operational phase.[31]

The social specialist identified both positive and negative impacts associated with the operational phase of the solar PV facilities (because the grid connection infrastructure would not be required without the proposed PV facilities), these impacts were identified as follows:

- The establishment of renewable energy infrastructure (positive);
- Creation of employment and business opportunities. The operational phase will also create opportunities for skills development and training (positive);
- Generation of additional income for the landowner (positive);
- Benefits associated with the establishment of a Community Trust (positive);
- The visual impacts and associated impact on sense of place; and
- Potential impact on tourism.

An assessment of both these positive and negative impacts are included in the tables below.

Table 73: Assessment of positive social impacts during the operational phase.

Nature: Development of infrastructure to generate clean, renewable energy		
	Without Mitigation	**With Mitigation**
Extent	Local, Regional and National	Local, Regional and National
Duration	Long term	Long term
Magnitude	High	High
Probability	Highly Probable	Definite
Significance	**High**	**High**
Status	Positive	Positive
Reversibility	Yes	
Irreplaceable loss of resources?	Yes, impact of climate change on ecosystems	Reduced CO_2 emissions and impact on climate change
Can impact be mitigated?	Yes	
Enhancement:	See section 7 of the BAR for a summary of mitigation measures (these measures include the relative enhancement opportunities	

[31] This includes the operational phase impacts of the PV facilities as a whole, as the operational phase impacts of the grid connection cannot be considered in isolation.

Cumulative impacts:	Overall reduction in CO_2 emission, reduction in water consumption for energy generation, contribution to establishing an economically viable commercial renewables generation sector in the Northern Cape and South Africa.
Residual impacts:	See cumulative impacts above
Assessment of No-Go option	The No-Development option would represent a lost opportunity for South Africa to supplement its current energy needs with clean, renewable energy.

Nature: Creation of employment and business opportunities associated with the operational phase		
	Without Mitigation	**With Enhancement**
Extent	Local and Regional	Local and Regional
Duration	Long term	Long term
Magnitude	Low	Low
Probability	Probable	Definite
Significance	**Low**	**Medium**
Status	Positive	Positive
Reversibility	N/A	N/A
Irreplaceable loss of resources?	No	No
Can impact be enhanced?	Yes	
Enhancement:	See section 7 of the BAR for a summary of mitigation measures (these measures include the relative enhancement opportunities	
Cumulative impacts:	Creation of permanent employment and skills and development opportunities for members from the local community and creation of additional business and economic opportunities in the area	
Residual impacts:	See cumulative impacts above	
Assessment of No-Go option	There is no impact as it maintains the current status quo. However, the potential opportunity costs in terms of the loss of employment and skills and development training would be lost.	

Nature: Establishment of a community trust funded by revenue generated from the sale of energy. The revenue can be used to fund local community development		
	Without Mitigation	**With Enhancement**
Extent	Local and Regional	Local and Regional
Duration	Long term	Long term
Intensity	Low	Moderate
Likelihood	Probable	Definite
Significance	**Medium**	**High**
Status	Positive	Positive
Reversibility	Yes	Yes
Can impact be enhanced?	Yes	
Enhancement:	See section 7 of the BAR for a summary of mitigation measures (these measures include the relative enhancement opportunities	
Cumulative impacts:	Promotion of social and economic development and improvement in the overall well-being of the community	

Residual impacts:	See cumulative impacts	
Assessment of No-Go option	There is no impact as it maintains the current status quo. However, the potential opportunity costs in terms of the supporting the social and economic development in the area would be lost. This would also represent a negative impact.	
Nature: The generation of additional income represents a significant benefit for the local affected farmer(s) and reduces the risks to their livelihoods posed by droughts and fluctuating market prices for sheep and farming inputs, such as feed etc. (+)		
	Without Mitigation	**With Enhancement**
Extent	Local	Local
Duration	Long term	Long term
Intensity	Low	Moderate
Likelihood	Probable	Definite
Significance	**Low**	**Medium**
Status	Positive	Positive
Reversibility	Yes	Yes
Can impact be enhanced?	Yes	
Enhancement:	See section 7 of the BAR for a summary of mitigation measures (these measures include the relative enhancement opportunities	
Cumulative impacts:	Support for local agricultural sector and farming	
Residual impacts:	See cumulative impacts	
Assessment of No-Go option	There is no impact as it maintains the current status quo.	

Table 74: Assessment of negative social impacts during the operational phase of the development.

Nature: [32]Visual impact associated with the proposed solar facility and the potential impact on the area's rural sense of place.		
	Without Mitigation	**With Mitigation**
Extent	Local	Local
Duration	Long term	Long term
Magnitude	Minor	Minor
Probability	Probable	Highly Probable
Significance	**Medium**	**Low**
Status	Negative	Negative
Reversibility	Yes, solar facility can be removed.	
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	
Mitigation:	See section 7 of the BAR for a summary of the suggested mitigation measures.	
Cumulative impacts:	Potential impact on current rural sense of place	
Residual impacts:	See cumulative impacts	

[32] This assessment includes visual impacts from a social perspective. Please also refer to the detailed standalone Visual Impact Assessment that was undertaken.

Assessment of No-Go option	There is no impact as it maintains the current status quo.	
Nature: Potential impact of the SEF on local tourism		
	Without Mitigation	**With Enhancement / Mitigation**
Extent	Local	Local
Duration	Long term	Long term
Magnitude	Low	Low
Probability	Probable	Probable
Significance	**Low (Applies to both – and +)**	**Low (Applies to both – and +)**
Status	Negative (Potential to distract from the tourist experience of the area) Positive (Potential to attract people to the area)	Negative (Potential to distract from the tourist experience of the area) Positive (Potential to attract people to the area)
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impact be enhanced?	Yes	
Enhancement:	See section 7 of the BAR for a summary of mitigation measures (including opportunities for enhancement	
Cumulative impacts:	The proposed Grid Infrastructure forms part of 5 of a number of solar energy facilities proposed in the KGLM area. Due to size and scale of the infrastructure the cumulative impacts are not rated significant.	
Residual impacts:	See cumulative impacts	
Assessment of No-Go option	There is no impact as it maintains the current status quo.	

6.11.4 Assessment of social impacts associated with the decommissioning phase

The social specialist identified negative impacts associated with loss of jobs after the decommissioning of the development. These impacts are assessed in the table below.

Table 75: Assessment of social Impacts associated with the decommissioning of the development.

Nature: Social impacts associated with retrenchment including loss of jobs, and source of income		
	Without Mitigation	**With Mitigation**
Extent	Local and regional	Local and regional
Duration	Medium Term	Very Short Term
Magnitude	Moderate	Low
Probability	Highly Probable	Highly Probable
Significance	**Medium**	**Low**
Status	Negative	Negative
Reversibility	Yes, assumes retrenchment packages are paid to all affected employees	
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	
Mitigation:	See section 7 of the BAR for a summary of the suggested mitigation measures.	

Cumulative impacts:	Loss of jobs and associated loss of income etc. can impact on the local economy and other businesses. However, decommissioning can also create short term, temporary employment opportunities associated with dismantling etc.
Residual impacts:	See cumulative impacts

6.11.5 Assessment of Cumulative Social Impacts.

The social specialists identified several cumulative impacts associated with sense of place, accommodation availability and local economics. An assessment of these potential cumulative impacts are included in the table below.

Table 76: Assessment of cumulative social impacts associated with the development.

Nature: Visual impacts associated with the establishment of more than one PV facility and their associated infrastructure and the potential impact on the area's rural sense of place and character of the landscape.		
	Without Mitigation	**With Mitigation**
Extent	Local and regional	Local and regional
Duration	Long term	Long term
Magnitude	Low	Minor
Probability	Probable	Probable
Significance	**Medium**	**Low**
Status	Negative	Negative
Reversibility	Yes. Solar energy plant components and other infrastructure can be removed.	
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	
Enhancement:	See section 7 of the BAR	
Cumulative impacts:	Impact on other activities whose existence is linked to rural sense of place and character of the area, such as tourism, bird watching, and hunting.	
Residual impacts:	See cumulative impacts	
Assessment of No-Go option	There is no impact as it maintains the current status quo.	
Nature: The establishment of a number of renewable energy facilities in the KGLM and ZFMDM will place pressure on local services, specifically medical, education and accommodation		
	Without Mitigation	**With Mitigation**
Extent	Local and regional	Local and regional
Duration	Long term	Long term
Magnitude	Moderate	Minor
Probability	Highly Probable	Highly Probable
Significance	**Medium**	**Low**
Status	Negative	Negative
Reversibility	Yes. Solar energy plant components and other infrastructure can be removed.	
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	
Enhancement:	See below	
Cumulative impacts:	Negative impact on the local services	

Residual impacts:	See cumulative impacts	
Comment on No-Go option	There is no impact as it maintains the current status quo.	
Nature: The establishment of a number of solar energy facilities in the KGLM and ZFMDM will create employment, skills development and training opportunities, creation of downstream business opportunities.		
	Without Mitigation	**With Mitigation**
Extent	Local and regional	Local and regional
Duration	Long term	Long term
Magnitude	Low	Moderate
Probability	Highly Probable	Definite
Significance	**Medium**	**High**
Status	Positive	Positive
Reversibility	Yes. Solar energy plant components and other infrastructure can be removed.	
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	
Enhancement:	See section 7 of the BAR	
Cumulative impacts:	Positive impact on the local and regional economy through the creation of downstream opportunities and wage spend in the local economy	
Residual impacts:	See cumulative impacts	
Assessment of No-Go option	There is no impact as it maintains the current status quo. This would represent a lost socio-economic opportunity for the KGLM.	

6.11.6 Assessment of social impacts of the no-go alternative.

The social specialist assessed the impacts associated with lost opportunities, should the no-go alternative be implemented. The outcome of this assessment is included in the table below.

Table 77: Assessment of social impacts associated with the no-go alternative.

Nature: The no-development option would result in the lost opportunity for South Africa to supplement is current energy needs with clean, renewable energy		
	Without Mitigation	**With Mitigation**
Extent	Local-International	Local-International
Duration	Long term	Long term
Magnitude	Moderate	Moderate
Probability	Highly Probable	Highly Probable
Significance	**Moderate**	**Moderate**
Status	Negative	Positive
Reversibility	Yes	
Irreplaceable loss of resources?	N/A	N/A
Can impact be mitigated?	Yes	
Enhancement:	See section 7 of the BAR	
Cumulative impacts:	Reduce carbon emissions via the use of renewable energy and associated benefits in terms of global warming and climate change	
Residual impacts:	See cumulative impacts	

6.11.7 Conclusion and recommendation of social specialist

The findings of the Social Impact Assessment indicate that the development of the proposed Geel Kop Grid Connection Infrastructure will create employment and business opportunities for locals during both the construction and operational phase of the project.

The establishment of a Community Trust associated with the PV facilities will also benefit the local community. The enhancement measures listed in the report should be implemented to maximise the potential benefits. The significance of this impact is rated as High Positive. The proposed development also represents an investment in clean, renewable energy infrastructure, which, given the negative environmental and socio-economic impacts associated with a coal-based energy economy and the challenges created by climate change, represents a significant positive social benefit for society. The findings of the Social Impact Assessment also indicate that the REIPPPP has resulted in significant socio-economic benefits, both at a national level and at a local, community level. These benefits are linked to foreign Direct Investment, local employment and procurement and investment in local community initiatives. The establishment of the proposed Geel Kop Grid Connection Infrastructure is therefore supported by the findings of the Social Impact Assessment.

Due the number of other renewable energy projects proposed in the local municipal area, it is recommended that the Kai !Garib Local Municipality liaise with the proponents to investigate how best the Community Trusts can be established and managed to promote and support local, socio-economic development in the region as a whole.

6.12 CUMULATIVE IMPACT ASSESSMENT

This section is summarised from the cumulative impact assessments that took place by each of the participating specialists. For further details in this regard, the reader is referred to the specialist assessments contained in **Appendix E**. It must be noted that one cannot separate the grid connection infrastructure from the PV projects which they connect. The cumulative assessments therefore include consideration of the PV projects along with their grid connections.

Where appropriate, certain specialists did include a cumulative assessment of a much wider area than the accepted 30km radius.

There are no potential fatal flaws associated with these cumulative impacts.

The 2014 EIA Regulations (as amended) (GNR 326) define a cumulative impact as follows:

"Cumulative impact in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities."

There are several other renewable energy facilities (each which include their own grid connection infrastructure) near the proposed Geel Kop Grid Connection Infrastructure as detailed in the table below.

A Strategic Environmental Assessment process was undertaken by the CSIR to identify geographical areas most suitable for the rollout of Renewable Energy projects and the supporting electricity grid network. The aim of the assessment was to designate REDZ within which such development will be incentivised and streamlined. After the SEA, these REDZ have been gazetted. The Geel Kop Grid Connection Infrastructure is within one of these Gazetted REDZ as well as a Strategic Powerline Corridor and as such deemed more suitable for such development on a cumulative scale.

Cumulative impacts that could occur due to the development of solar energy facilities and associated infrastructure near each other include impacts such as:

- Visual impacts
- Socio-economic impacts

- Loss of vegetation and the inability to achieve conservation targets
- Impacts to soil and agricultural potential
- Impacts on heritage resources (in this area particularly relating to Archaeology resources)
- Surface water resources

In terms of possible cumulative impacts, one needs to look at the presence of similar facilities on the farm portion as well as the greater landscape.

The table below reflects the other renewable energy facilities (each which include their own grid connection infrastructure) near the proposed Geel Kop Grid Connection Infrastructure.

Table 78: Renewable Energy Facilities in proximity to Geel Kop Grid Connection Infrastructure and their status

#	Project	Property	Status
1	Khi Solar 1 (CSP)	Portion 3 of the Farm McTaggarts Camp 453	Operational
2	Upington CSP tower 2 and 3 (CSP)	Portion 3 of the Farm McTaggarts Camp 453	Authorised
3	Rooipunt Solar Park (PV)	Remainder farm Rooipunt 617	Authorised
4	Sasol CSP Phase 1 and 2 (CSP)	Portions 443 and 450 of 450 van roois vley	Authorised
5	Sirius Solar One (PV)	Remainder of Farm Tungsten Lodge	Operational
6	Sirius Solar 2 (PV)	Remainder of Farm Tungsten Lodge	Authorised
7	Sirius Solar 3 (PV)	Remainder of Farm Tungsten Lodge	EIA in Process
8	Sirius Solar 4 (PV)	Remainder of Farm Tungsten Lodge	EIA in Process
9	S-Kol (PV)	Farm Geelkop 456	Authorised
10	Ofir ZX (PV)	Remainder of Farm 616	Authorised
11	Sonneberg PV Facility	Portion 11 of 474	Authorised
12	Dyasonsklip 1	Farm Dyasonsklip 454	Operational
13	Dyasonsklip 2	Farm Dyasonsklip 454	Operational
14	RE Capital 3C	Farm Dyasonsklip 454	Authorised
15	Dyasonsklip SEF 1	Farm Dyasonsklip 454	Authorised
16	AEP Bloemsmond Solar 1	Portion 5 and 14 of Bloemsmond 455	Authorised
17	AEP Bloemsmond Solar 2	Portion 5 and 14 of Bloemsmond 455	Authorised
18	Bloemsmond 3	Portion 5 and 14 of Bloemsmond 455	Authorised
19	Bloemsmond 4	Portion 5 and 14 of Bloemsmond 455	Authorised
20	Bloemsmond 5	Portion 5 and 14 of Bloemsmond 455	Authorised
21	Bushmanland Pv	Remaining Extent Farm Geelkop 456	Authorised
22	Duneveld PV	Remaining Extent Farm Geelkop 456	Authorised
23	Gordonia Solar PV	Remaining Extent Farm Geelkop 456	Authorised
24	Hari PV	Remaining Extent Farm Geelkop 456	Authorised
25	Shrubland PV	Remaining Extent Farm Geelkop 456	Authorised
26	Karroid PV	Remaining Extent Farm Geelkop 456	Authorised
27	GK Solar PV	Remaining Extent Farm Geelkop 456	Authorised

Cape EAPrac does not have details on the exact configuration of these facilities, however, based on the assumption that each facility along with its associated infrastructure on average will result in the transformation of approximately 230ha, one can assume the following transformation of the two vegetation types associated with the greater area.

Table 79: Potential habitat transformation proximity to Geel Kop Grid Connection Infrastructure.

Status	Transformation Area in Hectares
In operation	230
Under construction	675
Authorised	2530
EIA in Progress	1150

It is impossible to foresee how many of these projects will reach preferred bidder status in terms of the REIPPPP and will eventually be constructed. As a worst-case scenario one can assume a total transformation of 4585 hectares.

Potential cumulative impacts identified for the project include various negative impacts such as loss of habitat, visual massing, loss of agricultural land an influx jobseekers and change in the area's sense of place, but also include positive cumulative impacts on the economy, business development, and employment.

From an ecological perspective, cumulative impacts associated with the development are a concern. However, the loss of the habitat within the preferred alternative is not considered highly significant, given the context surrounding the site. As a result, the overall cumulative impact of the development is considered likely to be medium.

From a freshwater Ecology perspective, the overall impact is considered to be low – medium negative.

In terms of habitat loss, the affected vegetation type is still approximately 96% intact and is an extensive vegetation type, the cumulative loss of 4585ha of habitat is not considered highly significant, especially given the spatial context of the site within a REDZ.

From a social perspective the project is deemed to have a medium positive cumulative impact from employment, skills and business opportunities and skills development and a low negative cumulative impact from large-scale in-migration of people

From a visual perspective, the cumulative visual risk to scenic resources was rated medium negative. Retaining the vegetation around the proposed PV areas will retain the surrounding agricultural sense of place, and further localise the combined zone of visual influence. With successful rehabilitation of the area back to an agricultural land use on closure, the cumulative visual risk could be reduced to negligible in the long term.

6.13 IMPACT SUMMARY

The table below summarises the significance (with mitigation) of all impacts assessed in the sections above[33].

For ease of easy references, impacts are visually reflected using the following colour scheme[34].

All positive impacts (regardless of their significance)	
Neutral or Negligible negative impacts	
Very Low and Low negative impacts	
Medium negative impacts	
Medium – High, High and Very High negative impacts	

[33] To attain these outcomes, the mitigation measures reflected in section 7 of the report need to be implemented.

[34] Where specialist ratings fall across 2 of the groups, the worst case is reflected in the quick reference.

Table 80: Summary of the significance of impacts associated with the Geel Kop Grid Connection Infrastructure[35].

Impact	Significance (with mitigation)
Social Impacts during the construction Phase	
Creation of employment and business opportunities	Medium positive
Presence of construction workers and potential impacts on family structures and social networks.	Low negative
Influx of job seekers.	Low negative
Safety risk, stock theft and damage to farm infrastructure associated with presence of construction workers.	Low negative
Increased risk of veld fires	Low negative
Impact of heavy vehicles and construction activities.	Low negative
Loss of farmland.	Low negative
Social Impacts during the operational phase	
Promotion of renewable energy projects	High positive
Creation of employment and business opportunities	Medium positive
Establishment of Community Trust	High positive
Generate income for affected landowner/s	Medium positive
Visual impact and impact on sense of place	Low negative
Impact on tourism	Low positive and negative
Visual Impacts during construction and operation phase	
Change the character and sense of place of the landscape setting;	Low Negative
Change the character of the landscape as seen from the N14;	Low – Medium Negative
Change the character of the landscape as seen from the R359;	Low Negative
Change the character of the landscape as seen from the un-surfaced Lutzputs Road to the north and east;	Low Neutral
Change the character of the landscape as seen from local homesteads and settlements	Low Neutral
Lighting impacts.	Low Negative
Palaeontological Impacts	
Impact on potential palaeontological resources	Low negative
Agricultural Impacts	
Soil pollution with contaminants during the construction.	Low negative
Loss of Agricultural land	Low negative
Reduction in land capability	Low negative
Alteration of drainage patterns and erosion	Low negative
Soil pollution with contaminants during the operational phase may take place, including spillages of hydrocarbon (fuel oil) and cement. This is possible during the maintenance of the facility.	Low negative
Decrease in availability of soil for agriculture,	Low negative
Clearing of vegetation increases flow speed and a lower infiltration tempo increases silt transport (Cumulative)	Medium negative
Chemicals, hazardous substances and waste used or generated	Medium negative
Freshwater Ecology Impacts	
Loss of Very High Sensitivity systems, namely the mainstem alluvial water course and pans through physical disturbance although the proposed layout could avoid any of these systems.	Low negative
Impact on secondary alluvial water courses (Moderate Sensitivity), through physical disturbance	Low negative
Impact on all riparian and wetland systems through the possible increase in surface water runoff from the substations and any access tracks on riparian form and function through hydrological changes	Low negative
Increase in sedimentation and erosion	Low negative
Risks on the aquatic environment due to water quality impacts	Low negative
Cumulative impacts	Medium Negative

[35] This includes cumulative impacts associated with the facility

Impact	Significance (with mitigation)
Ecological Impacts	
Loss and/or fragmentation of indigenous natural vegetation	Medium – Low negative
Loss of individuals of protected plants	Low negative
Loss of faunal habitat and refugia	Low negative
Mortality of Fauna	Low negative
Displacement of Terrestrial Fauna	Low negative
Increased poaching and illegal collecting.	Low negative
Vegetation damage due to dust deposition	Low negative
Establishment and spread of declared weeds	Low negative
Changes in behavioural patterns of animals	Low negative
Increased runoff and erosion	Low negative
Continued disturbance of indigenous natural vegetation	Low negative
Mortality of fauna during operation	Low negative
Continued establishment and spread of declared weeds	Low negative
AVIFAUNAL IMPACTS	
Displacement of priority species.	Very low negative
Operational phase avifaunal impacts associated with electrocution	Very Low negative
Operational phase avifaunal impacts associated with collisions	Low negative
Cumulative Avifaunal Impacts	Low negative

As can be seen from the table above, there are several positive impact associated with Geel Kop Grid Infrastructure. Most of the negative impacts are either low or negligible, with a few Low – Medium and Medium Impacts (mostly associated with cumulative impacts. There are no high or very high impacts associated with the Geel Kop Grid Connection Infrastructure.

6.14 IMPACT STATEMENT

None of the participating specialists identified any impacts that remain high after mitigation. Because of the risk adverse approach followed for the development of the preferred infrastructure and the fact that grid connection infrastructure will follow existing or proposed infrastructure and straddle sensitive features. No structures are proposed within the sensitive features identified by participating specialists.

From an ecological perspective the preferred grid connection infrastructure corridors will not result in major fragmentation of the landscape. The affected area is considered suitable for development and there are no impacts associated with Geel Kop Grid Connection Infrastructure that cannot be mitigated to a medium level or low level (no medium – high or high impacts are associated with the Geel Kop Grid Infrastructure). As such there are no fatal flaws or high post-mitigation impacts that should prevent the development from proceeding. Based on the layout provided for the assessment, the Geel Kop Grid Infrastructure can be supported from an ecology, avifaunal, visual, social, heritage and agricultural point of view.

A map showing the proposed activity in relation to the key sensitive features is in attached in **Appendix D** as well as in the respective specialist reports in appendix E. All sensitive features along with their appropriate buffers are shown in this plan. As required by the EMPr, all areas outside of the proposed development footprint are to be demarcated as no go areas.

Please refer to the table in the section above listing the key impacts and their significance post mitigation for the preferred alternative. This section must be read in conjunction with the suggested mitigation measures listed in section 7 of this Report.

The table below shows the listed activities applied for with a reference of where the impacts associated with the specific activity are assessed by specialists.

Table 81: Specialist Impact Assessment of Listed Activities.

Listed activity as described in GN R.983, 984 and 985	Reference to Impact Assessment
Regulation 983 – Basic Assessment	
GN R983 Activity 11: *The development of facilities or infrastructure for the transmission and distribution of electricity-* *(i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts; or* *(ii) inside urban areas or industrial complexes with a capacity of 275 kilovolts or more.*	Annexures E1, E2, E3, E4, E5, E7, E8, E12, E13 & E14.
GN R983 Activity 12: The development of- (xii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- (a) within a watercourse; (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;	Annexures E1, E8, E11 & E13
GN R983 Activity 19: *The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic* *(i) a watercourse;*	Annexures E1, E8, E11 & E13

7. MITIGATION MEASURES

Please refer to the table below, which summarises the mitigation measures recommended by both the Specialists and Cape EAPrac. This table summarises the mitigations, and details whether they should be included as conditions of approval, or whether they have been included as actions in the EMPr. In instances where suggested mitigations have already been incorporated into the design phase, they have been reflected as such.

Table 82: Mitigation measures required for the construction, operation and decommissioning of the Geel Kop Grid Connection Infrastructure.

Mitigation	Condition of Approval	Included in EMPr
Agriculture		
Implementation of proper erosion control, and drainage on the access road and maintenance tracks underneath the powerline		✓
Dust control on the access road during construction.		✓
A designated area for refuelling must be constructed with an impervious floor and low wall that will keep the spillage inside. Any spillage must be cleaned with absorbent material as soon as possible and disposed into clearly marked containers. Where spillage takes place, contaminated soil must be excavated and replaced with unpolluted soil. The contaminated soil should be collected by a licenced landfill contractor.		✓
Ensure that most infrastructure features are erected on transformed or non-arable land. Implement stormwater management as an integral part of planning and as a guideline for the positioning of structures. Use existing roads and conservation structures to the maximum in the planning and operation phases. Rehabilitate disturbed areas as soon as possible after construction.	Already mitigated with the design of the preferred layout.	
Erosion and sediment control with proper water run-off control planning.		✓
Appropriate handling and storage of chemicals and hazardous substances and waste should be done.		✓
When spillage accidently takes place, it should be removed and replaced with unpolluted soil. The clean soil can be sourced from excavations nearby. The polluted soil must be piled at a temporary storage facility with a firm waterproof base and is protected from inflow of storm water. It must have an effective drainage system to a waterproof spillage collection area. Contaminated soil must be disposed of at a hazardous waste storage facility.		✓
Clear trees and bushes selectively, leaving grass un-disturbed. Use mechanised machinery when installing posts to eliminate need for foundations. Construct on alternate strips to combat possible erosion.		✓
Establish structures on the contour. Use grass strips to regulate flow speed		✓
Ecology		
Restrict impact to development footprint only and limit disturbance spreading into surrounding areas.		✓
As far as possible, locate infrastructure within areas that have been previously disturbed or in areas with lower sensitivity scores.		✓
Avoid sensitive features and habitats when locating infrastructure		✓
Cross streams and other linear features at right angles, where possible, and also near their end-points or where there are natural breaks in the feature.		✓
Compile a Rehabilitation Plan		✓
.A detailed pre-construction walk-through survey will be required during a favourable season to locate any additional individuals of protected plants. This survey must cover the footprint of all approved infrastructure, including internal access roads.	✓	
Plants lost to the development can be rescued and planted in appropriate places in rehabilitation areas. This will reduce the irreplaceable loss of resources as well as the cumulative effect.		✓
A Plant Rescue Plan must be compiled to be approved by the appropriate authorities	✓	
Undertake dust fall-out monitoring and manage, where necessary	✓	
Compile and implement an alien management plan, which highlights control priorities and areas and provides a programme for long-term control. This should include any areas within proximity to the project that may be affected by the project, or that could have an influence on invasion by alien invasive plants into the property.	✓	
Social		
Where reasonable and practical, the proponent should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories. However, due to the low skills levels in the area, the majority of skilled posts are likely to be filled by people from outside the area.		✓

Before the construction phase commences the proponent should meet with representatives from the KGLM to establish the existence of a skills database for the area. If such as database exists it should be made available to the contractors appointed for the construction phase.		✓
Where feasible, efforts should be made to employ local contactors that are compliant with Broad Based Black Economic Empowerment (BBBEE) criteria;		✓
The local authorities, community representatives, and organisations on the interested and affected party database should be informed of the final decision regarding the project and the potential job opportunities for locals and the employment procedures that the proponent intends following for the construction phase of the project.		✓
Where feasible, training and skills development programmes for locals should be initiated prior to the initiation of the construction phase		✓
The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.		✓
The KGLM, in conjunction with the local business sector and representatives from the local hospitality industry, should identify strategies aimed at maximising the potential benefits associated with the project.		✓
Where possible, the proponent should make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically for semi and low-skilled job categories;		✓
The proponent should consider the option of establishing a Monitoring Forum (MF) in order to monitor the construction phase and the implementation of the recommended mitigation measures. The MF should be established before the construction phase commences, and should include key stakeholders, including representatives from local communities, local KGLM Councillor for Ward 8, farmers and the contractor(s). The MF should also be briefed on the potential risks to the local community associated with construction workers;		✓
The proponent and the contractor(s) should, in consultation with representatives from the MF, develop a code of conduct for the construction phase. The code should identify which types of behaviour and activities are not acceptable. Construction workers in breach of the code should be dismissed. All dismissals must comply with the South African labour legislation;		✓
The proponent and the contractor should implement an HIV/AIDS awareness programme for all construction workers at the outset of the construction phase;		✓
The construction area should be fenced off before construction commences and no workers should be permitted to leave the fenced off area;		✓
The contractor should provide transport for workers to and from the site on a daily basis. This will enable the contactor to effectively manage and monitor the movement of construction workers on and off the site.		✓
Where necessary, the contractors should make the necessary arrangements to enable low and semi-skilled workers from outside the area to return home over weekends and/ or on a regular basis. This would reduce the risk posed to local family structures and social networks;		✓
The contractor must ensure that all construction workers from outside the area are transported back to their place of residence within 2 days after their contract coming to an end;		✓
It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay over-night on the site.	✓	
The proponent should implement a policy that no employment will be available at the gate.		✓
The construction area should be fenced off prior to the commencement of the construction phase. The movement of construction workers on the site should be confined to the fenced off area;	✓	
The proponent must enter into an agreement with the local farmers in the area whereby damages to farm property etc. during the construction phase will be compensated for. The agreement should be signed before the construction phase commences;		✓
Traffic and activities should be strictly contained within designated areas		✓
Strict traffic speed limits must be enforced on the farm		✓
All farm gates must be closed after passing through		✓
Contractors appointed by the proponent should provide daily transport for low and semi-skilled workers to and from the site. This would reduce the potential risk of trespassing on the remainder of the farm and adjacent properties		✓

The proponent should hold contractors liable for compensating farmers and communities in full for any stock losses and/or damage to farm infrastructure that can be linked to construction workers. This should be contained in the Code of Conduct to be signed between the proponent, the contractors and neighbouring landowners. The agreement should also cover loses and costs associated with fires caused by construction workers or construction related activities (see below)		✓
The Environmental Management Plan (EMP) must outline procedures for managing and storing waste on site, specifically plastic waste that poses a threat to livestock if ingested		✓
Contractors appointed by the proponent must ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct, specifically consequences of stock theft and trespassing on adjacent farms.		✓
Contractors appointed by the proponent must ensure that construction workers who are found guilty of stealing livestock and/or damaging farm infrastructure are dismissed and charged. This should be contained in the Code of Conduct. All dismissals must be in accordance with South African labour legislation		✓
Contractor should ensure that open fires on the site for cooking or heating are not allowed except in designated areas;		✓
Smoking on site should be confined to designated areas;		✓
Contractor should provide adequate fire-fighting equipment on-site, including a fire fighting vehicle;		✓
Contractor to provide fire-fighting training to selected construction staff		✓
The movement of heavy vehicles associated with the construction phase should be timed to avoid times of the week, such as weekends, when the volume of traffic travelling along the N14 may be higher;	Already mitigated with the design of the preferred layout	
Dust suppression measures must be implemented on un-surfaced roads, such as wetting on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.		✓
All vehicles must be road-worthy and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits		✓
An Environmental Control Officer (ECO) should be appointed to monitor the establishment phase of the construction phase;	✓	
All areas disturbed by construction related activities, such as access roads on the site, construction platforms, workshop area etc., should be rehabilitated at the end of the construction phase		✓
The implementation of a rehabilitation programme should be included in the terms of reference for the contractor/s appointed		✓
The implementation of the Rehabilitation Programme should be monitored by the ECO		✓
Implement a skills development and training programme aimed at maximising the number of employment opportunities for local community members; Maximise opportunities for local content, procurement and community shareholding		✓
The KGLM should liaise with the proponents of other renewable energy projects in the area to investigate how best the Community Trusts can be established and managed so as to promote and support local, socio-economic development in the region as a whole.		✓
The KGLM should be consulted as to the structure and identification of potential trustees to sit on the Trust. The key departments in the KGLM that should be consulted include the Municipal Managers Office, IDP Manager and LED Manager		✓
Clear criteria for identifying and funding community projects and initiatives in the area should be identified. The criteria should be aimed at maximising the benefits for the community as a whole and not individuals within the community;		✓
Strict financial management controls, including annual audits, should be instituted to manage the funds generated for the Community Trust from the renewable energy facilities and their associated infrastructure.		✓
The proponent should ensure that retrenchment packages are provided for all staff retrenched when the plant is decommissioned.		✓
All structures and infrastructure associated with the proposed facility should be dismantled and transported off-site on decommissioning		✓
Revenue generated from the sale of scrap metal during decommissioning should be allocated to funding closure and rehabilitation of disturbed areas.		✓

The Northern Cape Provincial Government, in consultation with the ZFMDM, KGLM and the proponents involved in the development of renewable energy projects in the GKLM, should consider establishing a Development Forum to co-ordinate and manage the development and operation of renewable energy projects in the area with the specific aim of mitigating potential negative impacts and enhancing opportunities. This would include identifying key needs, including capacity of existing services, accommodation and housing and the implementation of an accredited training and skills development programmes aimed at maximising the opportunities for local workers to be employed during the construction and operational phases of the various proposed projects. These issues should be addressed in the Integrated Development Planning process undertaken by the KGLM and ZFMDM.		✓
Freshwater Ecology		
No infrastructure to be planned in any watercourse to avoid erosion as well as potential damage to infrastructure during surface flooding. Infrastructure may however straddle watercourses.	✓	
Buffer zones for pans and the pans themselves are no-go zones	Already mitigated with the design of the preferred alignment	
Minimise alteration to existing drainage networks as far as possible, avoiding leveling or infilling as this will alter flow paths and cause erosion;		✓
Rainwater collection tanks should be installed on building roofs in order to reduce the risk of channeled flows from gutters.		✓
Consider the use of materials for parking areas that allow greater water infiltration rates such as gravel		✓
Should stormwater need to be discharged into a drainage line from any surface, methods of energy dissipation such as stilling basins should be employed to reduce flow velocities entering the watercourse		✓
Only slash or trim vegetation where it is necessary		✓
Clear vegetation outside of major bird breeding seasons		✓
Temporarily fence no-go and sensitive areas along their buffers with single-strand wire fencing, not danger tape. The aim is to exclude easy access by people and vehicles, but still allow the movement of fauna;		✓
Where vehicle access and work within a watercourse is unavoidable, such as the construction of a road crossing, then demarcate the access, parking and lay down areas using temporary fencing		✓
Where excessive damage has occurred to the watercourse bed, banks or riparian zone, this must be rehabilitated immediately under the guidance of an aquatic specialist.		✓
Limit disturbance to soil and vegetation as far as possible to reduce the risk of erosion.		✓
Establish sediment traps (e.g. silt fences or erosion berms) on areas prone to erosion. Although rainfall is an unlikely event, it must be planned for. Allowance must be made to clear sediment from the traps if erosion occurs during the construction period.		✓
If active erosion results in the formation of gullies, these areas must be infilled with topsoil and covered with hessian or a geotextile (e.g. hessian sheets or geotextiles) prior to revegetation.		✓
Where sedimentation downstream occurs as a direct result of construction activities this must be assessed and manual removal (using spades) under the supervision of a freshwater ecologist or environmental site officer may be recommended.		✓
Vehicle parking and refueling areas must be located > 50m from the edge of watercourses, and be clearly defined		✓
No refueling or vehicle maintenance should take place within 500 m of a watercourse.		✓
Any fuel storage areas must be bunded to prevent spills from spreading if they occur. Waste collection and removal must be arranged on a regular basis, and allowance must be made for conducting a litter clean-up for up to 100m downstream and upstream of the watercourses at the development site.		✓
If spills occur (e.g. oil or hydraulic fluid) there must be a procedure for the containment and management thereof;		✓
Any waste construction materials must be disposed of responsibly, such as at the local landfill site;		✓

Human waste should be stored in conservancy tanks kept well away from any watercourses;		✓
The sensitive features within the powerline corridors should be demarcated as no go areas prior to construction	✓	
Visual		
Light spillage reduction management should be implemented		✓
Dust management during the lifetime of the project.		✓
The laydown area should be sited away from the N14 road as well as the viticulture areas, and preferably not located on portions of the site that have local prominence		✓
Dust management during the lifetime of the project.		✓
Adopt responsible construction practices aimed at containing the construction activities to specifically demarcated areas thereby limiting the removal of natural vegetation to the minimum.		✓
Limit access to the construction site to existing access roads.		✓
Rehabilitate all disturbed areas to acceptable visual standards as soon as possible after construction is complete in each area.		✓
Construction should not take place at night-time.		✓
Topsoil from the footprints of the pylon structures should be stockpiled for rehabilitation and restoration purposes.		✓
If very dry conditions prevail and dust becomes a nuisance, water should be sprayed on the road surface (or implement another suitable mitigation to reduce wind-blown dust).		✓
Strict litter control.		✓
Temporary roads should be well marked and should only cross drainage lines on areas identified as permanent road features where erosion and soil loss management can be contained.		✓
Signage on the N14 should be moderated		✓
All buildings should be painted a grey-brown colour.		✓
Fencing should be simple, diamond shaped (to catch wind-blown litter) and be transparent in appearance. The fences should be checked on a monthly basis for the collection of litter caught on the fence.		✓
Palaeontology		
Should any substantial fossil remains (*e.g.* mammalian bones and teeth) be encountered during construction, 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: SAHRA. 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Phone: +27 (0)21 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). This 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.	✓	
A Chance Fossil Finds Procedure must form part of the EMPr		✓
Archaeology		
Archaeological resources identified for protection must be permanently fenced		✓
If excavations and earthmoving activities expose significant archaeological or heritage resources, such activities must stop and SAHRA must be notified immediately.		✓
If exposed during development, archaeological resources must be dealt with in accordance with the National Heritage Resources Act (No. 25 of 1999) and at the expense of the developer.	✓	
In the event of exposing human remains during construction, the matter will fall into the domain of the South African Heritage Resources Agency and will require a professional archaeologist to undertake mitigation if needed. Such work will also be at the expense of the developer	✓	

8. PUBLIC PARTICIPATION PROCESS

A public participation plan was submitted and approved by the Department (Refer to Annexure F8 for a copy of the approved Public Participation Plan).

Section 41 in Chapter 6 of regulation 982 details the public participation process that must take place as part of an environmental process. The table below provides a quick reference to show how this environmental process has or intends to comply with these legislated requirements relating to public participation.[36]. It must be noted that this Revised Draft BAR, is being subjected to an additional Public Participation process in compliance with regulation 19(1)(b).

Please refer to **Appendix F**, where all evidence of public participation is included.

Table 83: Public participation requirements in terms of S41 of R982

Regulated Requirement	Description
(1) If the proponent is not the owner or person in control of the land on which the activity is to be undertaken, the proponent must, before applying for an environmental authorisation in respect of such activity, obtain the written consent of the landowner or person in control of the land to undertake such activity on that land. (2) Subregulation (1) does not apply in respect of-. (a) linear activities;	The proposed grid connection infrastructure is deemed to constitute a linear activity and as such not required to obtain landowner consent for the linear components of the project. Landowner consent has obtained in instances where substation infrastructure is proposed (i.e. for the landowner of RE Farm Geel kop 456) Land owners along the powerline corridor have been given an opportunity to comment on the Draft BAR.
The person conducting a public participation process must consider any relevant 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 an application or proposed application which is subjected to public participation by -	
(a) fixing a notice board at a place conspicuous to and accessible by the public at the boundary, on the fence or along the corridor of - (i) the site where the activity to which the application or proposed application relates is or is to be undertaken; and (ii) any alternative site;	A site notice was placed at four positions along the N14. Photographic evidence of these notices is attached in **Annexure F3**.
(b) giving written notice, in any of the manners provided for in section 47D of the Act, to -	
(i) the occupiers of the site and, if the proponent or applicant is not the owner or person in control of the site on which the activity is to be undertaken, the owner or person in control of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;	There are no occupiers on the affected portions, other than the respective landowners (who have been notified)
(ii) owners, persons in control of, and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;	Owners of adjacent properties have been notified of this environmental process. Such owners have been requested to inform the occupiers of the land of this environmental process. **Annexure F4** contains these notifications.
(iii) the municipal councilor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;	The ward councilor has been notified of this environmental process. **Annexure F4** contains these notifications
(iv) the municipality which has jurisdiction in the area;	The Kai !Garib municipality (Planning and Technical Services) have been notified of this environmental process. **Annexure F4** contains these notifications.
(v) any organ of state having jurisdiction in respect of any aspect of the activity; and	Please refer to **Annexure F1** showing the list of organs of state that were notified as part of this environmental process.

[36] A public participation plan approved by the competent authority has been appended to the Basic Assessment Report

Regulated Requirement	Description
	Annexure F4 contains copies of these notifications.
(vi) any other party as required by the competent authority;	DEFF have been given an opportunity to comment on this Draft BAR. A copy of DEFF's[37] comment is included in Annexure F4 and the responses to this comment a
(c) placing an advertisement in - (i) one local newspaper; or (ii) any official Gazette that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations;	An advert calling for registration of I&APs was placed in Die Gemsbok local newspaper. Please refer to **Annexure F3** for a copy of this advertisement. The advert for the revised Draft BAR will be included in the Final BAR. There is currently no official Gazette that has been published specifically for providing public notice of applications
(d) placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or district municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official Gazette referred to in paragraph (c)(ii);and	Adverts were not placed in provincial or national newspapers, as the potential impacts will not extend beyond the borders of the municipal area.
(e) using reasonable alternative methods, as agreed to by the competent authority, in those instances where a person is desirous of but unable to participate in the process due to - (i) illiteracy; (ii) disability; or (iii) any other disadvantage.	Notifications have included provision for alternative engagement in the event of illiteracy, disability or any other disadvantage. In such instances, Cape EAPrac will engage with such individuals in such a manner as agreed on with the competent authority.
(3) A notice, notice board or advertisement referred to in subregulation (2) must - (a) give details of the application or proposed application which is subjected to public participation; and (b) state - (i) whether basic assessment or S&EIR procedures are being applied to the application; (ii) the nature and location of the activity to which the application relates; (iii) where further information on the application or proposed application can be obtained; and (iv) the manner in which and the person to whom representations in respect of the application or proposed application may be made.	Please refer to **Annexure F3**.
(4) A notice board referred to in subregulation (2) must - (a) be of a size at least 60cm by 42cm; and (b) display the required information in lettering and in a format as may be determined by the competent authority.	Please refer to **Annexure F3**.

[37] Comment was received from the Directorate: Integrated Environmental Authorisations and the Directorate: Biodiversity and Conservation.

Regulated Requirement	Description
(5) Where public participation is conducted in terms of this regulation for an application or proposed application, subregulation (2)(a), (b), (c) and (d) need not be complied with again during the additional public participation process contemplated in regulations 19(1)(b) or 23(1)(b) or the public participation process contemplated in regulation 21(2)(d), on condition that - (a) such process has been preceded by a public participation process which included compliance with subregulation (2)(a), (b), (c) and (d); and (b) written notice is given to registered interested and affected parties regarding where the - (i) revised basic assessment report or, EMPr or closure plan, as contemplated in regulation 19(1)(b); (ii) revised environmental impact report or EMPr as contemplated in regulation 23(1)(b); or (iii) environmental impact report and EMPr as contemplated in regulation 21(2)(d); may be obtained, the manner in which and the person to whom representations on these reports or plans may be made and the date on which such representations are due.	In compliance with regulation 19(1)(b), this revised Draft BAR is being subjected to an additional public participation process..
(6) When complying with this regulation, the person conducting the public participation process must ensure that - (a) information containing all relevant facts in respect of the application or proposed application is made available to potential interested and affected parties; and (b) participation by potential or registered interested and affected parties is facilitated in such a manner that all potential or registered interested and affected parties are provided with a reasonable opportunity to comment on the application or proposed application. (7) Where an environmental authorisation is required in terms of these Regulations and an authorisation, permit or Licence is required in terms of a specific environmental management Act, the public participation process contemplated in this Chapter may be combined with any public participation processes prescribed in terms of a specific environmental management Act, on condition that all relevant authorities agree to such combination of processes.	All reports that are submitted to the competent authority will be subject to a public participation process. These include: - Draft BAR - Draft EMPr - Revised Draft BAR - All specialist reports that form part of this environmental process.

8.1 REGISTRATION OF KEY STAKEHOLDERS

Several key stakeholders were automatically registered and will be given an opportunity to comment on the Draft BAR. Copies and proof of these notifications are included in **Annexure F4**. A list of key stakeholders registered for this process included in the table below.

Table 84: Key Stakeholders automatically registered as part of the Environmental Process

Stakeholders Registered		
Neighbouring property owners	Department of Environmental Affairs and Nature Conservation	Department of Water and Sanitation

Stakeholders Registered		
All parties registered as having prospecting rights on the farm	Kai !Garib Municipality: Municipal Manager	Department of Science and Technology
Kai !Garib: Ward 8 Councillor	South African National Roads Agency Limited	The Council for Scientific and Industrial Research
South African Heritage Resources Agency	Department of Transport and Public Works	The South African Square Kilometre Array
Northern Cape Heritage Resources Authority	Department of Health	The South African Civil Aviation Authority
Department of Agriculture, Forestry and Fisheries	Department of Minerals and Energy	Affected Land Owner
Provincial Department of Agriculture	Eskom	Department of Communications
Endangered Wildlife Trust.	Department of Mineral Resources	SENTECH
Department of Environmental Affairs, Biodiversity Directorate.	Birdlife Africa.	SARAO

8.2 NOTIFICATION OF DRAFT BASIC ASSESSMENT REPORT.

All key stakeholders listed above were notified of the availability of the Draft Basic Assessment Report. Such notices were provided in writing (Please refer to Annexure F4). Further to the written notification to stakeholders, notices were also placed on site and in the local newspaper. Please refer to Annexure F3 for copies of the Advert and Photographic evidence of the site notices placed.

8.3 AVAILABILITY OF DRAFT BASIC ASSESSMENT REPORT

In compliance with the approved Public Participation Plan, copies of the Draft Basic Assessment Report were available on:

- Cape EAPrac website
- Dedicated Dropbox download link at: https://www.dropbox.com/sh/kdjcm6anm05rd9d/AABNDd6rtu_Xn8gPTpqTlAPza?dl=0
- Dedicated SharePoint link at: https://eaprac-my.sharepoint.com/personal/dale_cape-eaprac_co_za/_layouts/15/onedrive.aspx?id=%2fpersonal%2fdale_cape-eaprac_co_za%2fDocuments%2fGeelkop+Grid+DBAR&FolderCTID=0x0120005ED8D9C12A42A74882645353D5CD9C18

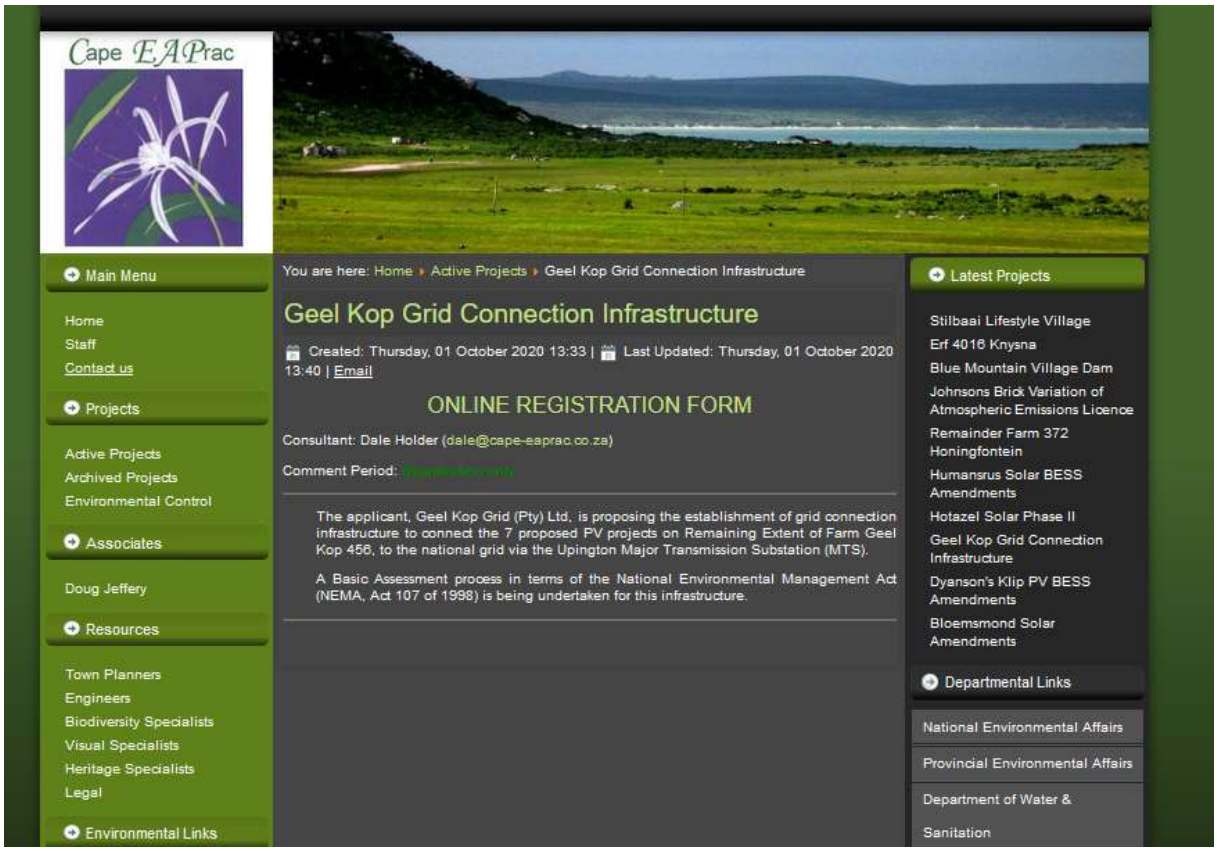

Figure 33: Draft Basic Assessment Report as available on the Cape EAPrac Website.

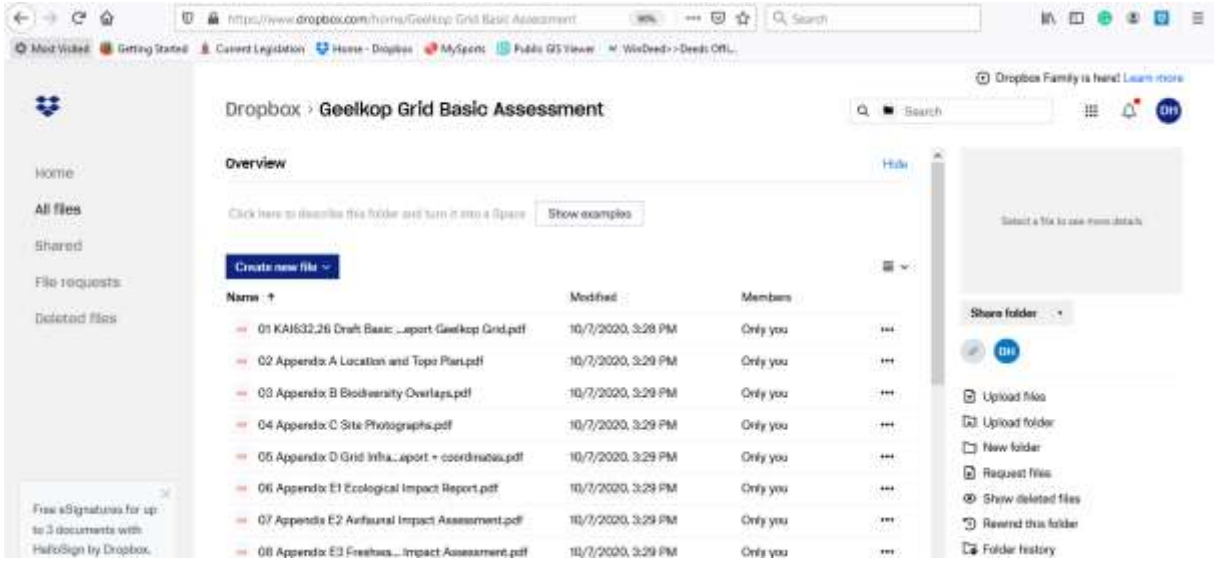

Figure 34: Draft Basic Assessment Report as available on a dedicated Dropbox Download.

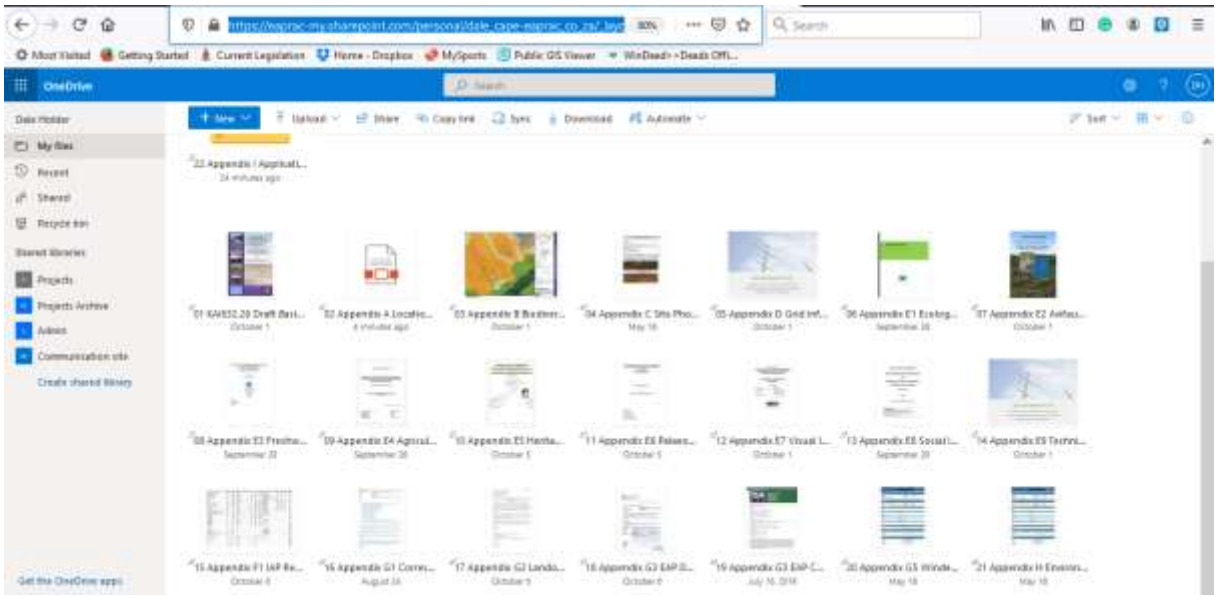

Figure 35: Draft BAR as available on dedicated SharePoint download.

8.4 COMMENTS ON THE DRAFT BASIC ASSESSMENT REPORT.

During the comment period on the Draft Basic Assessment, comments were received from the following parties:

- Department of Environment, Forestry and Fisheries Directorate: Integrated Environmental Authorisations;
- Department of Environment, Forestry and Fisheries Directorate: Conservation and Biodiversity Directorate; and
- Eskom.

Copies of these comments are attached in Annexure F5. The responses thereto are included in Annexure F2.

8.5 AVAILABILITY OF REVISED DRAFT BASIC ASSESSMENT REPORT.

In compliance with regulation 19(1)b, this Revised Draft Basic Assessment report is available for an additional 30-day comment period extending from Friday the 8th of January 2021, to Monday the 8th of February 2020. Details of this additional Public Participation process will be included in the Final Basic Assessment Report to be submitted to DEFF for decision making.

9. CONCLUSION AND RECOMMENDATIONS

This environmental process is currently being undertaken to present proposals to the public and potential and registered I&APs and to identify and assess environmental impacts, issues and concerns raised as a result of the proposed Geel Kop Grid Connection Infrastructure and the alternatives considered.

Cape EAPrac is of the opinion that the information contained in this BAR and the documentation attached hereto is sufficient to allow the I&APs to apply their minds to the potential negative and/or positive impacts associated with the development, in respect of the activities applied for. This environmental process has not identified any fatal flaws with the proposal and as such it is our reasoned view that the project should be conditionally authorised.

All specialists concur that the development as proposed (3 switching stations and a collector switching station, interconnection powerlines between the switching stations, the Geel Kop Collector switching station and Updated Alternative 1 powerline from the Geel Kop collector substation to the Upington MTS) can be considered for approval and that there are no reason(s) why the development should not be implemented. All impacts range from high positive to medium negative and all high and medium - high negative impacts have been avoided by the risk adverse approach to the development of this Geel Kop Grid Connection Infrastructure.

All stakeholders are requested to review this Revised Draft BAR and the associated appendices, and provide comment, or raise issues of concern, directly to *Cape EAPrac* within the specified 30-day comment period. All comments received during this comment period will be included in the Final BAR to be submitted to DEFF for decision making.

It is Cape EAPrac's reasoned opinion that the following infrastructure / alternatives as described in the Draft BAR be considered for approval:

- GK Solar PV switching station
- Shrubland PV switching station
- Karroid PV switching station
- Geel Kop Collector switching station
- Powerline from GK Solar SS to Shrubland SS
- Powerline from Shrubland SS to Karroid SS/Hari Facility Substation
- Powerline from Karroid SS / Hari facility substation to Geel Kop Collector Switching Station
- Powerline from, Bushmanland Facility substation to Geel Kop Collector Switching Station
- Powerline from Geel Kop Collector Switching Station to Upington MTS (Updated Alternative 1 Preferred Connection)

REMAINDER OF ENVIRONMENTAL PROCESS

The following process is to be followed for the remainder of the environmental process:

- The Revised Draft BAR is herewith available for review and comment for a 30 day period.
- All comments received during this period will be considered, addressed and incorporated into a Final BAR.
- The Final BAR will be submitted to the DEA for consideration and decision-making; and
- The DEA's decision (Environmental Authorisation) and the appeal process on the Final BAR will be communicated with all registered I&APs.

10. ABBREVIATIONS

AIA	Archaeological Impact Assessment
BGIS LUDS	Biodiversity Geographic Information System Land Use Decision Support
CBA	Critical Biodiversity Area
CDSM	Chief Directorate Surveys and Mapping
CEMPr	Construction Environmental Management Programme
DEFF	Department of Environment, Forestry and Fisheries
DEA&NC	Department of Environmental Affairs and Nature Conservation
DME	Department of Minerals and Energy
DSR	Draft Scoping Report
EAP	Environmental Impact Practitioner
EHS	Environmental, Health & Safety
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMPr	Environmental Management Programme
ESA	Ecological Support Area
GPS	Global Positioning System
GWh	Giga Watt hour
HIA	Heritage Impact Assessment
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
IFC	International Finance Corporation
IPP	Independent Power Producer
kV	Kilo Volt
LUDS	Land Use Decision Support
LUPO	Land Use Planning Ordinance
MW	Mega Watt

NEMA	National Environmental Management Act
NEMBA	National Environmental Management: Biodiversity Act
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act
NPAES	National Protected Area Expansion Strategy
NSBA	National Spatial Biodiversity Assessment
NWA	National Water Act
PM	Post Meridiem; “Afternoon”
PSDF	Provincial Spatial Development Framework
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
S.A.	South Africa
SACAA / CAA	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
TOPS	Threatened and Protected Species

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