REPORT

Final Basic Assessment Report for the Proposed Mier Rietfontein Solar PV and Battery Storage Project, Located within the Dawid Kruiper Local Municipality, in the Northern Cape Province (DFFE Ref. 14/12/16/3/3/1/2415)

Eskom Holdings SOC Ltd

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Abbreviations and Acronyms

Abbreviation/acronym	Description
AC	Alternative current
ADMD	After diversity maximum demand
AMSL	Above mean sea level
BA	Basic Assessment
BAR	Basic Assessment Report
BESS	Battery Energy Storage System
bgl	Below ground level
BIL	Background information letter
BTUs	Battery tripping units
DC	Direct current
DEA&DP	Department of Environmental Affairs and Development Planning
DEAT	Department of Environmental Affairs and Tourism
DFFE	Department of Forestry, Fisheries and the Environment
DKLM	Dawid Kruiper Local Municipality
c-Si	Crystalline silicon
CBA	Critical Biodiversity Area
COVID-19	Coronavirus 2019
CPA	Community Property Association
CS	Canadian solar
CSI	Corporate social investments
DAFF	Department of Agriculture, Forestry and Fisheries
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMF	Environmental Management Framework
EMPr	Environmental Management Programme Report
EPWP	Expanded Public Works Programme
ESA	Early Stone Age
FAO	Food and Agriculture Organisation
GHI	Global horizontal irradiance
ha	Hectares
HIV/AIDS	Human immunodeficiency virus / acquired immunodeficiency syndrome

Abbreviation/acronym	Description
HVAC	Heating, ventilation, and cooling
I&APs	Interested and affected parties
IFC	International Finance Corporations
IRP	Integrated Resource Plan
IPP	Indigenous Peoples Plan
km	Kilometres
KGNP	Kalahari Gemsbok National Park
KTP	Kgalagadi Transfrontier Park
kV	Kilovolt
kW	Kilowatt
ℓ	Litres
LED	Light-emitting diode
LPUs	Large power users
LSA	Later Stone Age
LV	Low voltage
M	metres
MV	Medium voltage
MVA	Megavolt amperes
MWh	Megawatt hour
NCOU	Northern Cape Operating Unit
NEMA	National Environmental Management Act
NEMAQA	National Environment Management: Air Quality Act
NEMBA	National Environmental Management: Biodiversity Act
NHRA	National Heritage Resources Act
NMD	Notified maximum demand
No.	Number
NWA	National Water Act
O&M	Operating and maintenance
OP	Operational Policy
POPI	Protection of Personal Information Act
PPP	Public participation processes
PV	Photovoltaic
RMU	Ring Main Unit
RSA	Republic of South Africa
S/Stn	Substation

Abbreviation/acronym	Description
SAAQIS	South African Air Quality Information System
SANBI	South African National Biodiversity Institute
SDF	Spatial Development Framework
SEIA	Socio-Economic Impact Assessment
SLO	Social licence to operate
SMS	Short Message Service
SP	Significance Point
SPLUMA	Spatial Planning and Land Use Management Act
STD	Sexually transmitted diseases
TBSh	Tropical shrubland
USA	Unites States of America
UPS	Unlimited power supply
WUL	Water use licence
XLPE	Cross linked polyethylene cable

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1.0 INTRODUCTION

Golder Associates Africa (Pty) Ltd. ("Golder") was appointed by Eskom Holdings SOC Ltd ("Eskom") to undertake a basic assessment ("BA") process for the proposed Mier Rietfontein Solar PV and Battery Storage Project (hereafter referred to as the "Project"), located in the Dawid Kruiper Local Municipality ("DKLM"), in the Northern Cape Province (DFFE Ref. 14/12/16/3/3/1/2415).

2.0 THIS REPORT

The purpose of this final basic assessment report ("BAR") is to present the environmental outcomes, impacts and residual risks of the proposed Project.

This BAR is submitted to the authorities, the National Department of Forestry, Fisheries and the Environment ("DFFE") in support of the application for environmental authorisation ("EA") for the proposed Project.

This BAR has been subjected to a public participation process in accordance with requirements as set out in Chapter 6 of the Environmental Impact Assessment Regulations, 2014[1] ("EIA Regulations, 2014).

2.1 Structure of the Report

The structure of this report is largely based on the information requirements as set out in Appendix 1 of the EIA Regulations, 2014. These requirements are listed in Table 1 below, with references to the relevant sections of the report.

Table 1: Content of basic assessment reports

Number	Information requirement	Relevant section of the report
1(a)	Details of: (i) the EAP who prepared the report; and (ii) the expertise of the EAP, including a curriculum vitae;	APPENDIX A
1(b)	the location of the activity, including: (i) the 21 digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name; (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	Section 3.0
1(c)	a plan which locates the proposed activity or activities applied for as well as associated structures and infrastructure at an appropriate scale;	Figure 3
1(d)	a description of the scope of the proposed activity, including- (i) all listed and specified activities triggered and being applied for; and (ii) a description of the activities to be undertaken including associated structures and infrastructure-	Section 7.0 Section 5.0
1(e)	description of the policy and legislative context within which the development is proposed including- (i) an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and (ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments	Section 6.0

[1] Published under Government Notice R982 in Government Gazette 38282 of 4 December 2014 (as amended)

Number	Information requirement	Relevant section of the report
1(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;	Section 8.0
1(g)	a motivation for the preferred site, activity, and technology alternative	Section 9.0
1(h)	a full description of the process followed to reach the proposed preferred alternative within the site, including- (i) details of all the alternatives considered; (ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; (iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; (iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (v) 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; (vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives; (vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (viii) the possible mitigation measures that could be applied and level of residual risk; (ix) the outcome of the site selection matrix; (x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and (xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;	Section 9.0 Section 10.0 Section 10.0 Section 11.0 Section 12.0 Section 12.1 Section 12.0 Section 13.0 Section 9.0 n/a Section 9.0
1(i)	a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including- (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	Section 12.1
1(j)	an assessment of each identified potentially significant impact and risk, including- (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring; (v) the degree to which the impact and risk can be reversed;	Section 12.0

Number	Information requirement	Relevant section of the report
	(vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) the degree to which the impact and risk can be avoided, managed or mitigated;	
1(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 report;	Section 12.0 and Section 13.0
1(l)	an environmental impact statement which contains- (i) a summary of the key findings of the environmental impact assessment; (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	Section 14.0
1(m)	based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management outcomes for the development for inclusion in the EMPr;	Section 13.0
1(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;	Section 14.0
1(o)	a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed;	Section 15.0
1(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;	Section 14.0
1(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;	n/a
1(r)	an undertaking under oath or affirmation by the EAP in relation to- (i) the correctness of the information provided in the reports; (ii) the inclusion of comments and inputs from stakeholders and I&APs; (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) 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; and	APPENDIX A
1(s)	where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts	n/a
1(t)	any specific information that may be required by the competent authority	n/a
1(u)	any other matters required in terms of section 24(4)(a) and (b) of the Act.	n/a

3.0 PROJECT BACKGROUND

As part of Eskom's commitment to implement clean energy projects, Battery Energy Storage System ("BESS") projects, totalling 1 440 MWh, are to be installed at various locations across the country. These projects are expected to be executed in two phases:

- **Phase 1:** Installation of BESS projects, totalling approximately 800 MWh, at Eskom distribution sites; and
- **Phase 2:** Installation of BESS projects, totalling approximately 640 MWh, at locations closer to the renewable power plant sites.

The KwaZulu-Natal, Eastern Cape, Western Cape, and Northern Cape operating units conducted preliminary studies to assess the suitability of selected sites for the Phase 1 installation of BESS on their electrical grids.

Subsequently, the Northern Cape Operating Unit ("NCOU") conducted an independent study on the Phase 2 installation of BESS at the Rietfontein-Rietfontein 33kV Overhead Line (hereafter referred to as the "Rietfontein feeder").

The Rietfontein feeder is supplied by NamPower through Mier 33kV Substation ("S/Stn"), which is located near Rietfontein Border Post (see Figure 3). Mier S/Stn is supplied by Nabas-Rietfontein line on the Namibian side. This line was built at 66 kV but is currently operated at 33 kV. The total length of this line is about 140 km.

On the South African side, the Rietfontein feeder supplies several small rural towns, namely Rietfontein, Philandersbron, Loubos, Groot Mier, Klein Mier, and Welkom (Figure **1**). The Rietfontein feeder also supplies three large power users ("LPUs"), namely the Rietfontein Border Post, Kgalagadi Transfontier Park, and Botswana Power Corp.

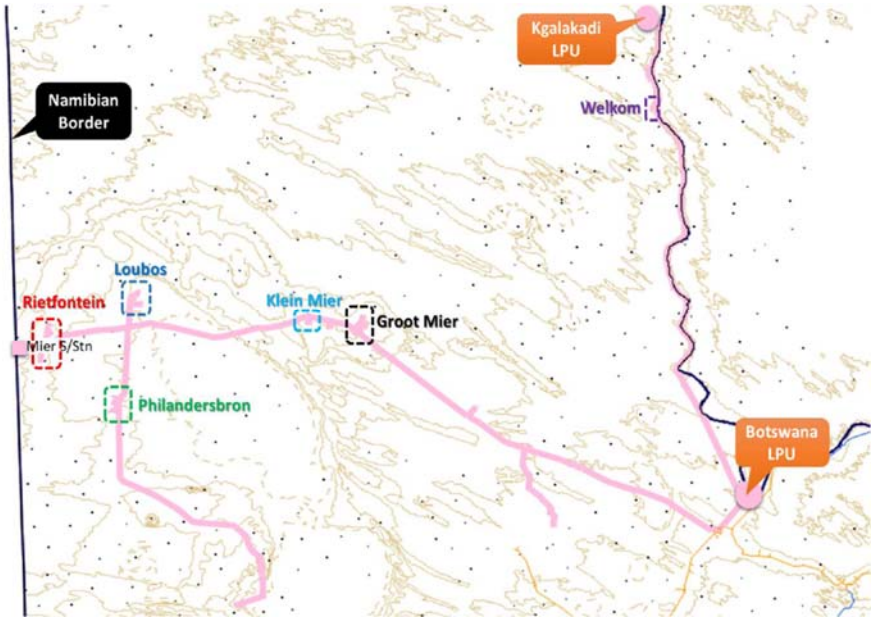


Figure 1: Small rural towns and LPUs supplied by the Rietfontein feeder

Currently, Eskom has an international Energy Trading Agreement with Nampower for notified maximum demand ("NMD") of 1.5 megavolt amperes ("MVA"). Nampower is unable to increase the NMD to address shortages on the Rietfontein feeder due to limitations on the infrastructure on the NamPower side. This is because Nampower does not have the transformer capacity at Nabas 66/33kV S/Stn to increase the NMD. Furthermore, the technical

losses on the Nabas-Rietfontein line will increase to above 10% if the NMD is increased from 1.5 MVA to 2 MVA. These losses are deemed to be unacceptable by both NamPower and the Namibia Energy Regulator.

As an alternative to increasing the capacity of the existing substations and overhead powerlines, the proposed Mier Rietfontein Solar PV and Battery Storage Project will be developed to increase the capacity of the Rietfontein feeder. The proposed project will unlock capacity to connect the areas identified in Table 2.

Table 2: Areas of identified electrification connection

Area	Number of Connections	ADMD (kVA)	Total load (kVA)
Loubos	26	0.8	20.8
Philandersbron	42	0.8	33.6
Rietfontein	77	0.8	61.6
Klein Mier	20	0.8	16
Groot Mier	29	0.8	23.2
Welkom	25	0.8	20
Andriesvale	50	0.8	40
Total	**269**		**215.2**

4.0 PROJECT LOCATION

The preferred sites (solar PV with BESS, and telecommunications tower) for the proposed Project are located near the town of Rietfontein, in the DKLM, in the ZF Mgcawu District Municipality, in the Northern Cape Province (Figure 3).

The preferred site layouts for proposed solar photovoltaic (PV) and BESS site and telecommunications tower site, as well as the sensitivity overlays are provided in Figure 4 and Figure 5.

Table 3 presents a summary of the details of the preferred site alternative for the solar PV and BESS site, as well as the telecommunications tower site, which make up the proposed Project.

Table 3: Details of the preferred site alternatives for the Project

Aspect	Description
Preferred site alternative for the solar PV and BESS site	
21-digit Surveyor General Code of each cadastral land parcel	C02800000000058500000
Physical address	The preferred site is located off the R31, near the Rietfontein Border Post.
Farm name	Mier No. 585
GPS Point Coordinates	20°0'31.535" E; 26°45'11.972" S 20°0'31.442" E; 26°45'22.690" S 20°0'26.393" E; 26°45'22.655" S 20°0'19.236" E; 26°45'19.477" S 20°0'15.951" E; 26°45'21.611" S 20°0'1.700" E; 26°45' 23.794" S 20°0'1.176" E; 26°45' 25.272" S 19°59' 59.938" E; 26°45' 25.240" S 20° 0'0.000" E; 26°45' 24.119" S

	20° 0'1.307" E; 26°45' 22.843" S 20° 0'15.469" E; 26°45' 20.704" S 20° 0'17.716" E; 26°45' 18.802" S 20° 0'24.269" E; 26°45' 11.921" S
Application area	10 ha
Zoning	Agricultural
Local Municipality	Dawid Kruiper Local Municipality
District Municipality	ZF Mgcawu District Municipality
Province	Northern Cape
Preferred site alternative for the telecommunications tower site	
21-digit Surveyor General Code of each cadastral land parcel	C02800000000058500130
Physical address	The preferred site is located 800m north of the R31 and 5km southeast of Groot Mier.
Farm name	Mier No. 585
GPS Point Coordinates	20°22'3.430" E; 26°46' 31.355" S 20°22'3.427" E; 26°46' 31.842" S 20°22'3.970" E; 26°46' 31.845" S 20°22'3.973" E; 26°46' 31.358" S
Application area	0.0225 ha
Zoning	Agricultural
Local Municipality	Dawid Kruiper Local Municipality
District Municipality	ZF Mgcawu District Municipality
Province	Northern Cape

The preferred site for the solar PV and BESS site is surrounded by the following land uses:

- **North:** The R31, a provincial road linking Kimberly to the Rietfontein, is located immediately north of the preferred site. The areas further north are mostly undeveloped.
- **East:** The border between Namibia and South Africa is approximately 500 m to the east. The areas between the preferred site and border is mostly undeveloped, with the exception of the border post and a telecommunications tower.
- **South:** The areas to the south of the preferred site are mostly undeveloped.
- **West:** The areas immediately west of the preferred site are mostly undeveloped. The town of Rietfontein, is located approximately 1 km to the west. There is also a water reservoir and telecommunications tower approximately 500 m to the west.

The preferred site for the telecommunication tower site is surrounded by the following land uses:

- **North:** The Groot Mier is located ~5km northwest of the preferred site. The areas further north are mostly undeveloped.
- **East:** The areas to the east of the preferred site are mostly undeveloped agricultural grazing areas.
- **South:** The R31, a provincial road linking Kimberly to the Rietfontein, is located ~800 m south of the preferred site. The areas to the south of the preferred site are mostly undeveloped agricultural grazing areas.
- **West:** The areas to the west of the preferred site are mostly undeveloped agricultural grazing areas.

Figure 6 below presents the spatial vision for Rietfontein[2]. The area in which the preferred sites for the Project are located are currently zoned as “G.a Vacant Land within Urban Edge” on the SDF but zoned as “Agricultural” according to the municipality; however the areas remain vacant. The zoning is used for areas with land uses other than the conservation areas, sensitive areas, agricultural areas, urban areas, industrial areas, and surface infrastructure, and buildings.

5.0 PROJECT DESCRIPTION

The following section presents a brief description of the proposed Project and is largely based on the *Rietfontein Feeder Solar PV Plant Concept Design Report* (Report no. 474-12447) and the Rietfontein PV, BESS & Cap Bank Project: Rietfontein-Rietfontein 33kV Feeder & Wessels-Klipkop 22kV Feeder Report (dated 2 February 2021) prepared by Eskom.

The proposed Project will consist of 12 independent PV blocks of 170 (“kW”) kW each, with a total installed capacity of 2 040 kW (or 2.04 megawatts (“MW”)). The proposed Project will also consist of 11 independent BESS of 140 kW (560 kWh) each, with a total installed capacity of 1 540 kW (or 1.54 MW) and 6 160 kWh (or 6.16 MWh).

The installation of these PV blocks and BESS will be staggered according to the expected growth in electrical demand:

- Initial installation of 5 x 170 kW PV blocks and 4 x 140 kW BESS for the “electrification scenario”
- Installation of an additional 3 x 170 kW PV blocks and 3 x 140 kW BESS for the “LPUs scenario”
- Installation of an additional 4 x PV blocks and 4 x 140 kW for the “unforeseen demand scenario”

For more information on the above-mentioned scenarios see Section 8.0.

It is proposed that the site will be unmanned and that the Mier Rietfontein solar PV and BESS Project will be remotely monitored and controlled. To ensure communication to the Project, a telecommunications tower to the proposed BESS is required. The telecommunications tower will be positioned close to the village of Groot Mier. The footprint area for the tower is only 15 x 15 m², which will also contain a small equipment room. The charging of the BESS from the PV blocks will done via network control, allowing for the PV blocks and BESS to operate independently from each other.

Table 4 presents a brief description of the proposed Project’s main infrastructure.

Table 4: Proposed Project’s main infrastructure

Infrastructure	Description
BESS	A total of 11 independent BESSs of 140 kW (560 kWh) each will be installed. The total installed capacity of the BESSs will be 1 540 kW (6 160 kWh). The BESSs will be housed within standard shipping containers (~63 m^2). Assuming that the BESS density is 2 MWh per container (worst case scenario), at least three containers will be required, with a total footprint of 189 m^2.
PV modules	PV modules are made up of PV cells that generate electricity on exposure to solar radiation.

[2] Dawid Kruiper Local Municipality (2018). *All-Inclusive Spatial Development Framework (SDF)*. Final Report February 2018.

Infrastructure	Description
	It is proposed that poly crystalline silicon (“multi c-Si”) PV modules will be used. These PV modules are based on poly crystalline cells, which are manufactured by melting many fragments of silicon together to form the wafers that are used in the PV cells. The main advantages of these PV modules is the relatively good efficiency, low cost per unit, proven technology, and availability. The main disadvantage of these PV modules is the lower efficiency when compared to other PV modules, such as mono crystalline silicon PV modules. The PV modules will be connected in series to form Strings. Each string will consist of 16 PV modules. These Strings will be combined via combiner boxes to form PV blocks. Each block will consist of 38 Strings with a total of 608 PV modules. The PV modules will be north facing with a tilt angle of 25 degrees. The tilt angle of the PV modules is typically based on the latitude, which is approximately 27 degrees at the preferred site. Currently, the Canadian Solar Inc. CS6X-320P is the preferred PV module technology option. Each module is 320 W_{DC} with a nominal efficiency 16.82%.
Mounting structures	The PV modules will be mounted at the appropriate orientation to the sun using fixed mounting structures, such as those shown in the below.  **Figure 2: Examples of fixed mounting structures** The fixed mounting structure will consist of two rows of PV modules, with a top and bottom row. A total of 64 PV panels will be installed on each structure (i.e., four strings). The distance between each structure is approximately 7.76 m. This is to allow for a 4 m wide road for cleaning and maintenance, as well as shadowing effects of adjacent rows. The height of each structure will be up to 3.5 m.
Inverters	Inverters will be used to convert the direct current (“DC”) electricity from the PV modules to the alternative current (“AC”) electricity at grid frequency. Each 170 kW PV block will have a 200 kW inverter. The size of the inverter is greater than the output of the PV block to account for days with higher solar irradiance where the PV block output could exceed the inverter size.

Infrastructure	Description
	Currently, the Ingeteam Energy S.A. INGECON SUN 200 TL U 330 is the preferred inverter technology option. It is proposed that each inverter will be housed in a MV Inverter Cabin together with a LV switchboard, step-up transformer, MV switchgear and protection, and an LV/LV auxiliary supply transformer.
Step-up transformers	Transformers will be used to step up the voltage from low voltage (“LV”) at the output of the inverter to the required medium voltage (“MV”) at the point of connection. Each 170 kW PV block will have a LV/MV transformer. Either liquid immersed or non-liquid immersed transformers will be used. If liquid immersed transformers are used, then secondary containment will be provided to prevent oil leakage.
Auxiliary transformers	Two 3.3/0.4kV auxiliary transformers will be installed to supply power to the auxiliaries of the proposed Project. Auxiliary loads include heating, ventilation, and cooling (“HVAC”) systems, lighting, socket outlets, security systems (perimeter lighting, cameras, gate motors, etc.), battery tripping units (“BTUs”), unlimited power supply (“UPS”), telephones, fire detection, and so on. It is proposed that these transformers will be tapped from the overhead line prior to the Mier substation connection.
MV switchgear	MV switchgear will be used to enable power distribution and electrical protection up to the point of connection. Each 170 kW PV block will have MV switchgear, which will be housed in a MV Inverter Cabin. Ring Main Unit (“RMU”) switchgear is the preferred technology option due to the low fault and current ratings, simple protection and control capabilities, and lower cost, space, and maintenance requirements.
Battery tripping units	BTUs will be used to provide DC supply to the switchgear control and protection circuits. These BTUs will be housed in a MV Inverter Cabin.
Uninterruptable power supply (“UPS”)	An UPS system, including battery backup, will be used to provide 230 V_{ac} power to the server room, control room, and network panels.
AC cables	Underground AC cables will be used to connect the PV and BESS to the Mier switching station, while overhead cables will connect the Mier switching station to the existing Rietfontein 33kV feeder. Cross linked polyethylene cable (“XLPE”) will be used for the AC cables as it is lighter, has better electrical and thermal properties, less maintenance, and easier terminating procedure. XLPE cable is also available country wide and has been used in most installations.

Infrastructure	Description
Operating & maintenance ("O&M") building	The O&M building will be 200 m^2 in extent, and include a control room, office, ablution facilities, server and equipment room, and spares storeroom (for the storage of spare solar panels and electronic equipment).
Parking area	A vehicle parking area will be located close to the O&M building. This parking area will have sufficient capacity for a minimum of four vehicles.
Potable water supply and reticulation	Potable water is required to service the two personnel who will be working in the O&M building from time to time. The potable water will be used for domestic purposes, namely drinking, cleaning, and ablution facilities. The preferred option is to source potable water from the municipal water distribution network. However, if this is option is not technically or financially viable, alternative water sources will be investigated. This includes the transport of potable water to site using water tankers or the onsite abstraction and treatment of groundwater[3]. Potable water will be stored in a closed water tank with a capacity 2000 ℓ. This is approximately one week's supply to the two staff that will be onsite from time to time. The water tank will be positioned to ensure water supply of at least 2 bar pressure to all outlets using gravity feed or pump system. The water tank will have an inlet valve for filling, drain nozzle, and outlet valve for supplying potable water to the O&M building. The tank will also have an overfill protection, low level, and high-level indicators.
Process water supply and reticulation	Process water is required for PV module washing and dust suppression activities. The quality of the water required for PV module washing will be based on the requirements of the manufacturer. This is likely to be potable water quality at a minimum. Preliminary estimates are that the PV modules will need to be cleaned twice a year, in June and September, or when reference cells show a difference of global horizontal irradiance ("GHI") measurements of greater than 50 Wh/m^2. The preferred option is to source process water from the municipal water distribution network. However, if this is option is not technically or financially viable, alternative water sources will be investigated. This includes the transport of potable water to site using water tankers or the onsite abstraction and treatment of groundwater[4]. The PV modules will be cleaned using taps located at various locations around the site. The distance between each tap will be less than 50 m.
Sewage disposal	Sewage disposal is required for the two personnel who will be working in the O&M building from time to time. The preferred option is to link into the municipal sewage disposal infrastructure. However, if this is option is not technically or financially viable, alternative sewage

[3] The source of potable water will only be confirmed during the detailed design phase.

[4] The source of process water will only be confirmed during the detailed design phase.

Infrastructure	Description
	disposal options will be investigated. This includes the use of onsite sanitation such as portable toilets during construction[5].
Roads	Access to the site will be from R31 via 5 m wide access road. In addition, there will also be a 5 m wide perimeter road, 3 m wide access roads to the inverters and transformers, and 5 m wide internal roads for maintenance purposes. All the roads will be gravel with a polymer binder to minimise dust. All the roads will also have a suitable drainage system to control stormwater runoff and to prevent erosion.
Telecommunications tower	Microwave links are reliable means of telecommunication network to connect to the existing network and is required to ensure communication to the solar PV and BESS Project site. In order for this option to work a new telecommunications tower site (15 m x 15 m) will be established. The new radio links will be installed between Mier substation to the middle site then to Andriesvale radio station. No guy wires will be used for the tower. The tower will have an equipment container (3 m x 4 m).

[5] The sewage disposal option will only be confirmed during the detailed design phase.

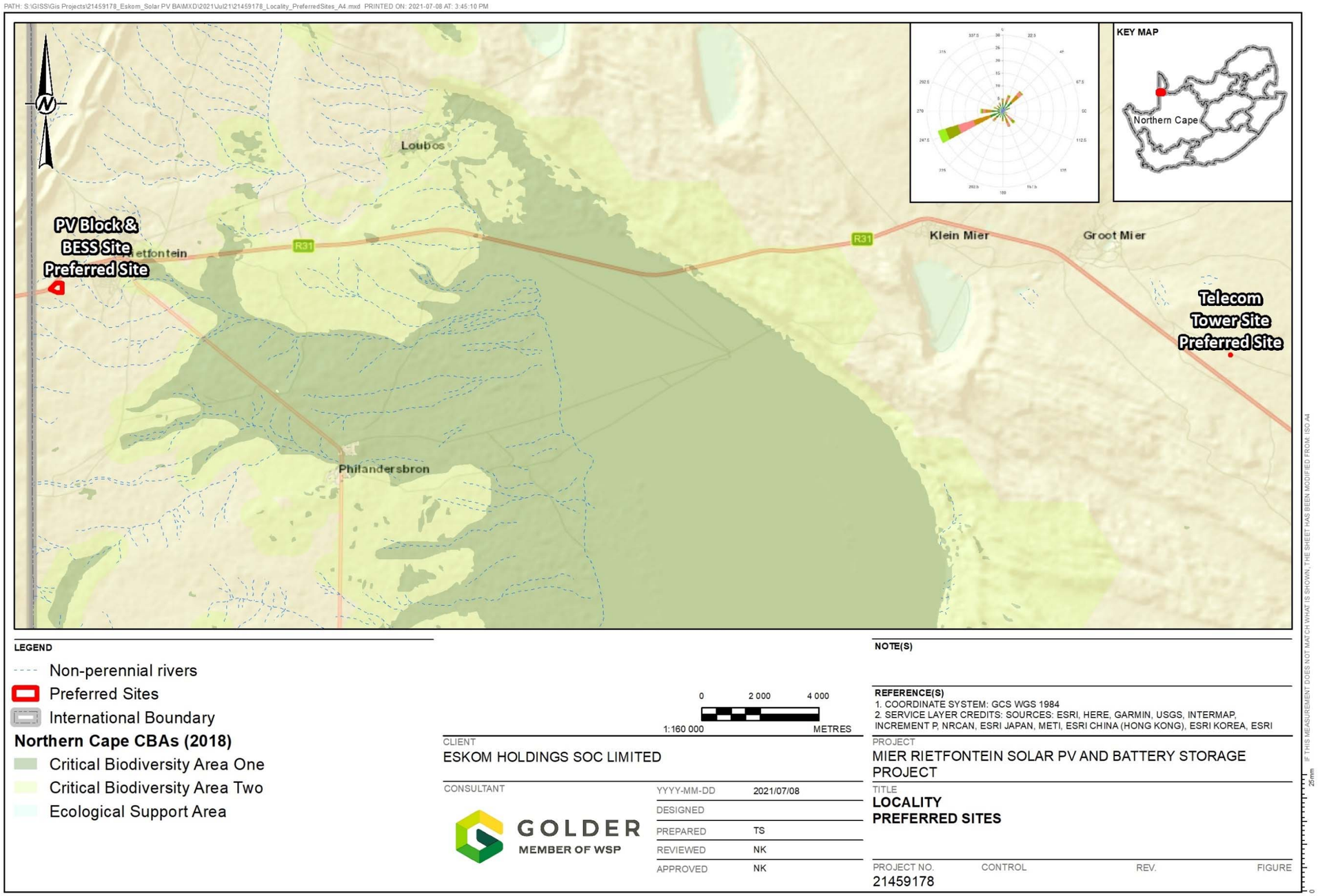
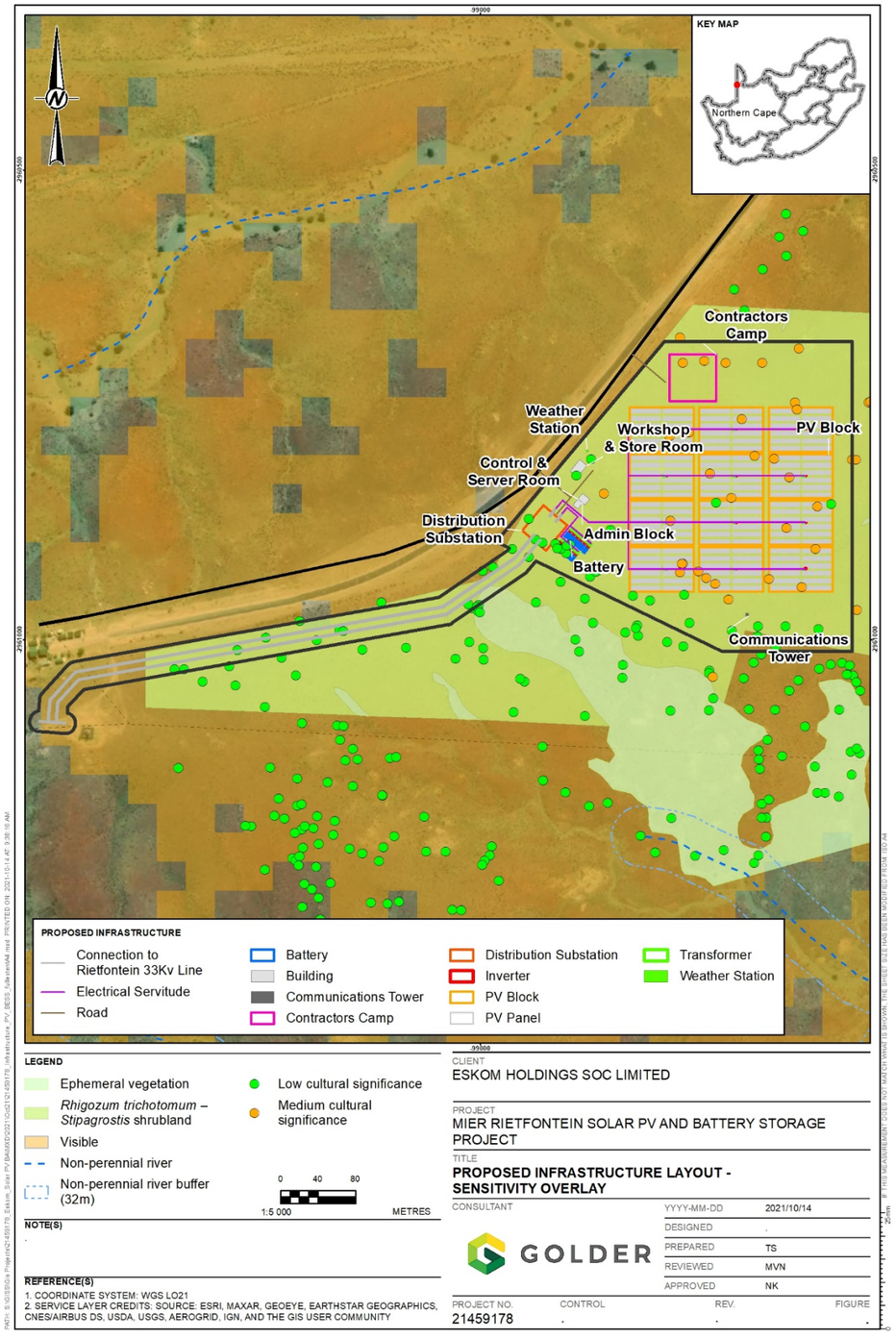


Figure 3: Preferred sites for the Project location



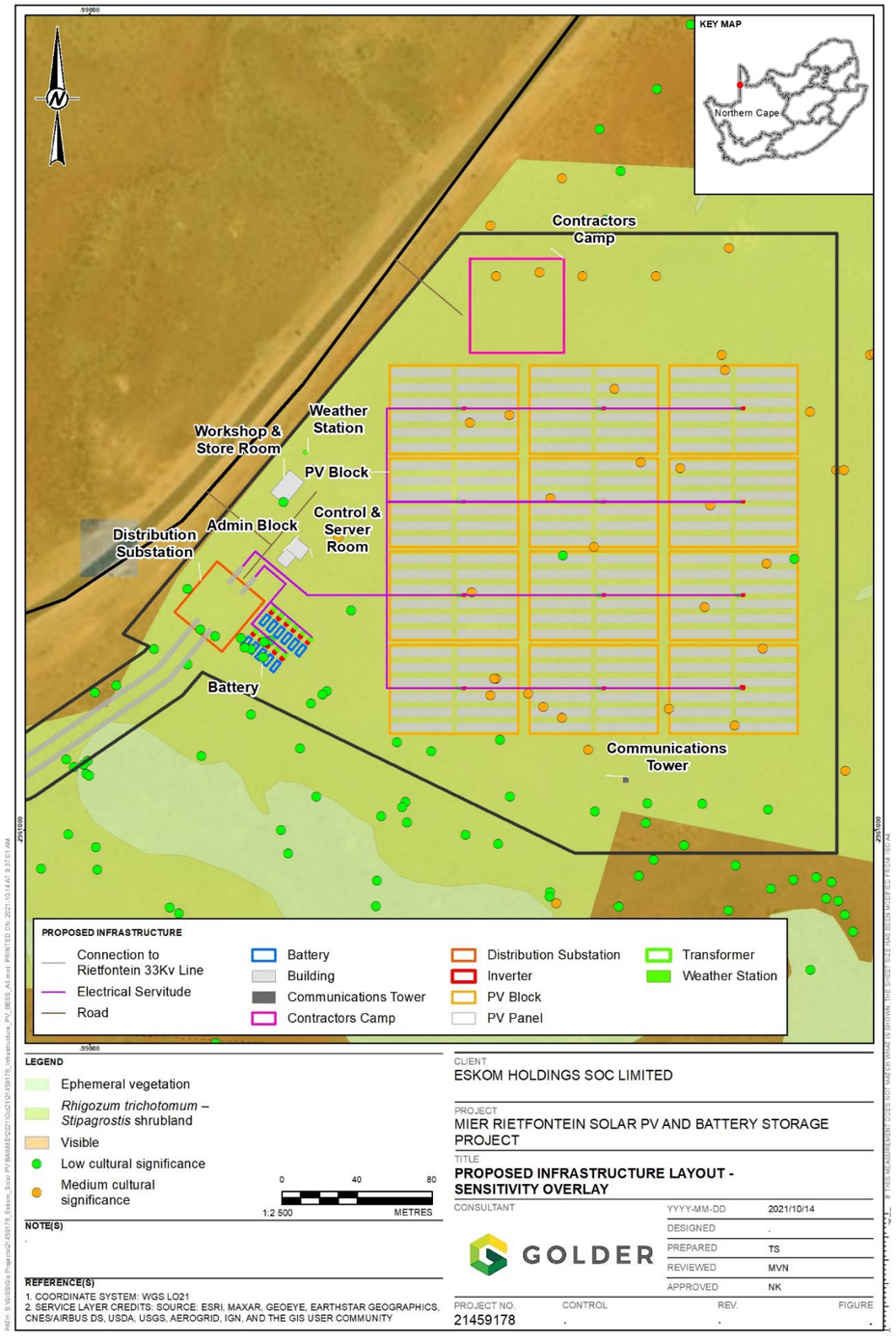
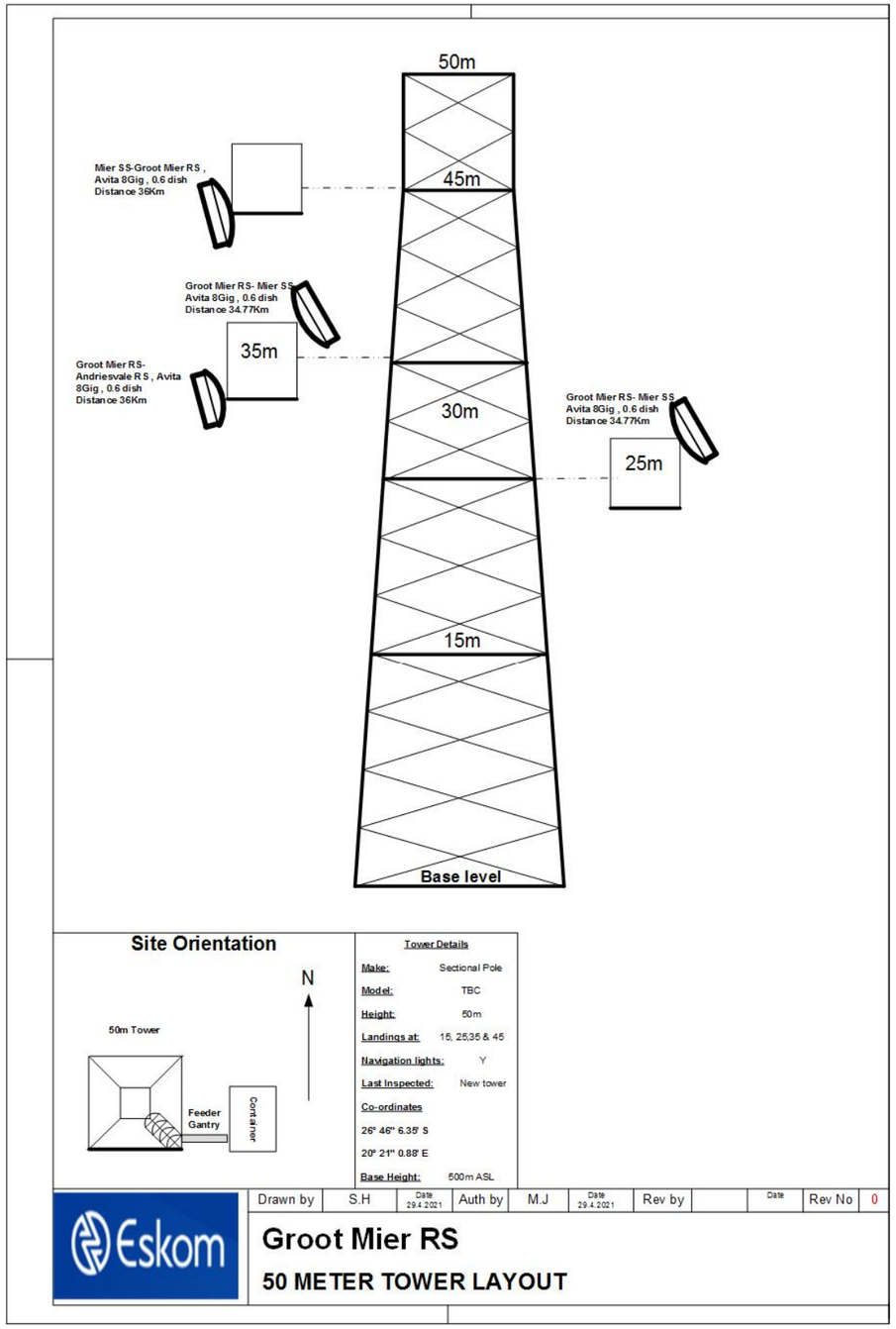


Figure 4: Proposed solar PV and BESS site layout and sensitivity overlays



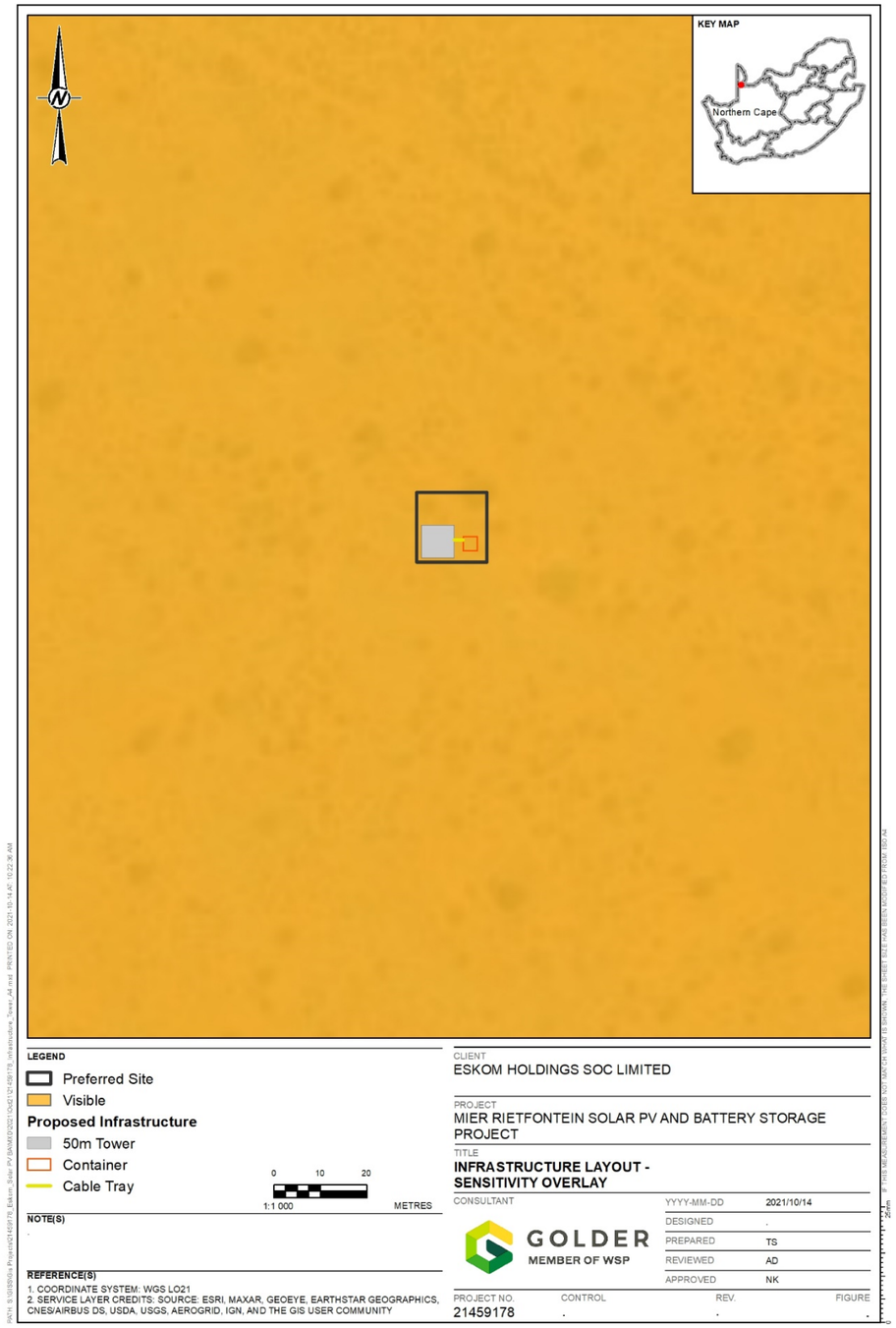


Figure 5: Proposed telecommunications tower site layout and sensitivity overlay

Figure 6: The spatial vision for Rietfontein

6.0 POLICY AND LEGISLATIVE CONTEXT

The following section presents a summary of the policy and legislative context within which this BAR was prepared. Note that this is not intended to be a comprehensive list, but only to mention the legislation, policies, and so on, which are most applicable to this application.

6.1 Legislation

The Constitution

The aim Constitution of the Republic of South Africa, 1996, as amended ("The Constitution") is to heal the divisions of the past and establish a society based on democratic values, social justice and fundamental human rights, lay the foundations for a democratic and open society in which government is based on the will of the people and every citizen is equally protected by law, improve the quality of life of all citizens and free the potential of each person, and build a united and democratic South Africa able to take its rightful place as a sovereign state in the family of nations.

The sections of The Constitution which are most relevant to this BAR are as follows:

- Chapter 2 sets out the rights of all South Africans. This includes the right to an environment that is not harmful to their health or wellbeing and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measure.

The National Environmental Management Act

The aim of the National Environmental Management Act 107 of 1998, as amended ("NEMA") is to provide for the establishment of principles for decision-making on matters affecting the environment, institutions that will promote cooperative governance, procedures for co-ordinating environmental functions exercised by organs of state, and certain aspects of the administration and enforcement of other environmental management laws.

The sections of the NEMA which are most relevant to this BAR are as follows:

- Section 2 sets out the national environmental management principles
- Section 24 sets out the requirements for obtaining EA for listed activities. The activities which require EA are listed in Listing Notice 1, 2014[6], Listing Notice 2, 2014[7], and Listing Notice 3, 2014[8]. The process of obtaining EA is regulated by the EIA Regulations, 2014
- Section 24N sets out the requirements for environmental management programmes ("EMPrs")
- Section 28 sets out the requirements for general duty of care and remediation of environmental damage
- Section 30 sets out the requirements for the control of incidents

National Environmental Management: Biodiversity Act

The aim of the National Environmental Management: Biodiversity Act 10 of 2004, as amended ("NEMBA") is to provide for the management and conservation of South Africa's biodiversity, the protection of species and

[6] Published under Government Notice R983 in Government Gazette 38282 of 4 December 2014 (as amended)

[7] Published under Government Notice R984 in Government Gazette 38282 of 4 December 2014c (as amended)

[8] Published under Government Notice R985 in Government Gazette 38282 of 4 December 2014 (as amended)

ecosystems that warrant national protection, the sustainable use of indigenous biological resources, and the fair and equitable sharing of benefits arising from bioprospecting involving indigenous biological resources.

The sections of the NEMBA which are most relevant to this BAR are as follows:

- Section 52 makes provision for the listing of ecosystems that are threatened or in need of protection. These ecosystems are listed in the *National List of Ecosystems that are Threatened and in Need of Protection (2011)*[9]
- Section 56 makes provision for the listing of species that are threatened or in need of national protection. These species are listed in the *List of Protected Tree Species*[10]
- Section 70 makes provision for the listing of invasive species. These species are listed in the Alien and *Invasive Species Lists of 2020*[11]
- Section 75 sets out the requirements for the control and eradication of listed invasive species.

National Water Act

The aim of the National Water Act 36 of 1998, as amended ("NWA") is to ensure that the nation's water resources are protected, used, developed, conserved, managed, and controlled.

The sections of the NWA which are most relevant to this BAR are as follows:

- Section 19 sets out the requirements for the prevention and remedying effects of pollution
- Section 20 sets out the requirements for the control of emergency incidents
- Chapter 4 sets out the requirements for obtaining a general authorisation or a water use licence ("WUL") for water uses listed in Section 21. The procedure to be followed for a general authorisation or WUL application is set out in the *Water Use Licence Application and Appeals Regulation, 2017*[12]

National Environment Management: Air Quality

The aim of the National Environment Management: Air Quality Act 39 of 2004, as amended ("NEMAQA") is to reform the law regulating air quality in order to:

- Protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development
- Provide for national norms and standards regulating air quality monitoring, management, and control by all spheres of government; for specific air quality measures

The sections of the NWA which are most relevant to this BAR are as follows:

[9] Published under Government Notice 1002 in Government Gazette 34809 of 9 December 2012

[10] Published under General Notice 635 in Government Gazette 42887 on 6 December 2019

[11] Published under Government Notice 1003 in Government Gazette 43726 on 18 September 2020

[12] Published under Government Notice R267 in Government Gazette 40713 of 24 March 2017

- Section 32 makes provision for the prescription of measures for the control of dust. These measures are set out in the National Dust Control Regulations, 2013[13]
- Sections 36 and 37 make provision for the licencing of listed activities and the procedure to be followed for licence applications. These activities are listed in the *Listed Activities and Associated Minimum Emission Standards Identified in terms of Section 21 of the National Environmental Management: Air Quality Act 39 of 2004*[14]

National Heritage Resources Act

The aim of the National Heritage Resources Act 25 of 1999 ("NHRA") is promote good management of the national estate, and to enable and encourage communities to nurture and conserve their legacy so that it may be bequeathed to future generations.

The sections of the NHRA which are most relevant to this BAR are as follows:

- Section 5 sets out the general principles for heritage resources management
- Sections 34, 35, 36, and 37 provide for the general protection of structures (older than 60 years), archaeology, palaeontology and meteorites sites, burial grounds and graves, and public monuments and memorials
- Section 38 sets out the requirements for notifying the responsible heritage resources authority if a listed activity is to be undertaken

Spatial Planning and Land Use Management Act

The aim of the Spatial Planning and Land Use Management Act 16 of 2013 ("SPLUMA") is to provide a framework for spatial planning and land use management in South Africa.

The sections of the SPLUMA which are most relevant to this BAR are as follows:

- Chapter 4 makes provision for the preparation of national, provincial, regional, and local spatial development frameworks

6.2 Protocols

Government Notice No. 320 dated 20 March 2020 refers to:

- Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Section 25(5)(a) and (h) and 44 of the National Environmental Management Act, 1988, when applying for Environmental Authorisation[15]

These protocols have been applied to the proposed project as related to the undertaking site sensitivity verification and protocols for the assessment of specific environmental theme for environmental impacts including:

[13] Published under Government Notice R827 in Government Gazette 36974 of 1 November 2013

[14] Published under Government Notice 893 in Government Gazette 37054 of 22 November 2013, as amended

[15] Published under Government Notice 320 in Government Gazette 43110 of 20 March 2020

- Agriculture
- Avifaunal
- Biodiversity
- Noise
- Defence
- Civil Aviation

6.3 Policies

White Paper on Renewable Energy

The White Paper on Renewable Energy, 2003 sets out Government's vision, policy, principles, strategic goals, and objectives for promoting and implementing renewable energy in South Africa.

The sections of the White Paper on Renewable Energy which are most relevant to this BAR are as follows:

- South Africa is pursuing energy security by encouraging diversity of both supply sources and primary energy carriers
- South Africa had set a renewable energy target of 10 000 GWh from mainly biomass, wind, solar, and small-scale hydro

6.4 Plans

Integrated Resource Plan

The Integrated Resource Plan 2019 ("IRP2019") is an electricity infrastructure development plan based on least-cost electricity supply and demand balance, taking into account security of supply and the environment (minimize negative emissions and water usage).

The sections of the IRP2019 which are most relevant to this BAR are as follows:

- Section 5.3 describes the key considerations and actions that were taken into account in the preparation of the IRP2019. This includes the contribution of solar and wind to South Africa's energy mix in the long-term and the opportunities associated with energy storage

6.5 Guidelines

EIA Guideline for Renewable Energy Projects

The aim of the EIA Guideline for Renewable Energy Projects[16] is to provide guidance on the environmental management legal framework applicable to renewable energy operations and all the role players in the sector.

The sections of the EIA Guideline which are most relevant to this BAR are as follows:

- Part B sets out the renewable energy authorisation requirements

[16] Department of Environmental Affairs (2015). *EIA Guideline for Renewable Energy Projects*. Department of Environmental Affairs, Pretoria, South Africa

Information Series 22: Socio-Economic Impact Assessment

The aim of the Department of Environmental Affairs and Tourism ("DEAT")'s guideline document for Socio-Economic Impact Assessment[17] to introduce the concept of Socio-Economic Impact Assessment ("SEIA") to a wide audience and to create awareness about this tool.

The sections of this guideline document which are most relevant to this BAR are as follows:

- Section 6 outlines the SEIA process. This includes guidelines for public involvement, identification of alternatives, baseline conditions, scoping, projection of estimated effects, predicting responses to impacts, estimating indirect and cumulative impacts, changes in alternatives, mitigation, and monitoring
- Section 7 outlines different approaches and techniques to SEIA
- Section 8 provides guidance for practitioners

Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts

The objectives of the International Finance Corporations ("IFC")'s Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts are as follows:

- To identify and evaluate environmental and social risks and impacts of the project
- To adopt a mitigation hierarchy to anticipate and avoid, or where avoidance is not possible, minimize,5 and, where residual impacts remain, compensate/offset for risks, and impacts to workers, Affected Communities, and the environment
- To promote improved environmental and social performance of clients through the effective use of management systems
- To ensure that grievances from Affected Communities and external communications from other stakeholders are responded to and managed appropriately
- To promote and provide means for adequate engagement with Affected Communities throughout the project cycle on issues that could potentially affect them and to ensure that relevant environmental and social information is disclosed and disseminated

The sections of Performance Standard which are most relevant to this BAR are as follows:

- Paragraph 7 sets out the requirements for the identification of risks and impacts of the project
- Paragraph 8 sets out the requirements for the identification of the project's area of influence
- Paragraph 11 sets out the requirements for consideration of policies, plans, spatial tools, municipal development planning frameworks, and other instruments which may be relevant to the project

[17] DEAT (2006). *Socio-Economic Impact Assessment*. Integrated Environmental Management Information Series 22

- Paragraph 12 sets out the requirements for the identification of individuals and groups that may be directly and differentially or disproportionately affected by the project because of their disadvantaged or vulnerable status
- Paragraphs 13 – 16 set out the requirements for the identification mitigation and performance improvement measures and actions that address the identified environmental and social risks and impacts of the project
- Paragraphs 17 – 18 set out the requirements for establishing, maintaining, and strengthening as necessary the organisational capacity and competency to implement the mitigation and performance improvement measures and actions
- Paragraphs 20 – 21 set out the requirements for establishing and maintaining an emergency preparedness and response system
- Paragraphs 22 -24 set out the requirements for establishing procedures to monitor and measure the effectiveness of the management program, as well as compliance with any related legal and/or contractual obligations and regulatory requirements
- Paragraph 29 sets out the requirements for the disclosure of information

6.6 Frameworks

Dawid Kruiper Local Municipality All-inclusive Spatial Development Framework

The aim of the Dawid Kruiper Local Municipality All-inclusive Spatial Development Framework (“SDF”), 2018 is to present the spatial vision of the DKLM.

The sections of the SDF which are most relevant to this BAR are as follows:

- The preferred site is located within an area zoned as agricultural according to the municipality and “G.a Vacant land inside the Urban Edge” according to the SDF (Figure 6) but “agricultural according to communication with the local municipality. These areas are for other land uses not included six Spatial Planning Categories. These areas can, subject to approval from the DKLM, be rezoned to any of the six Spatial Planning Categories
- Renewable energy structures, including PV systems, are permitted under the zoning “F.i. Renewable Energy Structures”, subject to approval from the DKLM

Dawid Kruiper Local Municipality All-inclusive Spatial Development Framework

The aim of the Siyanda Environmental Management Framework (“EMF”), 2008 is to ensure that future development in the area occurs in a manner that is appropriate to the unique features and character of the area.

The sections of the EMF which are most relevant to this BAR are as follows:

- Section 2.7.1 presents the Environmental Sensitivity Index. This Index is based on a number of factors, including soil erosion potential, conservation priority, topography, watercourses, drainage lines, and pans, and transformation (Figure 7)
- Section 3 presents the Environmental Control Zones. Each zone has a specific type or regime of control unique to the environmental elements that occur in these areas (Figure 8)

7.0 LISTED ACTIVITIES

Table 5 presents all the listed and specified activities that will be triggered and are being applied for in this application.

Table 5: Listed activities triggered by the proposed Project

Title	Activity	Description	Relevance to this application
Listing Notice 1, 2014	1	The development of facilities or infrastructure for the generation of electricity from a renewable resource where- (ii) the output is 10 megawatts or less but the total extent of the facility covers an area in excess of 1 hectare; excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs: (a) within an urban area; or (b) on existing infrastructure.	The proposed solar PV and BESS Project site is approximately 10 ha extent, which is in excess of the 1 ha threshold. The proposed Project is located outside an urban area and will not occur on existing infrastructure but on vacant land.
Listing Notice 1, 2014	27	The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for- (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	The proposed solar PV and BESS Project site will require the clearance of approximately 10 ha of indigenous vegetation, which is in excess of the 1 ha threshold.
Listing Notice 1, 2014	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: (i) will occur inside an urban area, where the total land to be developed is bigger than 5 hectares; or (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare; excluding where such land has already been developed for residential, mixed, retail, commercial, industrial, or institutional purposes.	The land to be developed is approximately 10 ha outside an urban area. Although, the preferred site is zoned as agricultural (according to the district municipality), it is currently vacant land and not used for agriculture, game farming, equestrian purposes or afforestation.

Table 6 presents the listed and specified activities that were considered in the preparation of this BAR and will not be triggered by the proposed Project.

Table 6: Listed activities not triggered by the proposed Project

Title	Activity	Description	Relevance to this application
Listing Notice 1, 2014	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 excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is- (b) 2 kilometres or shorter in length.	The proposed Project will include transmission lines with a capacity of 33 kV. However, these lines will be less than 2 km in length.
Listing Notice 1, 2014	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 exists, within 32 metres of a watercourse, measured from the edge of a watercourse.	There will be more than 100 m^2 of infrastructure, however there are no watercourses onsite, the site fence is ~214 m from the closest non perennial river.
Listing Notice 1, 2014	14	The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.	The BESS will use lithium as the preferred battery technology. The container or a storage infrastructure/ facility will contain the dangerous good and is considered an internal component and key to the functioning of the system.
Listing Notice 1, 2014	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	There will be dredging, excavation, removal or moving of more than 10 m^3 soil; however, the site is not located near any watercourse. There are no water courses onsite, the site fence is ~214 m from the closest non perennial river.
Listing Notice 3, 2014	3	The development of masts or towers of any material or type used for telecommunication broadcasting or radio transmission purposes where the mast or tower- (a) is to be placed on a site not previously used for this purpose; and (b) will exceed 15 metres in height but excluding attachments to existing buildings and masts. For the Northern Cape: ii. Outside urban areas: (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas;	The proposed telecommunication tower site covers an area of 0.0225 ha and will be developed outside an urban area on an undeveloped agriculturally zoned land, and the tower will stand ~50 m high without any guy wire attachments. However, based on the spatial information on the DFFE and SANBI websites, as well as biodiversity specialist studies and database knowledge, none of the criteria (aa) to (hh) are triggered by the location of the telecommunications tower outside urban areas in the Northern Cape.

Title	Activity	Description	Relevance to this application
		(cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (dd) Sites or areas identified in terms of an international convention; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Core areas in biosphere reserves; (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve; or (hh) Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined.	
Listing Notice 3, 2014	4	The development of a road wider than 4 metres with a reserve less than 13,5 metres. (g) Northern Cape ii. Outside urban areas, in (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans	The main access road and internal roads will be more than 4 m in width. However, this road is outside of critical biodiversity areas identified in the 2016 Northern Cape Critical Biodiversity Areas.
Listing Notice 3, 2014	12	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of Indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. 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; iii. Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuary, whichever distance is the greater, excluding where such removal will occur behind the	More than 300 m^2 of indigenous vegetation will be cleared with the development of the Project. However, the preferred site is located outside of a critically endangered or endangered ecosystem, outside of critical biodiversity areas identified in the 2016 Northern Cape Critical Biodiversity Areas, and land that is zoned open space, conservation or had an equivalent zoning.

Title	Activity	Description	Relevance to this application
		development setback line on erven in urban areas; or iv. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.	
Listing Notice 3, 2014	10	The development of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres. (g) Northern Cape iii. Outside urban areas, in: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;	The BESS will contain a dangerous good above the threshold of 80 m^3. However, the BESS itself is not deemed to be a container or a storage facility as the dangerous good, which it contains is an internal component and key to the functioning of the system. Furthermore, the preferred site is located outside of critical biodiversity areas identified in the 2016 Northern Cape Critical Biodiversity Areas, and land that is zoned open space, conservation or had an equivalent zoning.
Listing Notice 3, 2014	15	The transformation of land bigger than 1000 square metres in size, to residential, retail, commercial, industrial or institutional use, where, such land was zoned open space, conservation or had an equivalent zoning, on or after 02 August 2010.	The preferred site is located within an area zoned as agricultural and identified as 'G.a Vacant Land with Urban Edge' according to the SDF.

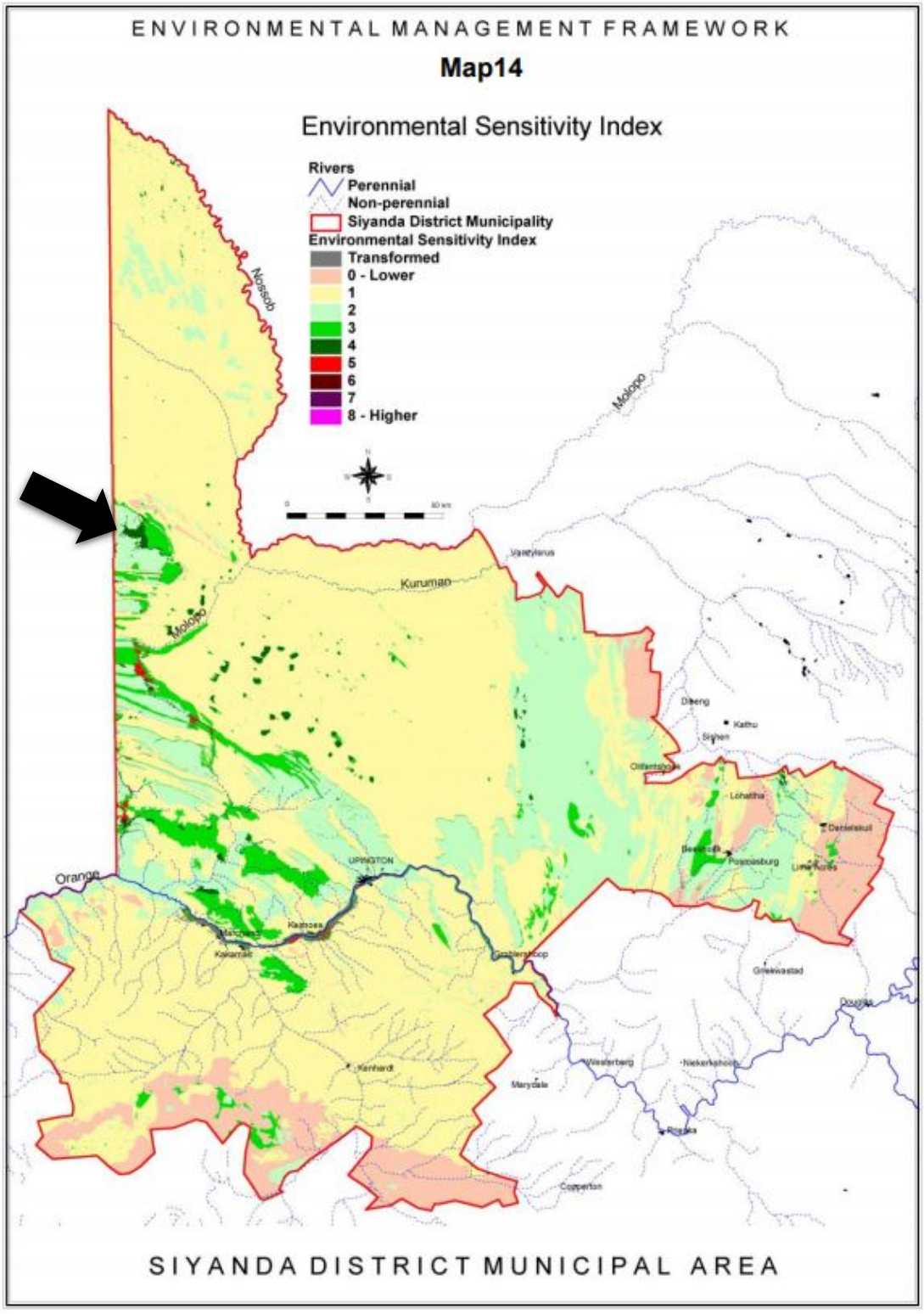


Figure 7: Environmental Sensitivity Index[18]

[18] Source: Siyanda Environmental Management Framework, 2008

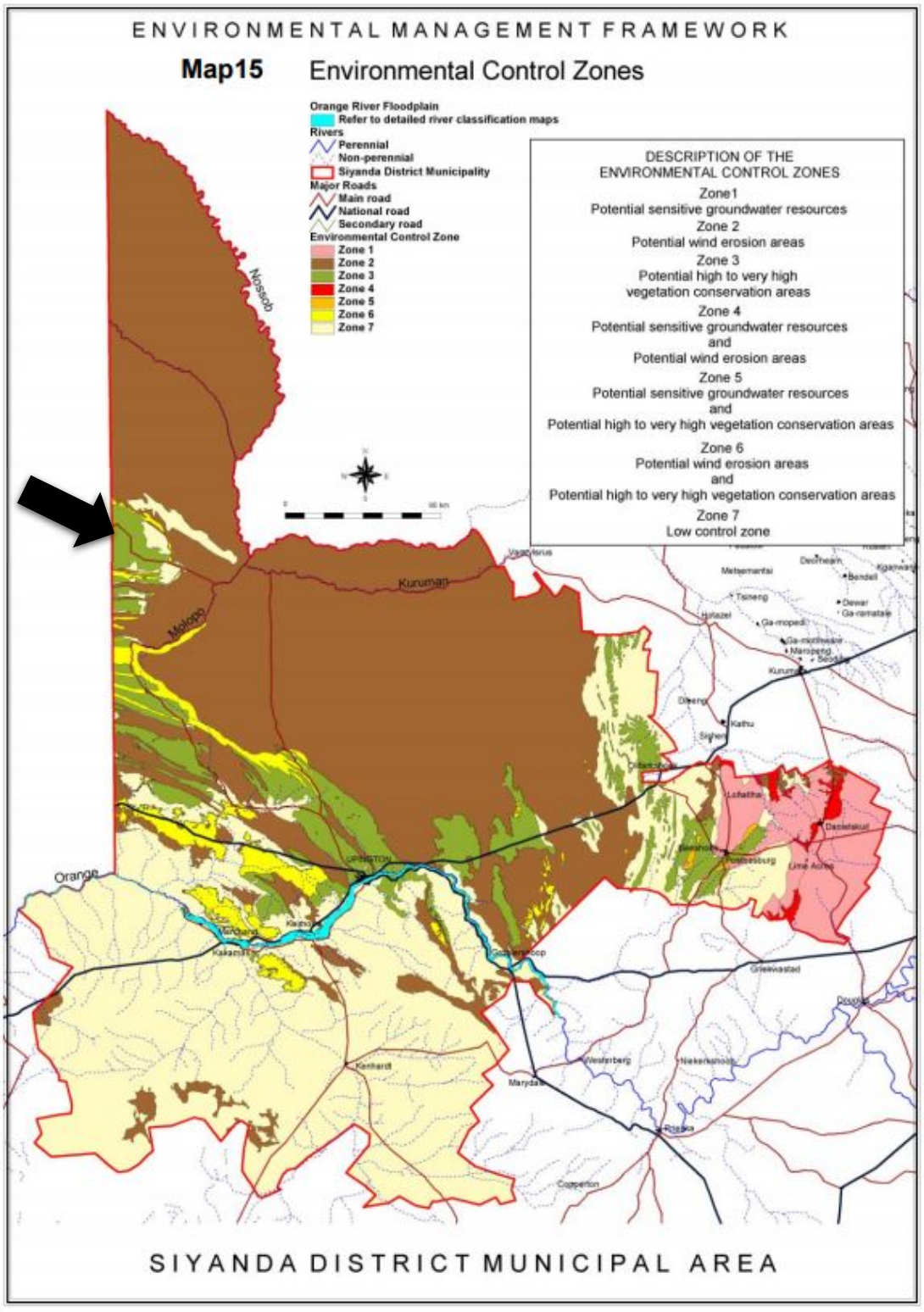


Figure 8: Environmental Control Zones[19]

[19] Source: Siyanda Environmental Management Framework, 2008

8.0 NEED AND DESIRABILITY

The following section presents the need for the proposed Project and the desirability of the preferred site alternatives.

8.1 Need

The proposed Project is needed for the following three reasons[20]:

1) To address the exceedances of Nampower's NMD

NMD refers to the maximum capacity, expressed in MVA, that the electricity supplier (i.e., Nampower) is contracted to make available to the customer (i.e., Eskom) for their use. Currently, Nampower is contracted to make 1.5 MVA available to Eskom via the Rietfontein-Rietfontein 33 kV overhead line (hereafter referred to as the "Rietfontein feeder"). As shown in Figure 9 below, the demand on the Rietfontein feeder is projected to exceed the current Nampower NMD of 1.5 MVA from 2021 onwards with the planned electrification projects in the next ten years. These projects are listed in Table 7 below.

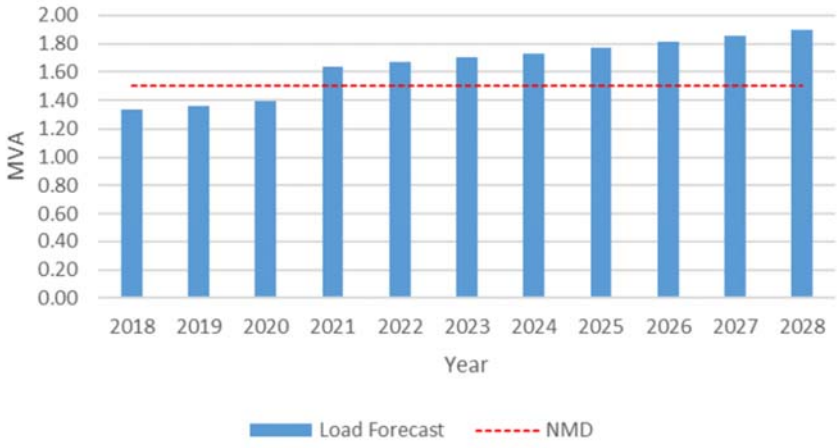


Figure 9: Load forecast for the Rietfontein feeder in the next ten years

With the planned electrification projects, the NMD is projected to increase to 1.9 MVA by 2028, exceeding the current Nampower NMD of 1.5 MVA. This projection is based on historical load profiles (i.e., day with the highest demand) and the additional load from the planned electrification projects.

Table 7: Planned electrification projects in the next ten years

Area	Number of connections	ADMD[21] (MVA)	Total load (MVA)
Loubos	26	0.0008	0.0208
Philandersbron	42	0.0008	0.0336
Rietfontein	77	0.0008	0.0616
Klein Mier	20	0.0008	0.0160
Groot Mier	29	0.0008	0.0232
Welkom	25	0.0008	0.0200

[20] Eskom (2021) *Rietfontein PV, BESS & Cap Bank Project: Rietfontein-Rietfontein 33kV Feeder & Wessels-Klipkop 22kV Feeder Report*

[21] After diversity maximum demand ("ADMD") is generally used to define network conditions at peak periods.

Area	Number of connections	ADMD[21] (MVA)	Total load (MVA)
Andriesvale	50	0.0008	0.0400
Total	**269**	**0.0008**	**0.2152**

2) Unlock the required capacity to connect new/waiting customers

Due to a lack of capacity on the Rietfontein feeder, there are several LPUs that had previously applied for a connection that were turned down. It is estimated that the connection of the LPUs listed in Table 8 below could increase the demand on the Rietfontein feeder to 2.26 MVA by 2028, further exceeding the current Nampower NMD of 1.5 MVA. This projection is based on historical load profiles (i.e., day with the highest demand) and the additional load from the planned electrification projects and LPUs.

Table 8: Previous LPU applications/queries

LPU	Estimated load (MVA)
Molopo Lodge upgrade	0.0315
Hakskeenpan new point of supply	0.0100
DKLM for high mast lights in Rietfontein and Andriesvale	0.0040
Clinic at Andriesvale	0.0250
Total	**0.0360**

3) To account for unforeseen loads

In order to account for unforeseen increases in demand, it may be necessary to increase the capacity of the Rietfontein feeder by a further 10%. These increases in demand could potentially be due to a substantial growth of tourism in the area. With the inclusion of the unforeseen increases in demand, the demand on the Rietfontein feeder could increase to 2.5 MVA by 2028, further exceeding the current Nampower NMD of 1.5 MVA. This projection is based on historical load profiles (i.e., day with the highest demand) and the additional load from the planned electrification projects, LPUs, and unforeseen increases in demand.

8.2 Desirability

In general, South Africa has excellent solar resources which provides favourable conditions for the development of solar projects. The annual average GHI varies between 1500 kWh/m^2 and 2400 kWh/m^2. As shown in Figure 10 below, the preferred site is located in an area with some of the highest solar resources in South Africa (> 2300 kWh/m^2).

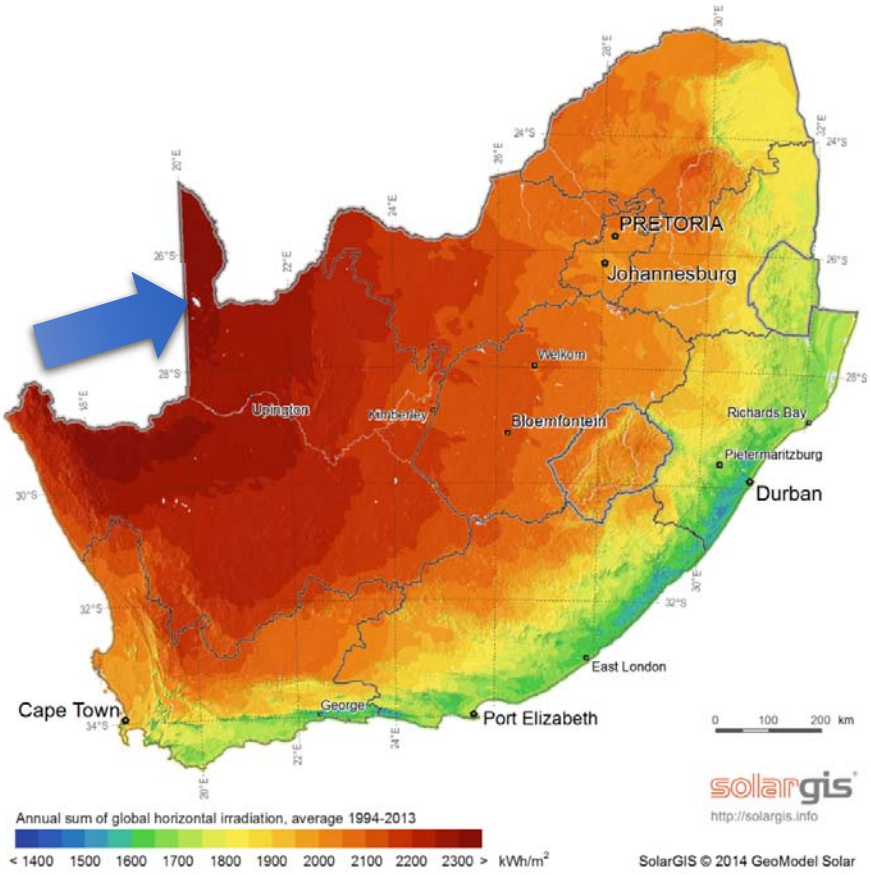


Figure 10: Annual GHI map for South Africa[22]

In addition to the high GHI, there are a number of factors, as presented in Table 9 below, which contribute to the desirability of the preferred site.

Table 9: Factors which contribute to the desirability of the preferred sites

Factor	Relevance to the preferred site
Land availability	There is sufficient land available within Mier No. 585 for the development of the proposed Project. Mier No. 585 is 47 233 ha in extent, and only 10 ha is required for the proposed solar PV and BESS site, and only 0.0225 ha for the telecommunications tower site.
Current land use	The preferred sites are currently used for grazing (subsistence farming).
Sensitive receptors	There are no sensitive receptors living on or immediately adjacent the preferred sites.
Distance to the point of connection	The preferred solar PV and BESS site is located approximately 200 m north of the existing Rietfontein-Rietfontein 33 kV overhead line, which runs parallel to the southern boundary of the site. Above ground cables linking the proposed Mier switching station to the existing Rietfontein-Rietfontein 33 kV overhead feeder line

[22] Image source: Eskom (2021) *Rietfontein PV, BESS & Cap Bank Project: Rietfontein-Rietfontein 33kV Feeder & Wessels-Klipkop 22kV Feeder Report*

Factor	Relevance to the preferred site
	will be less than 250 m in length. The preferred telecommunication site is located ~35 km east of the solar PV and BESS site.
Site accessibility	The preferred sites are located alongside the R31, a provincial road linking Kimberly to the Rietfontein Border Post. The preferred solar PV and BESS site will be accessed from the R31, via a new 5 m wide gravel access road.
Topography	The preferred sites have a very gentle slope (< 2%).
Landowner willingness	The DKLM, the landowner, has given consent by signing the official landowner consent form to the proposed development of the solar PV and BESS site. Mr Willemse, the landowner, has given consent by signing the official landowner consent form to the proposed development of the telecommunications tower site.
Land claims	There are no existing land claims on the preferred sites.
Fire risk	There sparse vegetation on and surrounding the sites presents a very a low fire risk.

9.0 ALTERNATIVES ASSESSMENT

Table 10 provides a summary of the feasible and reasonable alternatives that were considered for the proposed Project.

Table 10: Types of alternatives considered (adapted from DEA&DP, 2010)

Type of alternative	Description	Relevance to the proposed Project
Location	Consideration of alternative properties and/or alternative sites on the same property.	For the preferred solar PV and BESS site alternative, alternative sites were considered within a Study Area (Figure 11). The preferred solar PV and BESS site alternative is located off the R31, approximately 500 m from the Rietfontein Border Post and 1 km from the town of Rietfontein. The other site alternatives in the Study Area are located immediately to the west of the preferred site alternative, and closer to the Rietfontein Border Post (~250 m). The preferred solar PV and BESS site alternative was selected as it is further from the border with Namibia. It should be noted that a high-level screening exercise was undertaken to identify other potential solar PV and BESS sites in the vicinity of the above-mentioned site alternatives. No other potential sites were however identified that were less environmentally sensitive than the preferred site. For the preferred telecommunications tower site alternative, two alternative sites were considered (Figure 11).The preferred telecommunications tower site alternative is located ~800m north of the R31, approximately 5km from Groot Mier. The other site alternative is located at a greater distance from the road than the preferred site, i.e. 2.5km south of the R31.

Type of alternative	Description	Relevance to the proposed Project
Activity	Consideration of alternative activities which will achieve the same outcomes as the proposed Project.	For the preferred activity alternative, two alternative activities were considered. The preferred activity alternative is the construction of the Mier Rietfontein Solar PV and Battery Storage Project to generate the required additional grid capacity. The other activity alternative is to upgrade the capacity of the Nabas S/Stn and Mier S/Stn to allow for the increase of the voltage of the Nabas-Rietfontein line from 33 kV to 66 kV. This will allow Nampower to increase Eskom's NMD from 1.5 MVA to 2 MVA without incurring unacceptable technical losses on the Nabas-Rietfontein line. The proposed Project is preferred to the other activity alternative for the following reasons: ■ The cost of the proposed Project (~R34 million to R50 million). Is lower than upgrading the Mier S/Stn (~R60 million). Note that this excludes the cost of upgrading the Nabas S/Stn ■ Eskom would not be dependent on Nampower to upgrade the Nabas S/Stn. If this is not a priority for Nampower, the timing of the upgrade may not align with projected increases in demand (Section 8.1) ■ The proposed Project brings distribution generation capacity to the load centres, reducing technical losses, and increasing local security of supply ■ The proposed Project supports Eskom's commitment to implement clean energy projects
Layout	Consideration of different spatial configurations on a particular site.	Numerous other layout alternatives were considered in this assessment as the design of the Mier Rietfontein Solar PV and BESS Project site underwent several changes based on technical and environmental aspects before the layout presented in Figure 4 was selected.
Technological	Consideration of technological options which will achieve the same goal by using a different method or process.	For the PV modules, two technology alternatives were considered. The mono c-Si PV modules were selected as the preferred alternative due to the lower cost than the multi c-Si PV modules, despite the multi c-Si PV modules being generally more efficient than the mono c-Si PV modules. For the mounting structure, two technology alternatives were considered. The fixed mounting structure was considered to be preferable to the alternative, a tracking system, for the following reasons:

Type of alternative	Description	Relevance to the proposed Project
		■ The lower capital and maintenance costs. ■ The lower operational and maintenance requirements. This is particularly important given that the site will be unmanned. Lithium ion is the proposed preferred BESS, due to the inherently safe nature of the technology.
"No-Go Option"	This is the option of not implementing the proposed activities.	With the 'no-go' option, there will be no additional capacity for the planned electrification projects over the next 10 years, the LPU's, and unforeseen increases in load. With the 'no-go' option, the negative impacts associated with the proposed Project (Section 12.0) will be avoided.

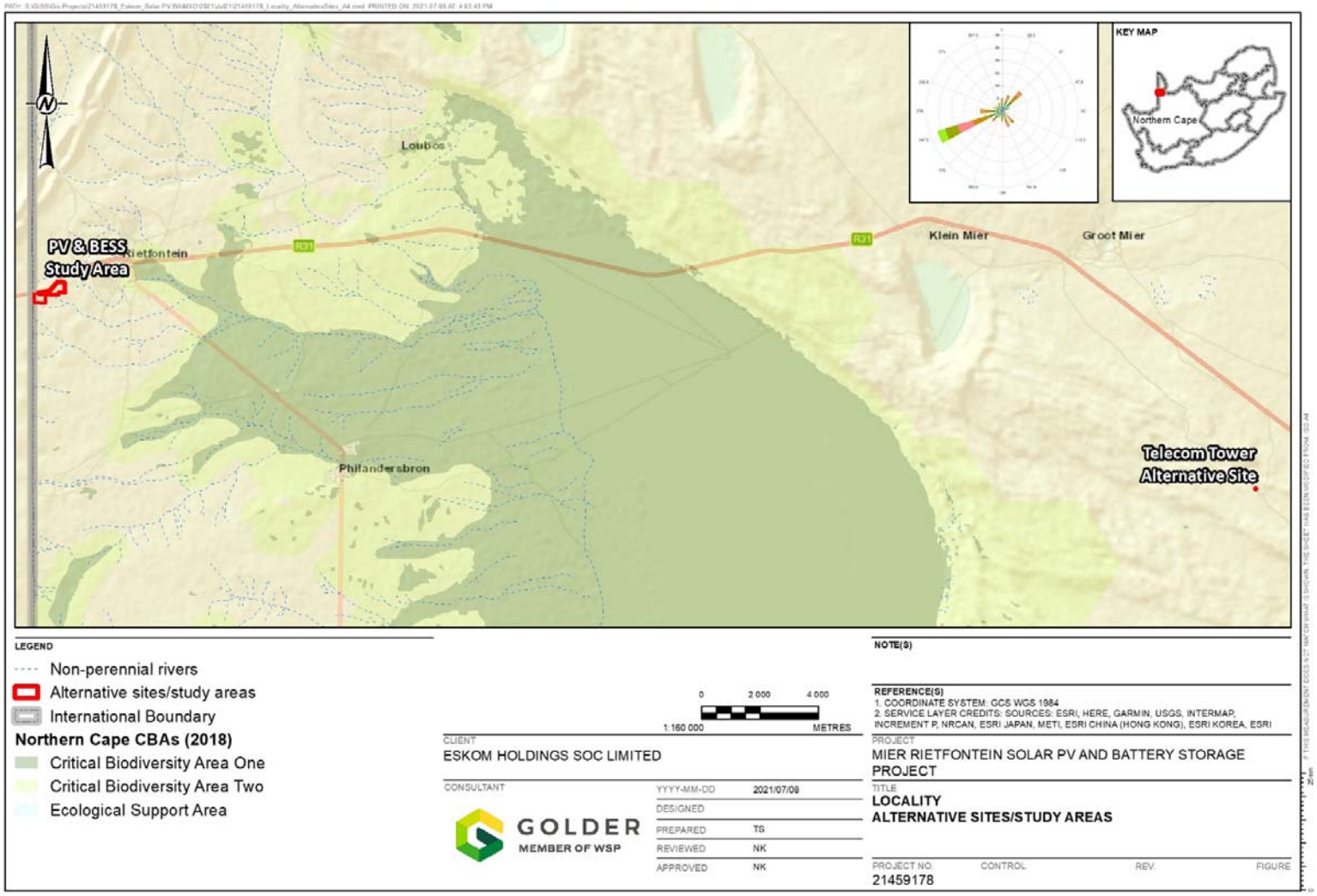


Figure 11: Location of the site alternatives

10.0 PUBLIC PARTICIPATION PROCESS

The following section outlines the process that was followed in identifying potential interested and affected parties ("I&APs") and the public participation processes ("PPP") that were followed. As part of this BA process, two separate, but interlinked PPPs were undertaken. More detailed descriptions of these two PPPs are presented in the sections to follow.

10.1 Legislated PPP

The following section presents a summary of the legislated PPP that was undertaken in terms of regulation 41 of the EIA Regulations, 2014. This included the following:

Register of I&APs

At the onset of the PPP, Golder opened a register of potential I&APs. The potential I&APs were identified through a process of networking and referrals, as well as an interrogation of Golder's existing I&AP databases from previous projects in the area. This initial register included the following potential I&APs:

- Landowners
- Relevant ward councillor
- Local community-based organisations/residents associations
- Local municipality
- District municipality
- Relevant provincial government departments
- Relevant conservation agencies
- Relevant non-governmental/non-profit organisations

This register is maintained for the duration of the BA process. All I&APs who have requested, in writing, who have submitted written comments, or who have attended public meetings, are notified by providing consent to Person Information, as required by the Protection of Personal Information Act (POPI), and placed on this register.

The complete list of potential I&APs is attached as APPENDIX B.

Notification of the Application

In accordance with the requirements of Regulation 41 of the EIA Regulations of 2014, potential I&APs are given notice of the application on 30 August 2021, by the following means:

- Email and background information letter ("BIL")
- Newspaper advertisement in one local newspaper (Noordkaap Bulletin)
- Site notices erected at public places listed below (Table 11)

Copies of the email and BIL that was sent to potential I&APs, local newspaper advertisement, and site notices are attached as APPENDIX B.

Basic Assessment Report

In accordance with the requirements of Regulation 43 of the EIA Regulations of 2014, the draft BAR was made available to all registered I&APs to comment on in writing. The report was made available on at the public place listed below (Table 11) and online via the Golder website:

https://www.golder.com/global-locations/africa/south-africa-public-documents/

Table 11: Public place where this report was made available

Public place	Address	Contact number
Mier Tourism, Kalahari Information Centre & Tented Camp	R31 immediately west of Rietfontein	072 159 6726
SAPS Rietfontein	Loubos Rd, Rietfontein, 8811	054 531 3000
Golder Associates Africa	Maxwell Office Park, Magwa Crescent West, Waterfall City, Midrand	011 254 4800

I&APs were given 30 days, from 30 August 2021 until 30 September 2021 (excluding the public holidays), during which to comment, in writing, on the draft BAR.

- Public Open House

The public was cordially invited to attend a public open house the Mier Tourism, Kalahari Information Centre & Tented Camp from 15h00 to 18h00 on 1 September 2021. At the request of the Khomani San CPA an addition open house was held at the Andriesvale Community Centre from 15h00 to 18h00 on 31 August 2021. All relevant COVID-19 directives were followed.

The written comments received during this period, including responses to these comments, are attached in APPENDIX B.

Competent Authority's Decision

Once the DFFE has taken a decision about the application, Golder will, within 14 days of the decision, notify all registered I&APs of the decision and the reasons for the decision, as well as drawing their attention to the fact that an appeal may be lodged against the decision in term of the National Appeal Regulations of 2014 (RSA, 2014a). This notification will be provided as follows:

- A sms and/or email will be sent to all registered I&APs, summarising DFFE's decision and explaining how to lodge an appeal should they wish to; and
- An advertisement to announce DFFE's decision will be published in the local newspapers, if so required by the DFFE.

10.2 PPP for Indigenous Peoples

The following section presents a summary of the PPP that is based on the World Bank *OP 4.10 – Indigenous Peoples*. For more a more detailed description of the PPP, see the Indigenous Peoples Plan ("IPP") attached in APPENDIX F.

10.2.1 Identification of Indigenous People

Indigenous Peoples (according to the World Bank (2013)) are frequently among the most marginalised and vulnerable segments of the population. As a result, their economic, social, and legal status often limits their capacity to defend their interests in and rights to lands, territories, and other productive resources, and/or restricts their ability to participate in and benefit from development. Due to the varied and changing contexts in which Indigenous Peoples live, there is no universally accepted definition of Indigenous Peoples.

For the proposed Project, screening was undertaken to determine whether Indigenous Peoples are present in, or have collective attachment to, the project-affected area. Two Indigenous Peoples, namely the ǂKhomani San and Mier community, were found to be present in, or have collective attachment to, the project-affected area. This is based on consideration of the following:

- Both communities identify themselves as a distinct indigenous cultural group. Their distinct identities were recognised in the successful land claims in 1999
- Both communities have a collective attachment to the project-affected area, and the natural resources therein
- The ǂKhomani San have customary cultural, social, and political institutions that are separate from those of the rest of South Africa. As mentioned previously, there are several pieces of legislation, such as the Traditional and Khoi-San Leadership Act, which recognise the distinct customary cultural, social, and political institutions of communities, such as the ǂKhomani San
- The ǂKhomani San previously had indigenous languages which were different from the 11 official languages of South Africa. While almost all of the indigenous languages have been lost, most of the Khomani San still speak *Khoekhoegowap.*

10.2.2 Consultation Framework for Indigenous People

The framework for the free, prior, and informed consultation with the affected Indigenous Peoples during Project preparation and implementation is considered.

10.2.2.1 Project Preparation

Two rounds of consultation are included at Project preparation.

- In the initial round of consultation, the aim was to meet key representatives from the Mier community and ǂKhomani San to introduce the Project, the Project team, and to collect relevant baseline information. The baseline information collected from the communities was used to supplement the information gathered from the literature review. Attendees were provided with an opportunity to raise any preliminary issues/concerns regarding the proposed Project. Attendees were also be provided with an opportunity to propose measures to avoid or to mitigate the potential adverse effects of the proposed Project.
- In the second round of consultation, the aim is to meet with key representatives from the Mier community and ǂKhomani San to present a more detailed description of the proposed Project, the main findings of the impact assessment, and the proposed mitigation measures. It is proposed that two focus-group meetings will also be held with community members from the Mier community and ǂKhomani San. This is to ensure that the issues/concerns of community members, and not only key representatives, have been considered in the IPP. Attendees will be provided with an opportunity to comment on the findings of the impact assessment and the proposed mitigation measures. Attendees will also be provided with an opportunity to raise any other issues/concerns regarding the proposed Project, and to propose additional mitigation measures.

10.2.2.2 Project Implementation

During Project implementation there will be feedback meetings with key representatives from the Mier community and ǂKhomani San. The purpose of these meetings will be to provide feedback on the following:

- Progress with Project
- Incidents (i.e., number, nature, cause, resolution)
- Number of local jobs

- Spend on local procurement of goods and services
- Progress with skills development, bursaries, and learnerships
- Progress with corporate social investments (“CSI”)

Attendees will also be provided with an opportunity to raise any other issues/concerns regarding the proposed Project, and to propose additional mitigation measures.

10.2.3 Public Participation Consultation Methods for Indigenous People

A range of socially and culturally appropriate methods are used to consult the affected Indigenous Peoples. This includes the following:

- Face-to-Face Interviews
  - Face-to-face interviews held with key individual stakeholders. This includes for example, the local ward councillor and senior members of each community. A guide from the local community was used to assist with translations (English to Afrikaans and vice versa) and minuting of the interviews. A list of discussion topics, which were prepared beforehand, were used to guide the interview. The list of discussion topics were tailored depending on the individual being interviewed.
- Telephone Interview
  - Telephone interviews held with key individual stakeholders. As with the face-to-face interviews, a list of discussion topics, which were prepared beforehand, were used to guide the interview. The list of discussion topics were varied depending on the individual being interviewed.
- Focus Group Meetings
  - Focus group meetings held with members from the ǂKhomani San and Mier Community. These meetings will be arranged and facilitated by Golder, with the support of a guide from the local community. The guide will assist with translations (English to Afrikaans and vice versa) and minuting of the meetings. A list of discussion topics, which will be prepared beforehand, will be used to guide the discussions during the meetings. The list of discussion topics will be tailored depending on the group attending the meeting.
- Email/SMS Notifications
  - Emails/SMSs used to notify stakeholders who have provided their contact details of the availability of the BAR for their review. Emails/SMSs will also be used to keep stakeholders updated on the Project’s progress.

10.2.4 Disclosure of Project Documents

A range of culturally appropriate methods disclose the relevant information about the Project to the affected Indigenous Peoples. This includes the following:

- Background Information Document
  - A background information document is developed prior to the second round of consultations. This document provides a brief overview of the proposed Project, the main findings of the impact assessment, and the proposed mitigation measures. Additional information on how Indigenous Peoples can be involved in project preparation is also provided. This document is translated into Afrikaans, the first language of most of the ǂKhomani San and Mier community.

- An electronic copy of the document is emailed to stakeholders who have provided their contact details. Hard copies of the document is made available at several public places in the project-affected area. This includes for example, the municipal offices, Rietfontein police station, and Rietfontein Community Health Centre.

- Posters
  - An A2-sized poster is developed prior to the second round of consultations. This poster provides a brief overview of the Project. Additional information on how Indigenous Peoples can be involved in project preparation is also be provided. This poster is also translated into Afrikaans. These posters are erected at several public places in the project-affected area. This includes for example, the municipal offices, Rietfontein police station, Rietfontein Community Health Centre, Rietfontein Gekombineerde Skool, and local shops.

- Advertisements
  - An advertisement is placed in a regional newspaper as there is no local newspaper. This advertisement notifies readers about the Project and encourage them to participate in the process by registering as an I&AP and providing comments on the Project in writing. This advertisement is also be translated into Afrikaans.

- Draft Basic Assessment Report
  - The draft BAR was made available for public review during the second round of consultation. An electronic copy of the report was uploaded to the Golder website for download. Hard copies of the report were also made available at Golder offices, the municipal offices, Rietfontein police station and Mier Tourism, Kalahari Information Centre & Tented Camp.

11.0 BASELINE ENVIRONMENTAL CONDITIONS

The following section presents the geographical, physical, biological, social, economic, heritage and cultural aspects associated with the preferred site alternative for the solar PV and BESS site, as well as the telecommunications tower site.

11.1 Climate

The preferred sites for the proposed Project area located in the interior of South Africa, approximately 500 km west of the Atlantic Ocean. This region is classified as Tropical shrubland ("TBSh") in terms of the Food and Agriculture Organisation (FAO) Global Ecological Zone classification system[23]. In this region, rainfall generally becomes lower and lower closer to the tropics, while temperatures remain high. Rainfall is always less than 1000 mm and seldom reaches 200 mm in the drier parts. The mean temperature of the coldest month is generally more than 20°C, except in the Kalahari where mean temperatures are lower due to the proximity of the sea.

Figure 12 below presents the average monthly temperature and rainfall at Rietfontein from 1901 to 2016 (World Bank Group, 2021). Average annual rainfall is approximately 179.7 mm, with most of the rainfall falling in January, February, and March. Little or no rain falls in June, July, and August. The average monthly temperature is 20.7°C, and ranges between 16.3°C in May and 28.1°C in January.

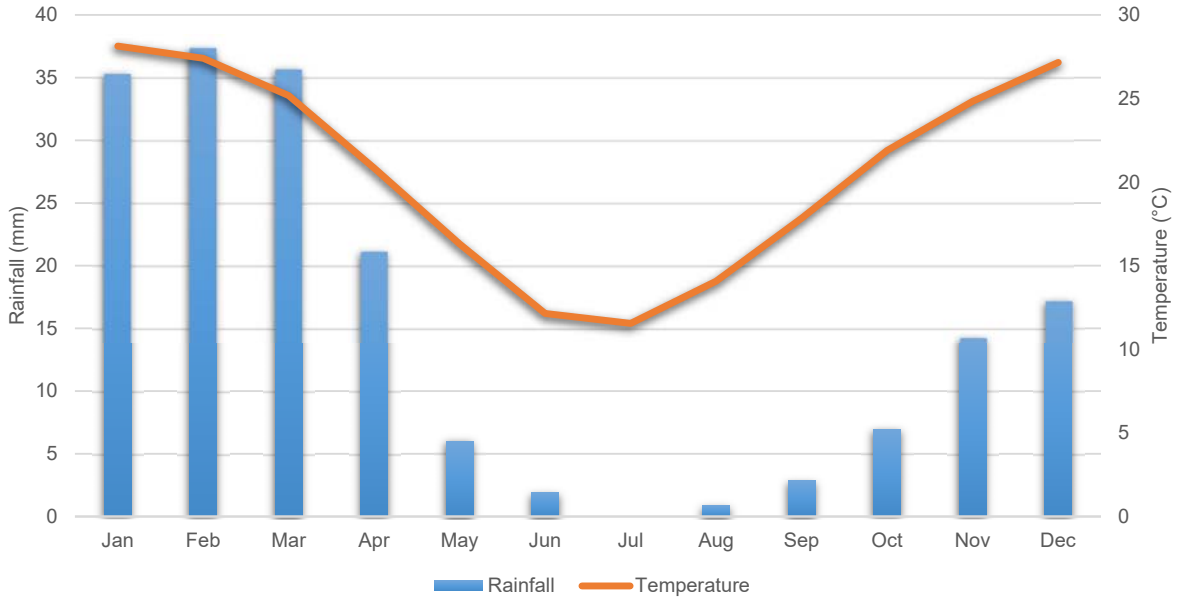


Figure 12: Average monthly temperature and rainfall from 1901 to 2016 (World Bank Group, 2021)

Figure 13 presents the annual wind rose for the Karoo Station, the closest weather station to the preferred sites. The prevailing wind is generally from the south west. Ambient wind speeds are mostly gentle, ranging between 4 and 10 m/s.

[23] http://www.fao.org/3/ad652e/ad652e00.htm

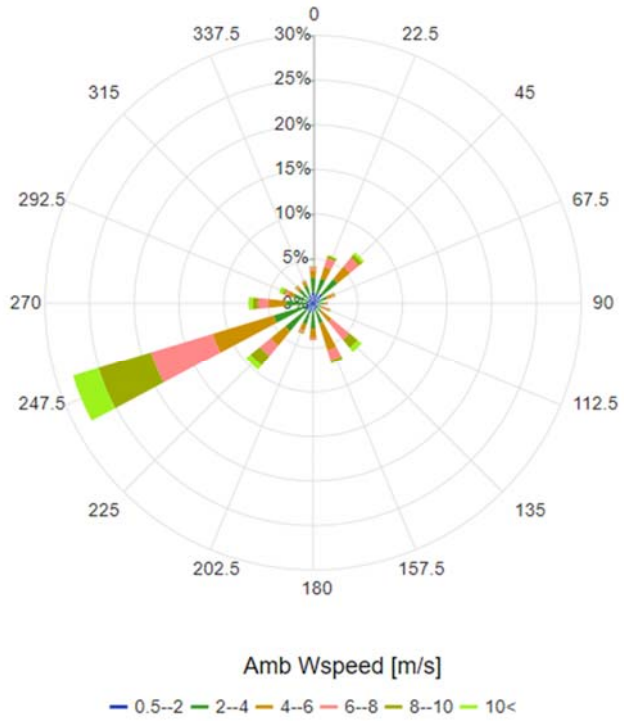


Figure 13: Annual wind rose for the Karoo Station (SAAQIS, 2021)

11.2 Topography

The preferred sites are located on a ridge that forms a divide between three geographical low features to the north, east, and south. Most of the solar PV and BESS site has a gentle topography, dropping off steeply down to the geographical low features near the site boundaries. It is situated in topographically subdued, arid terrain; at elevations of between ~ 860 – 870 m above mean sea level (amsl).

11.3 Civil Aviation

Process and procedures, as on the CAA website, state the approvals with conditions to the proposed project that will be sought when/if the proposed project EA is approved.

New obstacle application fees to CAA, as of 1 November 2021, will possibly apply to the erection of the “cellular telephone mast or any other obstacle” as relates in CAR reference Part 187.01.33(2)(e) of Obstacle Notice 2/2011. Obstacle Notice 3/2020 (Replacement for 17/11/2017) provides the additional requirements for solar project applications. A Glint & Glare Assessment may be required if the proposed site is located on the extended runway centreline within the ICAO Annex 14 Approach Surface, Take-Off Climb Surface & Departure Surface, and within 3km radius around an Aerodrome/helistop as pe Part 139.01.30 (3). Confirmation is still being awaited from the Obstacle Inspector at the CAA in this regard to the proposed application.

11.4 Geology

The preferred sites for the solar PV and BESS, and telecommunications tower Project is of the Kalahari Geomorphic Province (Partridge et al. 2010) of the Northern Cape. It is extensively mantled in polymict surface gravels with sparse to dense, bushy and grassy vegetation. Levels of bedrock exposure are very low to non-existent. Shallow drainage lines drain towards the Vetrivier and Hakskeen Pan in the east. The

telecommunications tower will be located in Kalahari dune veld terrain at around 880 m amsl, due east of Hakskeen Pan.

The geology of the Rietfontein region is shown on 1: 250 000 geology sheet 2620 Twee Rivieren (Council for Geoscience, Pretoria; Thomas et al. 1988). It is located within an extensive, broadly oval (west to east) patch of bedrock exposure spanning the RSA / Namibia border and surrounded by Kalahari dune sands. The bedrocks here belong to the Karoo Supergroup succession on the southern margins of the Kalahari - Aranos Basin (not the Main Karoo Basin) with representatives of the Permo-Carboniferous, glacially influenced Dwyka Group as well as overlying Early Permian post-glacial mudrocks of the Ecca Group. North of Rietfontein the Karoo beds unconformably overlie reddish-brown Early Cambrian sandstones of the Fish River Subgroup (Nama Group). According to the geological map, the small solar PV and BESS preferred site overlies Dwyka Group sediments but these are apparently not well-exposed at surface here (J. Kaplan pers. comm., 2021). Instead, the ground surface is extensively mantled by poorly-sorted, desert-varnished, polymict gravels derived by downwasting from the underlying Dwyka Group tillites. These time-composite Late Caenozoic gravels may be provisionally assigned to the Obogorogop Formation of the Kalahari Group (Partridge et al. 2006). No substantial alluvial deposits are associated with the shallow geographical low features within the area.

11.5 Soils

Soils in the region have Karoo-related elements, but indicate a transition from the Karoo to the sandy soils of the Kalahari (Mucina & Rutherford, 2011). Soils are deep, red-yellow, apedal and free draining (Mucina & Rutherford, 2011).

The soil surface is very rocky and gravelly. In comparison to the adjacent rocky surfaces, the soil surface in geographical low features (southern areas of the greater Study Area) comprises a mixture of sand, soil, rocks and gravel. The area around the telecommunications tower site comprise sandy, red soils or alluvial soils.

11.6 Land Capability

The preferred site is located in an area that is classified as Class VII in terms of the National Land Capability Classification (DAFF, 2017). These areas are described as being non-arable as the soils have severe limitations which make them unsuited to cultivation. The use of these areas is generally restricted to grazing, woodland, or wildlife.

11.7 Groundwater

Based on specialist knowledge of the Study Area, groundwater depths in the area are typically:

- Kalahari center: 95 to 100 mbgl (Kalahari sand)
- Mier central area: 80 - 110 mbgl (Kalahari sand)

11.8 Surface Water

Shallow drainage lines drain towards the Vetrivier and Hakskeen Pan ~15 south east of the Study Area. Several dry geographical low features traverse the landscape surrounding the Study Area. These ultimately flow into a large pan located about 14.5 km south-east of the Study Area. There are both poorly defined as well as well-defined geographical low features in the southern parts of the greater Study Area. In an arid region such as where this Study Area is located, geographical low features are functionally important due to the ephemeral vegetation. There are no surface water features and/or water courses onsite (Figure 14). Hence, the selection of the preferred site for the solar PV and BESS site was based on avoiding these areas.

There are no drainage lines on or near the telecommunications tower site.

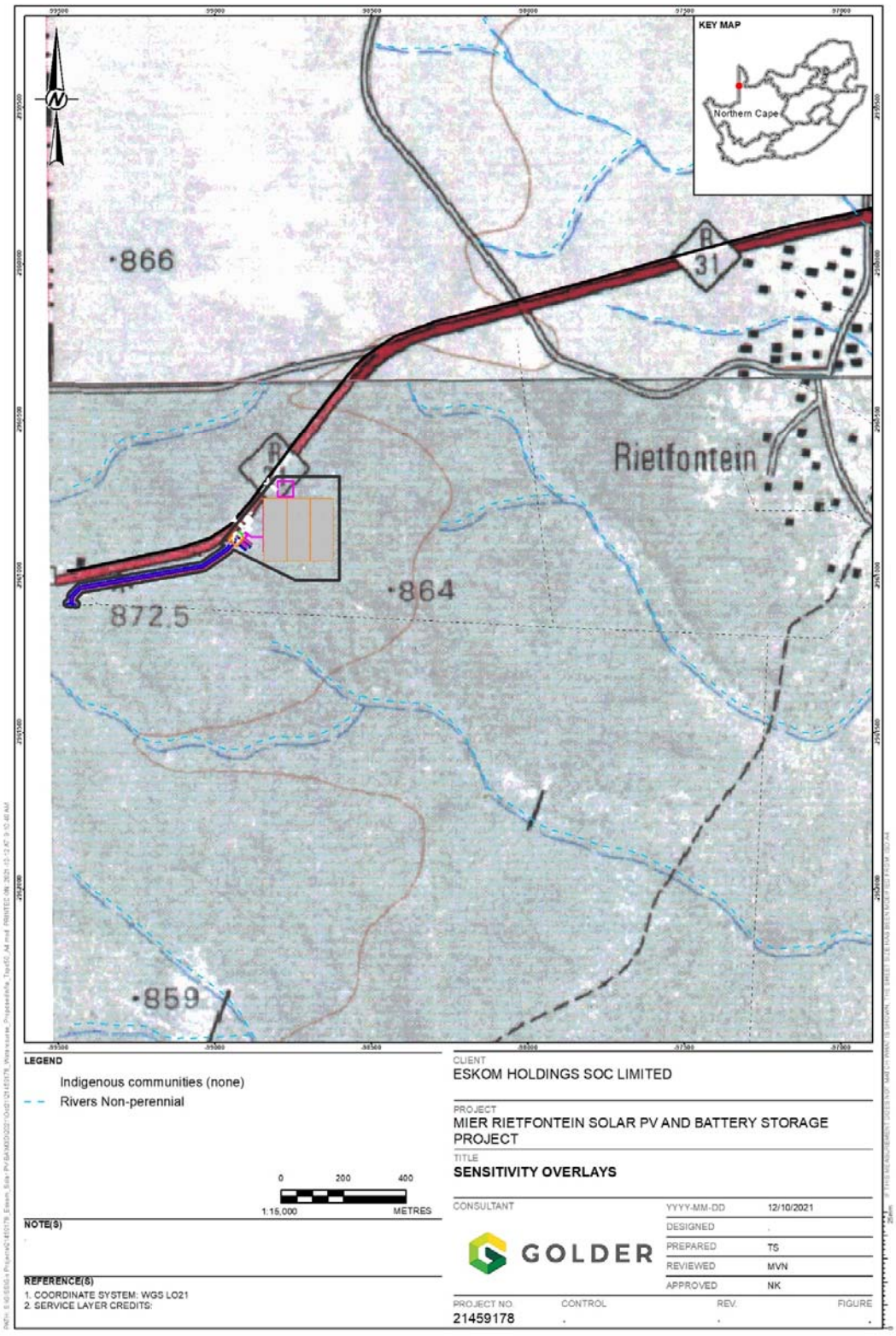


Figure 14: Surface Water Features near the Solar PV and BESS Site

11.9 Terrestrial Biodiversity

The national web-based environmental screening tool characterised the animal species, plant species and terrestrial biodiversity themes for the proposed solar PV and BESS site as 'low sensitivity'. The solar PV and BESS Project Study Area is located in Kalahari Karroid Shrubland (NKb5), while site of the proposed telecommunication tower site is located in the Gordonia Plains Shrubland (SVk16), as delineated and described by Mucina and Rutherford (2011). Both vegetation types are considered 'Least Threatened' on the national list of threatened ecosystems. The Northern Cape Critical Biodiversity Areas map (2018) indicates that both areas and most of the surrounding landscape are categorised as 'Other Natural Areas' the lowest priority category for non-transformed land.

Two vegetation communities were identified in the Study Area during the field visit. These are *Rhigozum trichotomum – Stipagrostis* Shrubland and Ephemeral Vegetation. The former community is the largest, covering approximately 17.3 ha of this Study Area. Ephemeral Vegetation comprises approximately 1.9 ha. Both communities are characterised by open- to sparse shrubland, comprising of both woody and herbaceous vegetation. *Rhigozum trichotomum – Stipagrostis* Shrubland is a uniform vegetation community and well-represented across the surrounding landscape. It was rated as having a moderate biodiversity sensitivity. Ephemeral Vegetation plays an important functional role in ecosystem dynamics, and accordingly was rated as having high biodiversity sensitivity. Vegetation landscape at the proposed telecommunication tower site is characterised by open, arid shrubland that is typical of the Gordonia Plains Shrubland vegetation type.

Two flora species (*Commiphora glandulosa* and *Hoodia gordonii*) recorded during the filed visit are listed as protected at a provincial and/or national level. *Commiphora glandulosa* is listed as protected at a provincial level and was recorded in the Study Area. *Hoodia gordonii* was recorded adjacent to the Study Area, and is listed as a nationally protected species, according to the NEMBA ToPS (2007) list and a specially protected according to the Northern Cape Nature Conservation Act (2009). Based on available literature, additional flora species of conservation concern that may be present, particularly at the proposed telecommunication tower landscape, include nationally protected trees such as *Boscia albitrunca* and *Vachellia erioloba.*

Mammal species confirmed to occur in and/or adjacent to the Study Area during the field visit include Cape or Scrub Hare (*Lepus capensis/saxatilis*), Ground Squirrel (*Xerus inauris*), Aardvark (*Orycteropus afer*), Cape serotine (*Neoromicia capensis*) and possibly the Egyptian slit-faced bat (*Nycteris thebaica*). Three reptile species were recorded in the Study Area during the field visit, namely the Anchieta's Agama (*Agama anchietae*), Plain Sand Lizard (*Pedioplanis inornata*) and Namaqua Sand Lizard (*Pedioplanis namaquensis*).

11.10 Avifauna

The solar PV and BESS site, and telecommunication tower site are based on the largely homogenous nature of the natural habitat with low avifaunal diversity particularly with regards to Red List species. The Study Area has been disturbed as a result of pastoral activities and vehicle traffic associated with the R31 road that borders the Study Area.

The site visit produced a combined list of 40 species, covering both the solar PV and BESS Project Study Area and to a limited extent, the surrounding area. Points located within the geographical low areas recorded the highest diversity of species each. Points near the road recorded the lowest density of species. The most notable record was that of a pair of Karoo Korhaan (NT). Martial Eagle, Kori Bustard and Lappet-faced Vulture were observed within the broader Study Area. Most observations were of small passerine species that are common to this area.

The selection of a preferred site alternative for the solar PV and BESS site within the Study Area has been determined using observations of available micro habitat, species composition and the location of the site alternative in relation to existing infrastructure. The southern portion of the Study Area contains a series of

ephemeral vegetation, a habitat type that supports a diversity of passerine species, as well as the Karoo Korhaan that were observed each morning during the field survey at this location. The preferred site also contains ephemeral vegetation but these are less defined and likely to be less sensitive. The field survey observations, both in terms of avifaunal species and habitat, confirm that the identified the preferred site is likely to pose the least impact to the resident avifaunal community.

The proposed telecommunication tower sites (both the preferred and alternative sites) are located within the Savanna Biome, specifically the Gordonia Plains Shrubland and Gordonia Duneveld vegetation units (South African National Biodiversity Institute, 2012 and Mucina & Rutherford, 2006). The savanna biome contains a large variety of bird species (it is the most species-rich community in southern Africa) but very few bird species are restricted to this biome. Savanna is particularly rich in raptors and forms the stronghold for priority species (recorded in the broader project area by SABAP2) such as Martial Eagle, Tawny Eagle, Lanner Falcon, Red-footed Falcon, Lappet-faced Vulture and African White-backed Vulture. Several non-Red Listed raptor species could also potentially occur such as the Booted Eagle, Black-chested Snake-Eagle Circaetus pectoralis and a multitude of medium-sized raptors, for example Southern Pale Chanting Goshawk and Spotted Eagle-Owl. Apart from raptors, open areas within this biome could also attract other Red Listed species, i.e. Kori Bustard, and Karoo Korhaan.

The selection of a preferred site alternative for the telecommunication tower is considered to be the least sensitive from an avifaunal perspective owing to its location relative to the R31 district road which is a source of existing disturbance. In addition its proximity to the road will also facilitate the construction of the telecommunication tower without the need for additional road infrastructure thereby reducing the displacement impacts associated with habitat loss and disturbance.

11.11 Visual

The visual resource analysis considered topography, hydrological features, vegetation cover and land uses. Resident receptors identified in both solar PV and BESS and telecommunication tower study areas include people living in local towns and villages, and farmers and farm workers. Transient receptors identified include local people travelling from town to town using the R31 as well as smaller roads and informal tracks, and cross-border tourists driving along the R31 to access the Rietfontein border post with Namibia.

Both the solar PV and BESS site, as well as the telecommunication tower site are dominated by vast expanses of undeveloped and relatively undisturbed natural habitat, consisting of arid shrub- and bushveld. Localised areas of development and transformation are present and include small towns and settlements, such as Rietfontein village and Philandersbron in the Study Area, and Groot Mier nearer the telecommunications tower site. There are also scattered small farm dwellings throughout the greater region. Overall, the vast and open expanses of the landscape, coupled with the dominance of short and relatively undisturbed arid vegetation, conveys a distinct rural, desolate and wilderness aesthetic to the region.

11.12 Socio-economic

The population of the regional study area in 2021 was estimated to be 115 472 with an annual growth rate of 1.5%, while the population of the local study area was estimated to be 7 409 in 2021 (assuming same annual growth rate as the regional study area). The population density of the regional study area was higher with 2.6 persons/km^2, compared to the local study area with 0.4 persons/km^2. Both the regional and local study areas have growing populations, with most of the population between the ages of 0 and 15.

There are marginally more females than males in the regional study area, and marginally more males to females in the local study area. In both the regional and local study areas, Coloureds are the largest population group, followed by Black African, White, and Indian or Asian. In terms of education, approximately a third of the population have completed Grade 7/Std. 5 or some form of primary education, while another third have

completed Grade 12/Std. 10 or some form of secondary education. Only a small percentage of the population have completed a tertiary qualification.

In the regional study area, approximately 72% of the economically active population are employed, while 21% of the population are unemployed and 7% are discouraged work seekers. Similarly, in the local study area, approximately 58% of the economically active population are employed, while 29% of the population are unemployed and 13% are discouraged work seekers. The remaining population are either not economically active or their status is not applicable.

Based on the census data, literature review, and key stakeholder interviews, several socio-economic challenges were identified which are presently affecting communities in the local and regional study areas. This includes high unemployment, lack of skills, water supply constraints, sanitation constraints, refuse removal constraints, energy constraints, and the distance from major centres. These have been highlighted as the proposed Project could, in the absence of mitigation, contribute to these existing challenges.

11.12.1 Indigenous People

11.12.1.1 The ǂKhomani San

The term ǂKhomani is an umbrella term for several indigenous groups, dwelling as hunters and gatherers in the southern Kalahari (Konrad, 2008). There are currently around 1 000 ǂKhomani San who are spread over a large area of approximately 1 000 km^2. Within the ǂKhomani San, the //Sa! Makai is the largest and most dominant group. Dawid Kruiper, who is responsible for lodging the ǂKhomani San's land claim, was the traditional leader of this group.

Prior to the 1930s, the ǂKhomani San had large stretches of land available for nomadic activities, such as hunting and searching for food. However, in 1930 large areas of the southern Kalahari were declared the Mier Coloured Reserve for the settlement of 'Coloureds" from the Cape Colony. There areas were fenced off and the ǂKhomani San prohibited from using the natural resources of these areas. This created tension between the "Coloured" stock farmers and the nomadic ǂKhomani San. This situation was exacerbated in 1931 with the establishment of the Kalahari Gemsbok National Park ("KGNP") adjacent to the Mier Coloured Reserve.

In the early 1940s, some of the ǂKhomani San were permitted to temporarily settle in the KGNP. Most of the men were employed as animal keepers and trackers. Others helped students with their botanical research and soldiers training survival techniques in the bush. While living in the KGNP, the ǂKhomani San received some clothing, small wages, some game, and limited access to land and natural resources.

In the 1970s, the ǂKhomani San who had been living in the KGNP were resettled in Welkom, a small rural settlement neighbouring the Mier Coloured Reserve. Most of the men made a living working on the farms within the Mier Coloured Reserve, while the others worked as guards in the KGNP.

In the late 1980s, some of the ǂKhomani San relocated to Kuruman to perform for tourists, adverts, and documentaries. Unhappy with the dire living conditions, part of the group returned to Mier to work as wageworkers on the farms. The remaining group eventually returned to the Kalahari.

In the early 1990s, some of ǂKhomani San relocated to a farm in Kagga Kamma where they were permitted to live on the land and to make a living by producing craftwork and weapons. More soon joined the initial group due to the deteriorating conditions in the Kalahari. Not long after, part of the group returned to the Kalahari due to the poor living conditions in Kagga Kamma.

11.12.1.2 The Mier Community

The population of the Mier Community is approximately 4 500 people (Konrad, 2008). The Mier Community is named after the area of Mier which stretches north from Askham up to the Kgalagadi Transfrontier Park ("KTP"), and west to the Namibian border.

The Mier Community settled in the area in around 1865. At the time, the area was mainly used for seasonal grazing land and hunting by various indigenous groups, such as the Korana. The only indigenous group that was permanently living in the area was the ǂKhomani San.

The first group of people, which would later be known as the Mier Community, to settle in the area were referred to as "Basters". This group was characterised as being mixed raced with at least one white ancestor. The "Basters" fled the oppression of the colonial system in the Cape Colony when their personal rights, such as the right to own land, was revoked. The group was led by Dirk Vielander who lobbied for the sovereignty of the "Basters" and demanded the independence of the Mier area. In 1891, the farmland which Dirk Vielander had distributed among his settlers was acknowledged as property of the Basters by the Cape Colony. From this point on, the "Basters", who had been without rights for decades, owned more than 90 different farms in the Mier area. However, by 1902 all but 11 of these farms had been bought or taken control of by white farmers.

From the 1900s, the remaining land of the Mier Community was expropriated in three phases. In the first phase, the farms owned by the Mier Community within the then KGNP, as well as the communal land used for grazing and hunting within the then KGNP, where expropriated. In the second phase, portions of the Mier Coloured Reserve, which was reserved for common use, was incorporated into the then KGNP when the southern border was fenced in. From the 1960s, large areas were privatised and the ownership of the land individualised. As a consequence, there was less land available for the communal use of the Mier Community.

11.12.1.3 Current Living Conditions

The information presented in this section is based on information gathered from the key stakeholder interviews. This section is not intended to present a detailed social baseline, but a broad overview of the baseline conditions at the time that this plan was being prepared. This broad overview will used to identify the main challenges facing the ǂKhomani San and Mier community.

- Land Ownership
  - Most of the Mier Community live in the towns/villages of Rietfontein, Philandersbron, Loubos, Klein Mier, and Groot Mier. Some members of the community also live on farms around Loubos, Klein Mier, and Groot Mier. Most of the community are landowners, having purchased land from the then Mier Local Municipality. There are however still some areas under land claim which have not yet been resolved. There is also a formal arrangement in place which allows members of the Mier community (and ǂKhomani San) to use land owned by the DKLM for grazing of livestock.
  - Most of the registered ǂKhomani San have settled on the eight (8) reinstituted farms near Andriesvale, where they are 'renters' or tenants. Some of the registered ǂKhomani San also live in Botswana, Namibia, Upington, small villages (e.g., Welkom, Witdraai, etc.), and on the commercial farms.
- Employment
  - Most of the Mier Community are unemployed, and in particular the youth. The majority of the unemployed are dependent on government social grants, such as pension, disability, and child support. Of those that are employed, the majority work for government at schools, clinics, police stations, municipal offices, post office, and the border post. Some people are also employed on the farms and in the tourism sector (e.g., lodges, guides, and arts and crafts). Some people are also temporarily employed through the Expanded Public Works Programme ("EPWP"). There are several reasons for

the high levels of unemployment. This includes the lack of local businesses/employment opportunities in the area, the lack of skills, the distance to major centres, such as Upington, to access funding and to purchase goods/materials, and the inability to compete with mostly foreigner-owned stores in the area.

- Most of the registered ǂKhomani San are unemployed. The majority of the unemployed live off government social grants. Some of the ǂKhomani San make money off part-time work on the commercial farms, making arts and crafts, and raising livestock (mostly goats and sheep). Of those that are employed, the majority work on commercial farms, at the game lodges, and KTP. The low level of education is one of the main challenges that prevents the ǂKhomani San from finding meaningful employment.

- Education
  - Almost all of the Mier Community have some level of formal education. Most of the elderly have some form of primary schooling, while most of the adults and youth have some form of secondary schooling. Very few members of the community have a tertiary qualification. One the greatest challenges facing the community with respect to education is the cost of schooling (i.e., fees, transport, books, stationary, accommodation, etc.). The distance to tertiary institutions, as there are none in the area, is also a major challenge. Most of the youth do not see the value in obtaining a matric or post-matric qualification due to the lack of employment opportunities in the area. Most will drop out of school if a job becomes available. There are also very few skilled people in the Mier community. This is largely because most of the skilled people have left the area in search of work in the larger towns and cities.
  - Most of the elderly members of the ǂKhomani San have little or no formal education. Adults generally have some form of primary schooling, while the youth have some form of secondary schooling. The distance to schools is one of the greatest challenges facing the ǂKhomani San with respect to education. This is because the high school in Rietfontein, some 80 km from Askham, is the only school in the area that offers classes up to matric. The cost of schooling (e.g., fees, transport, books, stationary, etc.) is also a major challenge.
- Health
  - Most of the Mier community use the Rietfontein Community Health Centre, which provides primary health care. While there are clinics in the other villages, except Loubos, Welkom, and Askham, most people use the clinic in Rietfontein due to the higher level of service. The nearest hospital is in Upington, some 280 km away. Very few members of the community use traditional medicines/remedies.
- Services
  - Most of the Mier community have piped water to their homes or yards. Some households, mostly informal settlements on the outskirts of towns/villages receive their water from municipal water tankers. Most of the Mier community use electricity for cooking, heating, and lighting. Some of the households, mostly informal settlements on the outskirts of towns/villages, do not have electricity. These households mostly use gas and firewood for cooking and heating. The majority of the firewood is purchased from the local stores, while some firewood is harvested from the communal areas. Most households without electricity were supplied with a small solar system for lighting. Most of the households have flush toilets, ventilated improved pit latrines, or pit latrines. Some households, mostly on the farms and informal settlements on the outskirts of towns/villages, use the bucket system. The majority of households have their waste collected by the local municipality. Some households, mostly

on the farms, burn or bury their waste. Some community members are unhappy with service delivery in the area, and the fact that many of the municipal functions are based in Upington.

- The ǂKhomani San on the eight (8) reinstituted farms source their water from a borehole. The water is distributed by a basic reticulation system setup by the Community Property Association ("CPA"). This system is however insufficient for the needs of the community. In the towns/villages, most of the households have piped water to their homes/yards. This is provided by the DKLM. Most of the households on the eight (8) reinstituted farms use a small solar system for lighting, and gas and firewood for cooking and heating, as there is no electricity on the farms. Most of the households on the eight (8) reinstituted farms still use the bucket system, whereas most of the households in the towns/villages have flush toilets, ventilated improved pit latrines, or pit latrines. The municipality collects waste from the households on the eight (8) reinstituted farms and towns/villages.

- Livelihoods
  - It is estimated that 20% of the Mier community are still involved in pastoralism, raising mostly sheep and goats. Very few households in Rietfontein are still involved in pastoralism, whereas most households in Loubos, Klein Mier, and Groot Mier are still involved in pastoralism. There is no/limited harvesting of wild foods from the communal areas surrounding the settlements. There is currently no control over the usage of the communal areas.
  - Most of the ǂKhomani San on the eight (8) reinstituted farms are still involved in pastoralism, raising mostly sheep and goats. The ǂKhomani San also derive some income from the Erin Game Farm (mostly hunting) and the Xhaus Lodge in the "!Ae!Hai Kalahari Heritage Park (receive percentage of the profits).
- Cultural Heritage
  - In Rietfontein, the only registered heritage site is the Dutch Reformed Mission Church, which dates back to 1890. The graves of David Vilander (son of Dirk Vilander) in Andriesvale and Katriena 'Ouma' Valbooi (oldest member of Mier community) in Rietfontein were also mentioned in the interviews.
  - As mentioned previously, in 2002, the ǂKhomani San were granted preferential tourism rights over 80 000 ha of land within the TNP (to the south of the Auob River), and the right to use a further 473 830 ha of land (between the Auob and Nossob Rivers) for symbolic and cultural purposes. In 2017, the ǂKhomani Cultural Landscape, which consists of the TNP and Ae!Hai Kalahari Heritage Park, was listed as a World Heritage Site by the United Nations Education, Scientific and Cultural Organisation

11.13 Paleoethology

There are generally poor fossil record of the Dwyka Group (McLachlan & Anderson 1973, Anderson & McLachlan 1976, Visser 1989, Visser *et al*., 1990, Von Brunn & Visser 1999, Visser 2003, Almond & Pether 2008); this is hardly surprising given the glacial climates that prevailed during much of the Late Carboniferous to Permian Periods in southern Africa. However, most Dwyka sediments were deposited during periods of glacial retreat associated with climatic amelioration. Sparse, low diversity fossil biotas from the Mbizane Formation in particular mainly consist of arthropod trackways associated with interglacial to post-glacial dropstone laminites and sporadic vascular plant remains (drifted wood and leaves of the Glossopteris Flora), while palynomorphs (organic-walled microfossils) are also likely to be present within finer-grained mudrock facies. Glacial diamictites (tillites or "boulder mudstones") are normally unfossiliferous but do occasionally contain fossiliferous carbonate erratics (cf Cooper & Oosthuizen 1974), fragmentary transported plant material as well as palynomorphs in the fine-grained matrix. Thomas *et al*. (1988, p. 4; after Meyer 1953) report Glossopteris leaf impressions within flaggy sandstones on the north-western side of Hakskeen Pan. Such rocks might also contain petrified wood

(cf Bangert & Bamford 2001, Bamford 2004), which may then be weathered out and concentrated in surface gravels.

During a site visit to Hakskeen Pan near Rietfontein by Almond (in 2019) no fossil plants, including leaves or petrified wood, were observed within the Dwyka Group exposures or reworked into the associated surface gravels. The only fossils recorded within the Dwyka Group here are low-diversity trace fossil assemblages including “segmented” epichnial grooves on wave-rippled sandstone bed tops (possibly of molluscan origin) and small-arthropod burrows on thin sandstone sole surfaces (ibid.). The latter include small-scale rusophycids and cruzianaeform burrows of possible crustacean origin (“Isopodichnus” as well as possible Cruziana carbonaria) that might be attributable to the Scoyenia Ichnofacies (cf Buatois & Mangano 2011).

Fossil remains have not been recorded from the Late Caenozoic coarse, downwasted gravels of the Obogorogop Formation (Kalahari Group) that are largely derived from erosion of Dwyka Group bedrocks or from the associated thin gravely alluvium of similar provenance. Elsewhere in the Northern Cape occasional erratic (ice-transported) boulders of Precambrian carbonate rocks (limestone / dolomite) with well-preserved stromatolites (fossil microbial mounds) have occasionally been recorded with Obogorogop surface gravels (J. Almond., pers. obs.). The Kalahari dune sands of the Gordonia Formation are generally of low palaeosensitivity.

It is concluded that the baseline palaeosensitivity of the Mier Rietfontein solar PV and BESS, and telecommunications tower Project areas are very low.

11.14 Archaeology

A relatively large number of Stone Age resources were documented in the 20ha Study Area of the solar PV and BESS site. More than 99% of the archaeological remains are assigned to the Middle Stone Age (MSA), but it is clear that the resources comprises an assemblage of mixed ages. Two Early Stone Age (ESA) flakes and an ESA biface/handaxe was also found, but no Later Stone Age (LSA) tools, or any organic remains such as bone, pottery or ostrich eggshell was found.

Most of the of the finds comprise single, isolated occurrences spread very thinly and unevenly across the landscape. However, dispersed scatters of tools were recorded in the less disturbed eastern portion of the study site, as well as outside the footprint area of the study site. During the study, 264 waypoints were logged, 188 (or 44.6%) of the observation were recorded inside the footprint area of the study are, while more than 55% of observations recorded occur outside the Study Area. The eastern portion of the study site (the applicant’s preferred alternative) is archaeologically more sensitive than the degraded western portion. No settlement sites or any evidence of human occupation were found in the surrounding area.

The following is noted from the desktop and site visit of the Study Area for the solar PV and BESS site:

- Grading
  - The mixed age of the assemblage suggest that the implements have displaced both vertically and spatially through many millennia of erosion and other natural processes. On archaeological grounds, the occurrences observed can be said to be of generally low-medium significance for the proposed development footprint.
- Graves
  - No formal graves, or typical grave features or markers were encountered in the Study Area.
- Buildings
  - No buildings, structures, or features (such as stone kraals, walling or enclosures) were encountered in the Study Area.

Regarding the assessment of the proposed telecommunications tower, near the village of Mier, the footprint area (225 m²) is so small that it is highly unlikely that any important archaeological remains would be encountered.

12.0 IMPACT/RISK ASSESSMENT

12.1 Impact Assessment Methodology

The impact assessment was undertaken using a matrix selection process, the most used methodology, for determining the significance of potential environmental impacts/risks associated with the proposed Project. This methodology is based on the minimum requirements as outlined in Appendix 1 of the EIA Regulations, 2014. The methodology incorporates four aspects for assessing the potential significance of impacts, namely direction, severity, probability of occurrence, and reversibility, which are further sub-divided as follows (Table 12).

Table 12: Impact assessment factors

Direction	Severity			Probability	Reversibility
Positive/ negative	Magnitude	Duration	Scale/ extent	Probability of occurrence	Reversible/ irreversible

To determine the significance of each potential impact/risk, the following four ranking scales are used (Table 13):

Table 13: Impact assessment scoring methodology

Value	Description
Magnitude	
10	Very high/unknown (of the highest order possible within the bounds of impacts that could occur. In the case of adverse impacts, there is no possible mitigation that could offset the impact, or mitigation is difficult, expensive, time-consuming or some combination of these. Social, cultural, and economic activities of communities are disrupted to such an extent that these come to a halt).
8	High
6	Moderate (impact is real, but not substantial in relation to other impacts that might take effect within the bounds of those that could occur. In the case of adverse impacts, mitigation is both feasible and easily possible. Social, cultural, and economic activities of communities are changed, but can be continued (albeit in a different form). Modification of the project design or alternative action may be required).
4	Low (impact is of a low order and therefore likely to have little real effect. In the case of adverse impacts, mitigation is either easily achieved or little will be required, or both. Social, cultural, and economic activities of communities can continue unchanged.)
2	Minor
Duration	
5	Permanent (Permanent or beyond closure)
4	Long term (more than 15 years)
3	Medium-term (5 to 15 years)
2	Short-term (1 to 5 years)

Value	Description
1	Immediate (less than 1 year)
Scale	
5	International
4	National
3	Regional
2	Local
1	Site only
0	None
Probability	
5	Definite/unknown (impact will definitely occur)
4	Highly probable (most likely, 60% to 90% chance)
3	Medium probability (40% to 60% chance)
2	Low probability (5% to 40% chance)
1	Improbable (less than 5% chance)
0	None

Significance = (Magnitude + Duration + Scale) x Probability.

Table 14: Significance of impact based on point allocation

Points	Significance	Description
SP>75	High environmental significance	An impact which could influence the decision about whether or not to proceed with the project regardless of any possible mitigation.
SP 30 - 75	Moderate environmental significance	An impact or benefit which is sufficiently important to require management, and which could have an influence on the decision unless it is mitigated.
SP<30	Low environmental significance	Impacts with little real effect and which will not have an influence on or require modification of the project design.
+	Positive impact	An impact that is likely to result in positive consequences/effects.

For the methodology outlined above (Table 13), the following definitions were used:

- **Direction** of an impact may be positive, neutral, or negative with respect to the impact

- **Magnitude** is a measure of the degree of change in a measurement or analysis (e.g., the severity of an impact on human health, well-being, and the environment), and is classified as none/negligible, low, moderate, high, or very high/unknown
- **Scale/geographic extent** refers to the area that could be affected by the impact and is classified as site, local, regional, national, or international
- **Duration** refers to the length of time over which an environmental impact may occur i.e. immediate/transient, short-term, medium term, long-term, or permanent
- **Probability** of occurrence is a description of the probability of the impact occurring as improbable, low probability, medium probability, highly probable or definite
- **Reversibility** of an impact, which may be described as reversible or irreversible

The following sections provide a description of the potential impacts/risks associated with the proposed Project in the construction, operational and closure phases. A summary of the impact/risk assessment is presented in Table 15.

12.2 Construction Phase

12.2.1 Terrestrial Biodiversity

12.2.1.1 Habitat Loss and Modification

Several negative impacts on terrestrial ecology associated with the proposed Project have been identified. Of these, the loss and modification of natural habitat resulting from vegetation clearing and earth works during construction is the primary impact of concern. This is mainly a concern for the solar PV and BESS site, where 10 ha of natural habitat will be cleared. Prior to mitigation this impact at this site will have a high impact significance and will impact all flora in the development footprint and all fauna that use these habitats as a foraging/breeding/refugia resource on-site.

12.2.1.2 Establishment and Spread of Alien Invasive Species

Disturbances caused by vegetation clearing and earth works during construction can facilitate the establishment and spread of alien invasive vegetation. Alien plant infestations can spread exponentially, suppressing or replacing indigenous vegetation. This may result in a breakdown of ecosystem functioning and a loss of biodiversity. Declared invasive *Prosopis* trees (NEMBA Category 3) are present in the landscape surrounding the areas, and it is possible that these species will colonise areas disturbed by construction activities. Before mitigation, the establishment and spread of alien invasive species is rated an impact of “moderate” significance.

12.2.1.3 Mortality and Disturbance of ground-dwelling Fauna

Large and mobile fauna will move off to avoid disturbances caused by construction activities. However, smaller and less mobile species may be trapped, injured and killed during vegetation clearing and earth works. Susceptible fauna includes, amongst others, burrowing mammals nesting birds, reptiles and amphibians. Other common causes of fauna death or injury include vehicle collisions along access roads, hunting and snaring by workers, and trapping of fauna in fences, excavations and trenches. Before mitigation, the mortality and disturbance of fauna is rated an impact of “moderate” significance.

12.2.1.4 Loss/disturbance of roosting bat individuals

Site clearance prior to construction could result in direct impacts including mortality and injury of bat individuals that may occasionally roost in the trees or rocky crevices in the Study Area. This is considered to be an impact of low significance, given the limited importance of the Study Area for roosting bats.

12.2.1.5 Reduction in extent of foraging habitats for bats

The loss of natural vegetation within Study Area during site clearance will result in a reduction of approximately 10 ha of available foraging habitat for bats. The overall significance of the impact of habitat loss is rated as moderate.

12.2.1.6 Dust Generation

Vegetation clearing, earth works and vehicle activity are likely to result in dust generation, which may negatively impact both local flora and fauna communities. Before mitigation, dust generation is rated an impact of “moderate” significance.

12.2.1.7 Loss of Flora of Conservation Concern

Vegetation clearing and earth works can result in the direct loss of flora species of conservation concern. Although no threatened (Red List) flora species were observed in the Study Area, some recorded plants (e.g., *Commiphora glandulosa*) and some species with a ‘possible/probable’ probability of occurrence are ‘protected’ in the Northern Cape or nationally, and it will be necessary to obtain a clearing permit from the relevant authority for their removal and/or relocation. Before mitigation, this impact is rated of “moderate” significance.

12.2.2 Avifaunal

During construction, avifaunal species have the potential to be displaced by the proposed Project and its ancillary infrastructure as a result of habitat transformation and disturbance. However, these species have persisted despite existing disturbance within the solar PV and BESS Project Study Area. This resilience, coupled with the fact that similar habitat is available throughout the broader area, means that the displacement impact will not be of regional or national scale.

The habitat within which the proposed Study Area is located is low to moderately sensitive from a potential bird impact perspective. The construction of the proposed Project will result in impacts of moderate significance to birds occurring in the vicinity of the new infrastructure; impacts will be of low significance to birds occurring in the vicinity of the telecommunications tower.

The field survey observations, that the identified the preferred sites for the solar PV and BESS, as well as the telecommunication tower are likely to pose the least impact to the resident avifaunal community.

12.2.3 Socio-economic

The following presents a description of the nature of the potential impacts/risks associated with the construction of the proposed Project.

12.2.3.1 Dust Impacts

Site clearance activities, earthworks, and materials handling, will generate dust. This will negatively affect not only construction workers, but also people living and working nearby the construction site. Exposure to low levels of dust over a short period of time can be a nuisance, whereas as the exposure to high levels of dust over a prolonged period of time can lead to health impacts, such as asthma. The impact of dust on construction workers and people living and working nearby the construction site is likely to be moderate.

12.2.3.2 Noise Impacts

During the construction phase, construction vehicles, equipment, and workers will generate noise. This will negatively affect people living and working near the construction site, as well as people (e.g., tourists) passing through the area. The impact of noise on people living and working nearby the site, and people passing through the area, is likely to be moderate.

12.2.3.3 Increase in Traffic Congestion

There will be an increase in road traffic moving along the R31 through Rietfontein, Klein Mier, Groot Mier and Askham. This includes motor vehicles transporting construction workers and heavy-duty vehicles transporting construction materials and equipment. With an increase in road traffic, and in particular heavy-duty vehicles, there is likely to be an increase in traffic congestion along the R31. The impact of an increase in traffic congestion is likely to be moderate.

12.2.3.4 Increase in Pressure on Basic Services

Construction activities are likely to increase the pressure on basic services. This includes potable water, sewage treatment and disposal, and solid waste disposal. The impact of an increase in the pressure on basic services is likely to be moderate.

12.2.4 Indigenous People

The following section presents a description of the nature of the potential impacts/risks associated with the construction of the proposed Project.

12.2.4.1 Loss of Access to Grazing Land

The entire site footprint of 10 ha for the solar PV and BESS site will be cleared of vegetation, in addition to a small area of 15m x 15m for the telecommunications tower. This will reduce the area that pastoralists living in Rietfontein have for the grazing of their goats and sheep. The sites will also be fenced, reducing access to and movement through the site. The impact of the loss of grazing land is likely to be moderate.

12.2.4.2 Increase in Road Traffic Deaths or Serious Injuries

There will be an increase in road traffic moving along the R31 through Rietfontein, Klein Mier, Groot Mier and Askham. This includes motor vehicles transporting construction workers and heavy-duty vehicles transporting construction materials and equipment. With an increase in road traffic, and in particular heavy-duty vehicles, there is the increased risk of road traffic deaths or serious injuries. The risk of an increase in road traffic deaths or serious injuries is likely to be moderate.

12.2.4.3 Increase in Spread of Communicable Diseases

There will be an increase in people living and working in the region, most of who will be from outside the area. With an increase in the number of people living and working in the region, there is the risk of an increase in the spread of communicable diseases, such as Tuberculosis, HIV/AIDs, sexually transmitted diseases (“STDs”), and COVID-19.

The risk of an increase in the spread of communicable diseases is likely to be moderate.

12.2.4.4 Increase in Anti-Social Behaviours

There will be an increase in people living and working in the region, most of who will be from outside the area. With an increase in the number of people living and working in the region, there is the risk of an increase in anti-social behaviours, such as gender-based violence, violence against children, sexual harassment, use of illegal substances, and so on. The risk of an increase in anti-social behaviours is likely to be moderate.

12.2.4.5 Perceived Increase in Local Jobs and Business Opportunities

There is likely to be the perception that the proposed Project will create a significant number of jobs for local people and opportunities for local businesses. However, the proposed Project will only create a limited number of local jobs (e.g., general construction workers, security guards, cleaners, and so on). This is because highly skilled workers are required for the installation of PV modules and BESS. Similarly, only a limited number of opportunities will be created for local businesses (e.g., building materials, accommodation, security, cleaning, and catering services). There is a risk that Eskom’s social licence to operate (“SLO”) may be negatively affected

if the local community's expectations, with respect to local jobs and business opportunities, are not being met. The impact/risk of a perceived increase in local jobs and business opportunities is likely to be moderate.

12.2.4.6 Perceived Increase in Education, Skills Training, and Skills Development

There is likely to be the perception that the proposed Project will create a significant number of education, skills training, and skills development opportunities. However, the proposed Project will only create a limited number of such opportunities. There is a risk that Eskom's SLO may be negatively affected if the local community's expectations, with respect to education, skills training, and skills development opportunities, are not being met. The impact/risk of a perceived increase in education, skills training, and skills development opportunities is likely to moderate.

12.2.4.7 Compromise of Cultural Integrity of Indigenous People

There will be an increase in people living and working in the region, this may include people moving to the area from outside the region. With an increase in the number of people living and working in the region, there is a moderate risk that the cultural integrity of the indigenous people would be compromised. The risk of compromising the cultural integrity of indigenous people is likely to be moderate.

12.2.5 Paleoethology

The construction phase of the proposed Project will entail substantial excavations into the superficial sediment cover and perhaps locally into the underlying bedrock as well. These include, for example, surface clearance and excavations for the PV panel footings, laydown areas, internal and access roads, underground cables, powerline pylon footings, on-site electrical substation and BESS facility. All these activities may adversely affect potential legally-protected, scientifically-valuable fossil heritage within the project footprint as a result of excavations and surface disturbance (*e.g.* surface clearing and vehicle activity) during the construction phase by destroying, disturbing or permanently sealing-in fossils preserved at or beneath the surface of the ground that are then no longer available for scientific research or other public good.

The inferred impact of the proposed expansion of the proposed Project on legally-protected, local fossil heritage resources of scientific or broader conservation value applies only to the construction phase of the development, since further significant impacts on fossil heritage during the planning, operational and decommissioning phases of the facility are not anticipated. Confidence levels in this assessment are High, given the very low levels of bedrock exposure within the project area; and the availability of relevant recent palaeontological field data from the Rietfontein area (Almond 2019).

12.2.6 Archaeology

The study has shown that archaeological heritage resources will be impacted by proposed development activities. The results of the study indicate that the proposed Project will have a permanent destructive negative impact on archaeological resources.

During the construction phase, the magnitude is considered moderate as the impact is real, but not substantial in relation to other impacts that might take effect and can be continued. The duration would be permanent, the scale limited to the site only, and the probability high/definite. In terms of archaeological grading, the occurrences observed can be said to be of generally low-medium significance for the proposed development footprint.

12.3 Construction and Operational Phase

12.3.1 Visual

For the purposes of this assessment, the potential impacts of the construction and operational phases have been grouped together, as they are expected to be largely similar in nature.

12.3.1.1 Dust generation during vegetation clearance and construction activities

Considering the small size of the proposed telecommunications tower footprint (0.0225 ha), dust generation is only considered an impact of concern for the larger solar PV and BESS site footprint, which is estimated at 10 ha footprint. Before mitigation, dust generation is rated an impact of “moderate” significance.

12.3.1.2 Reduction in visual resource value due to presence of solar PV blocks, BESS and associated infrastructure

Before mitigation, this impact is rated of “moderate” significance.

12.3.1.3 Reduction in visual resource value due to presence of telecommunications tower and associated infrastructure

Due to the size and nature of this proposed infrastructure, it is very difficult to mitigate the associated visual impact. Both before and after mitigation, impact significance is rated as “moderate”.

12.3.1.4 Light pollution at night

This impact is only considered applicable at the solar PV and BESS site. Before mitigation dust generation is rated an impact of “moderate” significance.

12.4 Operational Phase

12.4.1 Terrestrial Biodiversity

12.4.1.1 Security Lighting Disturbing Bats and Other Nocturnal Fauna

Predicted operational phase impacts relate to disturbance of typical bat foraging patterns caused by ongoing activities at the facility (e.g., security lighting at night).

The proposed PV and BESS development is likely to be well-lit at night for security purposes. This is expected to cause disturbance to nocturnal faunal species in surrounding areas. Disturbance may mean that some species are attracted to the lights to prey upon the insects that are attracted to the lights (particularly some common bat species such as Cape serotine or Egyptian free-tailed bat); other more sensitive bat species (such as horseshoe bats) and other nocturnal fauna may be deterred from well-lit areas. The predicted impact is considered to be of moderate significance prior to mitigation.

12.4.1.2 Establishment and Spread of Alien Invasive Species

The potential establishment of alien invasive species in, and immediately adjacent to, the Study Area will continue to be an impact of concern during the operational phase. Before mitigation, the establishment and spread of alien invasive species is rated an impact of “moderate” significance.

12.4.1.3 Dust Generation

During the operational phase, the Study Area will be kept free of vegetation through active control. This may promote dust generation from exposed soil surfaces. Before mitigation, impact magnitude is low, while duration is long-term and it has a high probability. The spatial extent will be local. Prior to mitigation, dust generation is rated an impact of “low” significance.

12.4.2 Avifaunal

12.4.2.1 Mortality due to collisions with the PV panels (impact trauma)

This impact refers to collision-related fatality i.e., fatality resulting from the direct contact of the bird with a project structure(s). Sheet glass or the so-called “lake effect” is a hazard for birds. When the sky is reflected in the sheet glass, birds fail to see the building as an obstacle and attempt to fly through the glass, mistaking it for empty space. In addition, the so-called “lake effect” where large sheets of dark blue PV panels may attract birds in flight, mistake the broad reflective surfaces for water (Kagan et al. 2014). However, due to limited data it would

be premature to make any general conclusions about the influence of the lake effect or other factors that contribute to fatality of water-dependent birds.

It is important to understand that bird abundance and flight activity levels differ according to habitat availability, and other natural features. Therefore, the impact on birds through direct fatality is very site specific. Given the number of variables, it is not possible to determine whether this impact will occur until operational monitoring reveals actual mortalities at the proposed solar PV and BESS site.

12.4.2.2 Mortality due to electrocutions on the 33kV power line infrastructure

Electrocution refers to the scenario where a bird that is perched on an electrical structure causes an electrical short circuit. Electrocution risk is strongly influenced by the power line voltage and design of the tower/pole structure and mainly affects larger, perching species that are capable of spanning the spaces between energised components. This is particularly likely when more than one bird attempts to sit on the same pole, a behaviour that is typical of sociable species when perching or roosting. Relevant to this development, eagles, vultures, ibis and herons may be susceptible to this impact.

12.4.2.3 Mortality due to collisions with the 33kV power line conductors

Collisions are the biggest single threat posed by power lines to birds in southern Africa (van Rooyen 2004). Most heavily impacted upon are bustards, storks, cranes and various species of waterbirds. These species are mostly heavy-bodied birds with limited manoeuvrability, which makes it difficult for them to take the necessary evasive action to avoid colliding with power lines (van Rooyen 2004, Anderson 2001). Unfortunately, many of the collision sensitive species are considered threatened in southern Africa.

A potential impact of the proposed 33kV power line is collisions with the overhead conductors. Quantifying this impact in terms of the likely number of birds that will be impacted, is very difficult because a number of variables play a role in determining the risk. Relevant to this proposed Project, collisions are likely to be linked to specific habitat types and/or specific sets of circumstances potentially involving Karoo Korhaan, Northern Black Korhaan, ibis and heron species that utilise the Study Area.

12.4.2.4 Mortality due to collision with the telecommunication tower

Collisions with man-made structures are a significant and well-documented cause of avian mortality (Erickson et al, 2001). The single biggest attractant seems to be the lighting on the towers, with taller, better lit towers responsible for more fatalities.

Relevant to this assessment, the proposed telecommunication tower is likely to be constructed substantially different from those in the USA (where there have been mass nocturnal mortality events of migrant birds). The telecommunication tower is likely to be shorter in length, with minimal lighting and perhaps more importantly, the tower infrastructure does not contain guy wires, thereby significantly reducing the potential collision impact with the tower.

12.4.2.5 Nesting

Various bird species are quick to seize a new opportunity for perching, roosting or nesting, including on man-made structures (van Rooyen & Ledger 1999, de Goede 2011 and de Goede & Jenkins 2001). Relevant to the proposed Project, passerine and corvid species are likely to use certain parts of the proposed facility and the tower once commissioned. Whilst nesting could be viewed as a positive impact for birds, it can result in operational problems for the facility and the tower infrastructure. An increase in the number of birds roosting, nesting and feeding at the facility could lead to increased defecation on the solar infrastructure causing panel obstruction requiring management actions such as nest management in order to ensure that the nests does not interfere with operations or increase fire risk.

12.4.3 Socio-economic

12.4.3.1 Increase in Pressure on Basic Services

During the operational phase, the proposed Project is likely to increase the pressure on basic services. This includes potable water, sewerage treatment and disposal, and solid waste disposal. The impact of an increase in the pressure on basic services is likely to be moderate.

12.4.3.2 Dangerous substances release

During the operational phase, the proposed Project is likely to increase the risk of overheating or flammable substance and/or gases being released from the battery technology. The impact of an increase in health and safety fire risk to the community is likely to be moderate.

12.4.4 Indigenous People

12.4.4.1 Perceived Increase in Local Jobs and Business Opportunities

There is likely to be the perception that the proposed Project will create a significant number of jobs for local people and opportunities for local businesses. However, the proposed Project will only create a limited number of local jobs (e.g., security guards, cleaners, and so on). This is largely because the sites will be unmanned. Similarly, only a limited number of opportunities will be created for local businesses (e.g., maintenance supplies, accommodation, security, cleaning, and catering services). There is a risk that Eskom's SLO may be negatively affected if the local community's expectations, with respect to local jobs and business opportunities, are not being met. The impact/risk of a perceived increase in local jobs and business opportunities is likely to be moderate.

12.5 Closure Phase

12.5.1 Terrestrial Biodiversity

12.5.1.1 Establishment and Spread of Alien Invasive Species

The potential establishment of alien invasive species in, and immediately adjacent to, the Study Area will continue to be an impact of concern during the decommissioning and closure phase. Before mitigation, the establishment and spread of alien invasive species is rated an impact of "moderate" significance.

12.5.1.2 Dust Generation

The decommissioning and removal of Project infrastructure during the closure phase may result in dust generation. This may persist until the site revegetates naturally. Before mitigation, dust generation is rated an impact of "moderate" significance.

12.5.2 Avifaunal

While the decommissioning of the Project in the areas will undoubtedly displace some species, the bird species likely to occupy this area, and the fact that similar habitat is available within the broader area, displacement as a result of disturbance is unlikely to be permanent and of national significance. Similarly, the displacement as a result of the disturbance caused by the decommissioning of the telecommunication tower will also be permanent or of national significance.

12.5.3 Visual

For the purposes of this assessment, the potential impacts of the decommissioning phase were considered to be as follows:

- Reinstatement of visual resource value due to the dismantling of all proposed Project infrastructure and the subsequent rehabilitation of footprint areas; and
- Visible dust plumes during rehabilitation.

12.5.3.1 Dismantling of all proposed solar PV blocks, BESS and associated infrastructure and subsequent rehabilitation of footprint areas

The dismantling of all infrastructure at the BV Block and BESS site, coupled with the rehabilitation of disturbed footprints during the decommissioning and closure phase will have a positive impact on the visual resource of this Study Area.

12.5.3.2 Dismantling of all proposed telecommunications tower and associated infrastructure and subsequent rehabilitation of footprint areas

The dismantling of all infrastructure at the telecommunications tower site, coupled with the rehabilitation of disturbed footprint during the decommissioning and closure phase will have a positive impact on the visual resource of this Study Area.

12.5.3.3 Visible dust plumes during rehabilitation

Before mitigation, dust generation is rated a negative impact of “moderate” significance.

12.5.4 Socio-economic

The following section presents a description of the nature of the potential impacts/risks associated with the decommissioning and closure of the proposed Project.

12.5.4.1 Dust Impacts

The dismantling and demolition of the solar PV blocks, BESS, and associated infrastructure will generate dust. This will negatively affect not only demolition workers, but also people living and working nearby the preferred site alternative. Exposure to low levels of dust over a short period of time can be a nuisance, whereas as the exposure to high levels of dust over a prolonged period of time can lead to health impacts, such as asthma. The impact of dust on people living and working nearby the site, and people passing through the area, is likely to be moderate.

12.5.5 Indigenous People

12.5.5.1 Increase in Road Traffic Deaths or Serious Injuries

There will be an increase in road traffic moving along the R31 through Rietfontein, Klein Mier, Groot Mier and Askham during decommissioning of the Project sites. This includes motor vehicles transporting demolition workers and heavy-duty vehicles transporting demolition waste offsite. With an increase in road traffic, and in particular heavy-duty vehicles, there is the increased risk of road traffic deaths or serious injuries. The risk of an increase in road traffic deaths or serious injuries is likely to be moderate.

12.5.5.2 Noise Impacts

Demolition vehicles, equipment, and workers will generate noise. This will negatively affect people living and working near the preferred site alternative, as well as people (e.g., tourists) passing through the area.

The impact of noise on people living and working nearby the site, and people passing through the area, is likely to be moderate.

Table 15: Summary of the potential impacts/risks

Aspect	Potential Impact	Impact Assessment Factors		Probability	Significance without mitigation	Impact Assessment Factors		Probability	Significance with mitigation
Construction phase									
Terrestrial ecology	Study Area: Habitat loss and modification	*Direction:*	Negative	Definite/ Unknown	High	*Direction:*	Negative	Definite/ Unknown	Moderate
		Magnitude:	High			*Magnitude:*	Moderate		
		Duration:	Permanent			*Duration:*	Long Term		
		Scale:	Local			*Scale:*	Site		
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Terrestrial ecology	Telecommunications tower site: Habitat loss and modification	*Direction:*	Negative	Definite/ Unknown	Low	*Direction:*	Negative	Definite/ Unknown	Low
		Magnitude:	Low			*Magnitude:*	Minor		
		Duration:	Permanent			*Duration:*	Long Term		
		Scale:	Local			*Scale:*	Site		
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Terrestrial ecology	Establishment and spread of alien invasive species	*Direction:*	Negative	High	Moderate	*Direction:*	Negative	Low	Low
		Magnitude:	High			*Magnitude:*	Low		
		Duration:	Long Term			*Duration:*	Long Term		
		Scale:	Local			*Scale:*	Site		
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Terrestrial ecology	Mortality and disturbance of fauna	*Direction:*	Negative	High	Moderate	*Direction:*	Negative	Low	Low
		Magnitude:	High			*Magnitude:*	Low		
		Duration:	Immediate			*Duration:*	Immediate		
		Scale:	Local			*Scale:*	Local		
		Reversibility:	Irreversible			*Reversibility:*	Reversible		

Aspect	Potential Impact	Impact Assessment Factors		Probability	Significance without mitigation	Impact Assessment Factors		Probability	Significance with mitigation
Terrestrial ecology	Loss and disturbance of individual bats	*Direction:*	Negative	Low	Low	*Direction:*	Negative	Improbable	Low
		Magnitude:	Minor			*Magnitude:*	Minor		
		Duration:	Permanent			*Duration:*	Long Term		
		Scale:	Site			*Scale:*	Site		
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Terrestrial ecology	Reduction in extent of foraging habitats for bats	*Direction:*	Negative	Definite / Unknown	Moderate	*Direction:*	Negative	Medium	Low
		Magnitude:	Low			*Magnitude:*	Minor		
		Duration:	Long Term			*Duration:*	Long Term		
		Scale:	Site			*Scale:*	Site		
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Terrestrial ecology	Dust generation	*Direction:*	Negative	High	Moderate	*Direction:*	Negative	Low	Low
		Magnitude:	Low			*Magnitude:*	Low		
		Duration:	Long Term			*Duration:*	Immediate		
		Scale:	Local			*Scale:*	Local		
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Terrestrial ecology	Loss of flora of conservation concern	*Direction:*	Negative	High	Moderate	*Direction:*	Negative	Improbable	Low
		Magnitude:	Moderate			*Magnitude:*	Minor		
		Duration:	Immediate			*Duration:*	Immediate		
		Scale:	Site			*Scale:*	Site		
		Reversibility:	Irreversible			*Reversibility:*	Irreversible		
Avifaunal	Solar PV and BESS site:	*Direction:*	Negative	High	Moderate	*Direction:*	Negative	Medium	Moderate
		Magnitude:	High			*Magnitude:*	Moderate		

Aspect	Potential Impact	Impact Assessment Factors		Probability	Significance without mitigation	Impact Assessment Factors		Probability	Significance with mitigation
	Displacement of Red List species as a result of habitat loss & transformation	*Duration:*	Long term			*Duration:*	Long term		
		Scale:	Local			*Scale:*	Local		
		Reversibility:	Irreversible			*Reversibility:*	Irreversible		
Avifaunal	Telecommunications tower site: Displacement of Red List species as a result of habitat loss & transformation	*Direction:*	Negative	Medium	Low	*Direction:*	Negative	Medium	Low
		Magnitude:	Low			*Magnitude:*	Minor		
		Duration:	Long term			*Duration:*	Long term		
		Scale:	Site			*Scale:*	Site		
		Reversibility:	Irreversible			*Reversibility:*	Irreversible		
Avifaunal	Solar PV and BESS site: Displacement of Red List species as a result of disturbance	*Direction:*	Negative	High	Moderate	*Direction:*	Negative	Medium	Low
		Magnitude:	High			*Magnitude:*	Moderate		
		Duration:	Short term			*Duration:*	Short term		
		Scale:	Local			*Scale:*	Local		
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Avifaunal	Telecommunications tower site: Displacement of Red List species as a result of disturbance	*Direction:*	Negative	Medium	Low	*Direction:*	Negative	Medium	Low
		Magnitude:	Low			*Magnitude:*	Minor		
		Duration:	Short term			*Duration:*	Short term		
		Scale:	Site			*Scale:*	Site		
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Socio-economic	Negative impact of dust from site clearance activities, earthworks, and materials handling.	*Direction:*	Negative	Definite	Moderate	*Direction:*	Negative	High	Moderate
		Magnitude:	Moderate			*Magnitude:*	Moderate		
		Duration:	Short-term			*Duration:*	Short-term		
		Scale:	Local			*Scale:*	Local		

Aspect	Potential Impact	Impact Assessment Factors		Probability	Significance without mitigation	Impact Assessment Factors		Probability	Significance with mitigation
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Socio-economic	Negative impact of noise from construction vehicles, equipment, and workers.	*Direction:*	Negative	High	Moderate	*Direction:*	Negative	Medium	Low
		Magnitude:	Moderate			*Magnitude:*	Moderate		
		Duration:	Short-term			*Duration:*	Short-term		
		Scale:	Local			*Scale:*	Local		
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Socio-economic	With an increase in road traffic, and in particular heavy-duty vehicles, there is likely to be an increase in road congestion along the R31.	*Direction:*	Negative	Medium	Moderate	*Direction:*	Negative	Low	Low
		Magnitude:	Moderate			*Magnitude:*	Moderate		
		Duration:	Short-term			*Duration:*	Short-term		
		Scale:	Regional			*Scale:*	Regional		
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Socio-economic	Impact of an increase in pressure on basic services (i.e., potable water, sewerage treatment & disposal, and solid waste disposal).	*Direction:*	Negative	High	Moderate	*Direction:*	Negative	Medium	Moderate
		Magnitude:	High			*Magnitude:*	High		
		Duration:	Short-term			*Duration:*	Short-term		
		Scale:	Local			*Scale:*	Local		
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Socio-economic: Indigenous People	During the construction phase, the entire site footprint of 10 ha solar PV and BESS, and 15mx15m tower sites will be cleared of vegetation.	*Direction:*	Negative	Definite/ unknown	Moderate	*Direction:*	Negative	Definite/ unknown	Moderate
		Magnitude:	Moderate			*Magnitude:*	Moderate		
		Duration:	Permanent			*Duration:*	Long term		
		Scale:	Site only			*Scale:*	Site only		
		Reversibility:	Reversible			*Reversibility:*	Reversible		

Aspect	Potential Impact	Impact Factors	Assessment	Probability	Significance without mitigation	Impact Factors	Assessment	Probability	Significance with mitigation
Socio-economic: Indigenous People	With an increase in road traffic, an in particular heavy-duty vehicles, there is the increased risk of road traffic death or serious injury.	*Direction:*	Negative	Medium	Moderate	*Direction:*	Negative	Low	Low
		Magnitude:	High			*Magnitude:*	High		
		Duration:	Short term			*Duration:*	Short term		
		Scale:	Regional			*Scale:*	Regional		
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Socio-economic: Indigenous People	With an increase in the number of people living and working in the region, there is the risk of an increase in the spread of communicable diseases.	*Direction:*	Negative	Medium	Moderate	*Direction:*	Negative	Low	Low
		Magnitude:	High			*Magnitude:*	High		
		Duration:	Short term			*Duration:*	Short term		
		Scale:	Regional			*Scale:*	Regional		
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Socio-economic: Indigenous People	With an increase in the number of people living and working in the region, there is the risk of an increase in anti-social behaviours	*Direction:*	Negative	Medium	Moderate	*Direction:*	Negative	Low	Low
		Magnitude:	High			*Magnitude:*	High		
		Duration:	Short term			*Duration:*	Short term		
		Scale:	Regional			*Scale:*	Regional		
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Socio-economic: Indigenous People	Risk that Eskom's SLO may be negatively affected if the local community's expectations, with respect to local jobs and business	*Direction:*	Negative	Medium	Moderate	*Direction:*	Negative	Low	Low
		Magnitude:	High			*Magnitude:*	High		
		Duration:	Short term			*Duration:*	Short term		
		Scale:	Regional			*Scale:*	Regional		
		Reversibility:	Reversible			*Reversibility:*	Reversible		

Aspect	Potential Impact	Impact Assessment Factors		Probability	Significance without mitigation	Impact Assessment Factors		Probability	Significance with mitigation
	opportunities, are not being met.								
Socio-economic: Indigenous People	Risk that Eskom's SLO may be negatively affected if the local community's expectations, with respect to education, skills training, and skills development opportunities, are not being met.	*Direction:*	Negative	Medium	Moderate	*Direction:*	Negative	Low	Low
		Magnitude:	High			*Magnitude:*	High		
		Duration:	Short term			*Duration:*	Short term		
		Scale:	Regional			*Scale:*	Regional		
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Socio-economic: Indigenous People	With an increase in the number of people living and working in the region from other areas, there is the risk that the cultural integrity of indigenous people may be compromised.	*Direction:*	Negative	Medium	Moderate	*Direction:*	Negative	Low	Low
		Magnitude:	High			*Magnitude:*	High		
		Duration:	Short term			*Duration:*	Short term		
		Scale:	Regional			*Scale:*	Regional		
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Archaeological heritage resource	Disturbance, damage or destruction of archaeological remains.	*Direction:*	Negative	High / definite	Medium	*Direction:*	Negative	High	Low
		Magnitude:	Moderate			*Magnitude:*	Minor		
		Duration:	Permanent			*Duration:*	Permanent		
		Scale:	Site only			*Scale:*	Site only		
		Reversibility:	Irreversible			*Reversibility:*	Irreversible		
	Disturbance, damage or destruction of	*Direction:*	Negative	Improbable	Low	*Direction:*	Negative	Improbable	Low
		Magnitude:	Minor			*Magnitude:*	Minor		

Aspect	Potential Impact	Impact Assessment Factors		Probability	Significance without mitigation	Impact Assessment Factors		Probability	Significance with mitigation
Palaeontological heritage resource	legally-protected fossil heritage within the development footprint.	*Duration:*	Permanent			*Duration:*	Permanent		
		Scale:	Site only			*Scale:*	Site only		
		Reversibility:	Irreversible			*Reversibility:*	Irreversible		
Construction & Operational phase									
Visual Resource	Dust generation during vegetation clearance and construction activities	*Direction:*	Negative	High	Moderate	*Direction:*	Negative	Low	Low
		Magnitude:	Low			*Magnitude:*	Minor		
		Duration:	Medium Term			*Duration:*	Short Term		
		Scale:	Local			*Scale:*	Local		
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Visual Resource	Reduction in visual resource value due to presence of solar PV blocks, BESS and associated infrastructure	*Direction:*	Negative	Definite/ Unknown	Moderate	*Direction:*	Negative	High	Moderate
		Magnitude:	Low			*Magnitude:*	Low		
		Duration:	Long Term			*Duration:*	Long Term		
		Scale:	Local			*Scale:*	Local		
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Visual Resource	Reduction in visual resource value due to presence of telecommunications tower and associated infrastructure.	*Direction:*	Negative	Definite/ Unknown	Moderate	*Direction:*	Negative	High	Moderate
		Magnitude:	Moderate			*Magnitude:*	Moderate		
		Duration:	Long Term			*Duration:*	Long Term		
		Scale:	Local			*Scale:*	Local		
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Visual Resource	Light pollution at night	*Direction:*	Negative	High	Moderate	*Direction:*	Negative	Medium	Low
		Magnitude:	Low			*Magnitude:*	Minor		
		Duration:	Long Term			*Duration:*	Long Term		

Aspect	Potential Impact	Impact Assessment Factors		Probability	Significance without mitigation	Impact Assessment Factors		Probability	Significance with mitigation
		Scale:	Local			*Scale:*	Local		
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Operational phase									
Terrestrial ecology	Security lighting disturbing nocturnal fauna	*Direction:*	Negative	Medium	Low	*Direction:*	Negative	Low	Low
		Magnitude:	Low			*Magnitude:*	Low		
		Duration:	Long Term			*Duration:*	Long Term		
		Scale:	Local			*Scale:*	Local		
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Terrestrial ecology	Establishment and spread of alien invasive species	*Direction:*	Negative	High	Moderate	*Direction:*	Negative	Low	Low
		Magnitude:	High			*Magnitude:*	Low		
		Duration:	Long Term			*Duration:*	Long Term		
		Scale:	Local			*Scale:*	Site		
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Terrestrial ecology	Dust generation	*Direction:*	Negative	Low	Low	*Direction:*	Negative	Low	Low
		Magnitude:	Low			*Magnitude:*	Minor		
		Duration:	Long Term			*Duration:*	Short-term		
		Scale:	Local			*Scale:*	Local		
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Avifaunal	Mortality at PV facility (impact trauma on PV panels)	*Direction:*	Negative	Medium	Moderate	*Direction:*	Negative	Medium	Low
		Magnitude:	Moderate			*Magnitude:*	Low		
		Duration:	Long term			*Duration:*	Long term		
		Scale:	Regional			*Scale:*	Local		

Aspect	Potential Impact	Impact Assessment Factors		Probability	Significance without mitigation	Impact Assessment Factors		Probability	Significance with mitigation
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Avifaunal	Mortality as a result of electrocution on the 33kV power line infrastructure	*Direction:*	Negative	High	Moderate	*Direction:*	Negative	Low	Low
		Magnitude:	High			*Magnitude:*	Moderate		
		Duration:	Long term			*Duration:*	Long term		
		Scale:	Local			*Scale:*	Local		
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Avifaunal	Mortality due to collision with the 33kV power line infrastructure	*Direction:*	Negative	High	Moderate	*Direction:*	Negative	Low	Low
		Magnitude:	High			*Magnitude:*	Moderate		
		Duration:	Long term			*Duration:*	Long term		
		Scale:	Local			*Scale:*	Local		
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Avifaunal	Mortality due to collision with the telecommunication tower	*Direction:*	Negative	Low	Low	*Direction:*	Negative	Improbable	Low
		Magnitude:	Low			*Magnitude:*	Minor		
		Duration:	Long term			*Duration:*	Long term		
		Scale:	Local			*Scale:*	Local		
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Avifaunal	Nesting on the PV panels and ancillary infrastructure	*Direction:*	Positive	Medium	Positive	*Direction:*	Positive	Medium	Positive
		Magnitude:	Moderate			*Magnitude:*	Low		
		Duration:	Long term			*Duration:*	Long term		
		Scale:	Local			*Scale:*	Local		
		Reversibility:	N/A			*Reversibility:*	N/A		
Socio-economic		*Direction:*	Negative	Medium	Moderate	*Direction:*	Negative	Medium	Low

Aspect	Potential Impact	Impact Factors	Assessment	Probability	Significance without mitigation	Impact Factors	Assessment	Probability	Significance with mitigation
	Impact of an increase in pressure on basic services (i.e., potable water, sewerage treatment & disposal, and solid waste disposal).	*Magnitude:*	Moderate			*Magnitude:*	Moderate		
		Duration:	Long-term			*Duration:*	Long-term		
		Scale:	Local			*Scale:*	Local		
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Socio-economic	Impact of an increase of the risk of overheating or flammable substance and/or gases being released from the BESS.	*Direction:*	Negative	Medium	Moderate	*Direction:*	Negative	Medium	Low
		Magnitude:	Moderate			*Magnitude:*	Moderate		
		Duration:	Long-term			*Duration:*	Long-term		
		Scale:	Local			*Scale:*	Local		
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Socio-economic: Indigenous People	Risk that Eskom's SLO may be negatively affected if the local community's expectations, with respect to local jobs and business opportunities, are not being met.	*Direction:*	Negative	Medium	Moderate	*Direction:*	Negative	Low	Low
		Magnitude:	High			*Magnitude:*	High		
		Duration:	Long term			*Duration:*	Long term		
		Scale:	Regional			*Scale:*	Regional		
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Closure phases									
Terrestrial ecology	Establishment and spread of alien invasive species	*Direction:*	Negative	High	Moderate	*Direction:*	Negative	Low	Low
		Magnitude:	High			*Magnitude:*	Low		
		Duration:	Long Term			*Duration:*	Short Term		
		Scale:	Local			*Scale:*	Site Only		
		Reversibility:	Reversible			*Reversibility:*	Reversible		

Aspect	Potential Impact	Impact Assessment Factors		Probability	Significance without mitigation	Impact Assessment Factors		Probability	Significance with mitigation
Terrestrial ecology	Dust generation	*Direction:*	Negative	Medium	Moderate	*Direction:*	Negative	Low	Low
		Magnitude:	Moderate			*Magnitude:*	Low		
		Duration:	Long Term			*Duration:*	Short-term		
		Scale:	Local			*Scale:*	Local		
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Visual resource	Dismantling of all proposed solar PV blocks, BESS and associated infrastructure and subsequent rehabilitation of footprint areas	*Direction:*	Positive	Definite/ Unknown	Positive	*Direction:*	n/a	n/a	Positive
		Magnitude:	Minor			*Magnitude:*	n/a		
		Duration:	Short Term			*Duration:*	n/a		
		Scale:	Local			*Scale:*	n/a		
		Reversibility:	Reversible			*Reversibility:*	n/a		
Visual resource	Dismantling of all proposed telecommunications tower and associated infrastructure and subsequent rehabilitation of footprint areas	*Direction:*	Positive	Definite/ Unknown	Positive	*Direction:*	n/a	n/a	Positive
		Magnitude:	Minor			*Magnitude:*	n/a		
		Duration:	Short Term			*Duration:*	n/a		
		Scale:	Local			*Scale:*	n/a		
		Reversibility:	Reversible			*Reversibility:*	n/a		
Visual Resource	Visible dust plumes during rehabilitation	*Direction:*	Negative	High	Moderate	*Direction:*	Negative	Low	Low
		Magnitude:	Low			*Magnitude:*	Minor		
		Duration:	Long Term			*Duration:*	Short Term		
		Scale:	Local			*Scale:*	Local		
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Avifaunal		*Direction:*	Negative	High	Moderate	*Direction:*	Negative	Medium	Low

Aspect	Potential Impact	Impact Assessment Factors		Probability	Significance without mitigation	Impact Assessment Factors		Probability	Significance with mitigation
	Solar PV and BESS site:	*Magnitude:*	High			*Magnitude:*	Moderate		
		Duration:	Short term			*Duration:*	Short term		
		Scale:	Local			*Scale:*	Local		
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Avifaunal	Telecommunications tower site:	*Direction:*	Negative	Medium	Low	*Direction:*	Negative	Medium	Low
		Magnitude:	Low			*Magnitude:*	Minor		
		Duration:	Short term			*Duration:*	Short term		
		Scale:	Site			*Scale:*	Site		
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Socio-economic	Negative impact of dust on construction workers and people living and working nearby the Project site	*Direction:*	Negative	High	Moderate	*Direction:*	Negative	Medium	Moderate
		Magnitude:	Moderate			*Magnitude:*	Moderate		
		Duration:	Short-term			*Duration:*	Short-term		
		Scale:	Local			*Scale:*	Local		
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Socio-economic	Negative impact of noise on people living and working nearby the Project site.	*Direction:*	Negative	High	Moderate	*Direction:*	Negative	Medium	Low
		Magnitude:	Moderate			*Magnitude:*	Moderate		
		Duration:	Short-term			*Duration:*	Short-term		
		Scale:	Local			*Scale:*	Local		
		Reversibility:	Reversible			*Reversibility:*	Reversible		
Socio-economic:	With an increase in road traffic, an in	*Direction:*	Negative	Medium	Moderate	*Direction:*	Negative	Low	Low
		Magnitude:	High			*Magnitude:*	High		

Aspect	Potential Impact	Impact Assessment Factors		Probability	Significance without mitigation	Impact Assessment Factors		Probability	Significance with mitigation
Indigenous People	particular heavy-duty vehicles, there is the increased risk of road traffic death or serious injury.	*Duration:*	Immediate			*Duration:*	Immediate		
		Scale:	Regional			*Scale:*	Regional		
		Reversibility:	Reversible			*Reversibility:*	Reversible		

12.6 Cumulative Impacts

There are no renewable energy projects within a radius of 30 km of the proposed Project near Rietfontein. The following cumulative impacts are to be noted:

- Palaeontological impact significances inferred for renewable energy projects, where these are assessed at all, may well to some extent reflect different assessment approaches rather than contrasting palaeontological sensitivities and impact levels;
- Meaningful cumulative impact assessments require comprehensive data on *all* major developments within a region, not just those involving renewable energy, as well as an understanding of the extent to which recommended mitigation measures are followed through; and
- Trying to assess cumulative impacts on different fossil assemblages from different stratigraphic units (for example, Precambrian stromatolites from 2.6 billion years ago *versus* Late Caenozoic alluvial and calcrete sediments less than 2.5 million years old) has limited value.

13.0 ENVIRONMENTAL MANAGEMENT PROGRAMME - IMPACT MANAGEMENT MEASURES

The following section presents the proposed impact management measures to avoid, reverse, mitigate and/or manage the potential impacts/risks which were assessed Section 12.0.

As with the assessment of potential impacts/risks, the impact management actions have been arranged according to the following project phases:

- Pre-construction
- Construction
- Operational
- Closure
- Post-closure

For each impact management action, the following information is provided:

- **Category:** The category within which the potential impact/risk occurs
- **Potential impact/risk:** Identified potential impact/risk resulting from the pre-construction, construction, operation, and closure of the proposed Project
- **Description:** Description of the possible impact management action
- **Prescribed standards or practices:** Prescribed environmental standards or practices with which the impact management action must comply. Note that only key standards or practices have been listed
- **Mitigation type:** The type of mitigation measure. This includes the following:
  - Avoidance
  - Minimisation
  - Rehabilitation or restoration
  - Offsetting

- **Time period:** The time period when the impact management actions must be implemented
- **Responsible persons:** The persons who will be responsible for the implementation of the impact management actions.

Table 16 presents a summary of the proposed impact mitigation actions during the pre-construction, construction, operational, closure (including decommissioning), and post-closure phases.

Table 16: Summary of proposed EMP impact mitigation measures

Section No.	Category	Potential impact/risk	Mitigation Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
Pre-construction phase							
	Terrestrial Flora Communities	Habitat loss and modification	At the PV Blocks and BESS site, all proposed Project infrastructure should be positioned outside a 10 m buffer around the ephemeral vegetation community; and The layout of the telecommunications tower site should be positioned to avoid clearing any large, protected trees (e.g., Vachellia erioloba).	N/A	Avoidance	Prior to construction phase	Project manager
	Basic services	Increase in pressure on sewerage treatment and disposal infrastructure.	If technical feasible, sewerage must be treated onsite via septic tank and soakaway system.	-	Mitigation	Prior to start of construction	Project Manager
Construction phase							
	Terrestrial Flora Communities	Habitat loss and modification	Vegetation clearing for the Project, including the contractor site office and laydown area, should be restricted to the proposed Project footprints only, with no clearing permitted outside of these areas. The footprints to be cleared should be clearly demarcated prior to construction to prevent unnecessary clearing outside of these areas. No heavy vehicles should travel beyond the marked works zone.	N/A	Minimisation	During construction phase	Project manager

Section No.	Category	Potential impact/risk	Mitigation Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
			Preferably, clearance in advance of construction should be done during the drier seasons; and Removed topsoil should be stockpiled and used to rehabilitate all non-operational disturbed areas. Native species planting (where possible with regard to safety and not hindering firebreak outs near solar panels) should be used to aid in the reduction of soil erosion and additional loss of vegetation beyond the footprint of cleared areas; and enhance landscape connectivity around the cleared solar farm footprint.				
	Terrestrial Flora Communities	Establish and spread of alien invasive species	An alien invasive species control programme must be developed for the Project. It is recommended that the programme include: A combined approach using both chemical and mechanical control methods; Periodic follow-up treatments, informed by regular monitoring; and A focus on all areas immediately adjacent to the Project footprints, and in particular, areas of Ephemeral Vegetation adjacent to the Study Area.	N/A	Minimisation	During construction phase	Project manager
	Terrestrial Fauna Communities	Mortality and disturbance of fauna	An ECO should be on-site during vegetation clearing to monitor and manage any wildlife-human	N/A	Avoidance / Minimisation	During construction phase	ECO

Section No.	Category	Potential impact/risk	Mitigation Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
			interactions. The ECO should be trained in inter alia, snake handling, species identification and identifying potential bat roosting sites; A low-speed limit (recommended 20-40 km/h) should be enforced on site to reduce wildlife collisions; The handling, poisoning and killing of on-site fauna by contractors must be strictly prohibited.				
	Bats	Loss/disturbance of bat individuals	Preferably, conduct vegetation clearance during dry season (April to September).	N/A	Minimisation	During construction phase	Project manager
	Bats	Reduction in extent of foraging habitat for bats	See mitigation measures for Habitat loss and modification	N/A	Minimisation	During construction phase	Project manager
	Terrestrial Flora and Fauna Communities	Dust generation	Active dust suppression using suitable dust suppressant should be implemented during construction, if dust levels become problematic.	N/A	Minimisation	During construction phase	Project manager
	Terrestrial Flora Species	Loss of flora of conservation concern	Surveys of each development footprint should be conducted to identify and record the number of protected flora species that require clearing; Clearing and/or relocation permits should be obtained from the provincial authority to clear or remove provincially protected flora species occurring on-site; and	N/A	Avoidance / Minimisation	Prior to construction phase	Project manager

Section No.	Category	Potential impact/risk	Mitigation Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
			If possible, rescued plants (e.g., small succulents/geophytes) should be relocated to an adjacent area of natural habitat.				
	Avifaunal	Displacement as a result of habitat loss	No development within the areas delineated as HIGH sensitivity. Construction activity should be restricted to the immediate footprint of the infrastructure. All construction activities should be strictly managed according to generally accepted environmental best practice standards, so as to avoid any unnecessary impact on the receiving environment. All temporary disturbed areas should be rehabilitated according to the site's rehabilitation plan, following construction. A carefully considered operational surface water/drainage management plan for the site must be developed. The operational surface water management plan must stipulate the use of environmentally friendly and acceptable cleaning products.	Best practice for avifaunal fieldwork	Minimisation	Commencement the completion of construction. Water management strategies developed prior to commissioning and implemented during the operational life.	Construction Manager, ECO & Avifaunal Specialist.
	Avifaunal	Displacement as a result of disturbance	Conduct a pre-construction inspection (avifaunal walk-through) of the final solar PV and BESS layout, road and power line routes and telecommunication tower site to identify	Best practice for avifaunal fieldwork	Minimisation	Commencement to the completion of construction.	Construction Manager, ECO & Avifaunal Specialist.

Section No.	Category	Potential impact/risk	Mitigation Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
			Red List species that may be breeding within footprint of the Solar PV, BESS Project and telecommunication tower sites and the road and power line servitudes to ensure that the impacts to breeding species (if any) are adequately managed. Access to the remainder of the site should be strictly controlled to prevent unnecessary disturbance of priority species. Measures to control noise should be applied according to current best practice in the industry.				
	Dust	Negative impact of dust from site clearance activities, earthworks, and materials handling.	Where possible, limit construction activities to the wetter months when soil moisture content and vegetation cover is the greatest. Where possible, clear the site as the work front progresses, thereby limiting the exposed areas. Where possible, shelter (e.g., using shade clothe fencing) onsite sources of dust (e.g., soil stockpiles) to reduce wind speeds. Exposed surfaces and soil stockpiles must be dampened periodically to avoid excessive dust. Where possible, surfactants should be used to reduce water usage. Limit speed of construction vehicles to maximum 20 km/hr while onsite.	NEM: AQA (2004) National Dust Control Regulations (2013)	Avoidance Minimisation	Duration of construction phase	Site Foreman HSE Manager

Section No.	Category	Potential impact/risk	Mitigation Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
			Dust track-onto the R31 must be cleaned at the end of each day. A complaints register must be kept at the site office or security office. All complaints about dust must be recorded in writing in the complaints register. Complaints must be addressed as soon as possible.				
	Noise	Negative impact of noise from construction vehicles, equipment, and workers.	Construction activities must be limited to daytime hours (06h00 to 18h00). No construction activities are permitted on Sundays. People living nearby the construction site must be notified in advance of any particularly noisy activities, such as jackhammers and blasting. Construction vehicles and equipment that are excessively noisy due to poor maintenance are not permitted to be used onsite. A complaints register must be kept at the site office or security office. All complaints about noise must be recorded in writing in the complaints register. Complaints must be addressed as soon as possible.	SANS 10103	Mitigation	Duration of construction phase	HSE Manager
	Traffic	Increase in road congestion along the R31.	Access routes for construction vehicles to the preferred site alternative, and haulage routes within the site	Best practice	Minimisation	Prior to start of construction phase	Site Foreman

Section No.	Category	Potential impact/risk	Mitigation Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
			boundaries must be identified and agreed by all parties, including the ECO, at the outset of construction. Construction vehicles are not permitted to use residential roads. Construction vehicles travelling to site must adhere to the road's speed limit, while vehicles on site must adhere to the speed limit of 20km/hr.				
	Basic Services: Potable Water	Impact of an increase in pressure on potable water supply	Water tankered to site or borehole water is to be used for construction and dust suppression. Where possible, surfactants should be used for dust suppression to reduce water usage. Potable water is to be used for domestic purposes only.	Best practice	Minimisation	Prior to start of construction phase	Site Foreman
	Basic Services: Sanitation	Impact of an increase in pressure on sewage treatment facilities	Ablution facilities must be fitted with low flow fixtures. Sewerage must be transported by a licenced contractor to the Rietfontein Oxidation Ponds for treatment and disposal	Best practice	Minimisation	Prior to start of construction phase	Site Foreman
	Basic Services: Solid waste	Impact of an increase in pressure on waste disposal facilities.	The waste management hierarchy approach will be used, where practically and technically possible, when facilities are available in the Northern Cape. This may include separate bins for the separation of mainline recyclables (i.e., plastics,	Best practice	Minimisation	Duration of construction phase	HSE Manager

Section No.	Category	Potential impact/risk	Mitigation Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
			paper, glass, and cans/tins) from the general waste stream. Where possible, mainline recyclables will be transported to a licensed recycler for recycling. Residual general waste must be transported to the Rietfontein Landfill for disposal. Separate containers must be provided onsite for the separation of oils/greases from the hazardous waste stream. Oils/greases should be transported to a licensed facility, preferably a recycler. Residual hazardous waste must be transported to a licenced hazardous waste disposal facility for disposal.				
	Livelihoods	The entire site footprint of 10 ha solar PV and BESS, and 15mx15m tower sites will be cleared of vegetation.	To limit the development footprint as far as possible to reduce the loss of access to grazing land.	Best practice	Avoidance	Pre-construction	Engineering manager
	Health and safety	With an increase in road traffic, an in particular heavy-duty vehicles, there is the increased risk of road traffic death or serious injury.	All fleet vehicles (Eskom and contractors) must adhere to the speed limits which must be strictly enforced. Develop and implement a road safety awareness campaign targeting schools in Rietfontein, Klein Mier, Groot Mier and Askham. Erect warning signs on the R31 at	Best practice	Minimisation	During the construction phase	HSE manager

Section No.	Category	Potential impact/risk	Mitigation Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
			major pedestrian crossing points.				
	Health and safety	With an increase in the number of people living and working in the region, there is the risk of an increase in the spread of communicable diseases.	All Eskom employees and contractors must attend induction, which includes information on preventing the spread of communicable diseases. All Eskom employees and contractors must sign a code of conduct which strictly condemns behaviours that contribute to the spread of communicable diseases Develop and implement an awareness raising campaign targeting schools in Rietfontein, Loubos, Klein Mier, Groot Mier, Andriesvale, and Askham. Awareness campaign must include information on preventing the spread of communicable diseases	Best practice	Minimisation	At the start of the construction phase	HSE manager
	Health and safety	With an increase in the number of people living and working in the region, there is the risk of an increase in anti-social behaviours	All Eskom employees and contractors must attend induction. Induction must include information on anti-social behaviours. All Eskom employees and contractors must sign a code of conduct which strictly condemns anti-social behaviours. Develop and implement an awareness raising campaign targeting schools in Rietfontein, Loubos, Klein Mier, Groot Mier, Andriesvale, and Askham. Awareness campaign must provide information on anti-social behaviours.	Best practice	Minimisation	At the start of the construction phase	HSE manager

Section No.	Category	Potential impact/risk	Mitigation Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
			Develop and implement a mechanism to address the grievances of people from the Mier Community and ǂKhomani San with respect to anti-social behaviours.				
	Livelihoods	Risk that Eskom's SLO may be negatively affected if the local community's expectations, with respect to local jobs and business opportunities, are not being met.	Quarterly meetings with key representatives from the Mier community and ǂKhomani San. Identify jobs that can be undertaken by people from Rietfontein and nearby villages, based on the skills register obtained from the DKLM. Set targets for local jobs in consultation with key representatives from the Mier community and ǂKhomani San. Include local employment targets in tender documents. Identify goods and services that can be procured locally. Set targets for local procurement in consultation with key representatives from the Mier community and ǂKhomani San. Include local procurement targets in tender documents. Identify and implement CSI initiatives in consultation with key representatives from the Mier community and ǂKhomani San.	Best practice	Minimisation	At the start of the construction phase	HSE manager
	Livelihoods	Risk that Eskom's SLO may be negatively affected	Quarterly meetings with key representatives from the Mier community and ǂKhomani San.	Best practice	Minimisation	At the start of the construction phase	HSE manager

Section No.	Category	Potential impact/risk	Mitigation Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
		if the local community's expectations, with respect to education, skills training, and skills development opportunities, are not being met.	Identify education, skills training, and skills development opportunities in consultation with key representatives from the Mier community and ǂKhomani San. Include education, skills training, and skills development targets in tender documents. Identify and implement CSI initiatives in consultation with key representatives from the Mier community and ǂKhomani San.				
	Livelihoods	With an increase in the number of people living and working in the region from other areas, there is the risk that the cultural integrity of indigenous people may be compromised.	All Eskom employees and contractors must attend induction. Induction must include information on indigenous people's culture and behaviours All Eskom employees and contractors must sign a code of conduct which strictly upholds the culture of indigenous people. Develop and implement a mechanism to address the grievances of people from the Mier community and ǂKhomani San with respect to upholding the culture of indigenous people.	Best practice	Minimisation	At the start of the construction phase	HSE manager
	Archaeological heritage resource	Disturbance, damage or destruction of archaeological remains.	Sampling and collection of archaeological resources must be undertaken. A permit to collect archaeological remains must be requested from the SAHRA.	Best practice for archaeological fieldwork & SAHRA requirement	Minimisation	Ongoing during construction phase. Following alert from ECO	Archaeologist ECO &

Section No.	Category	Potential impact/risk	Mitigation Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
			In the event of human burials being uncovered during construction activities, work in the immediate area must be halted. The find will need to be reported to the SAHRA and will require inspection by a professional archaeologist. Burials must not be removed until inspected by the archaeologist.				Archaeologist Archaeologist
	Palaeontological heritage resource	Disturbance, damage or destruction of legally-protected fossil heritage within the development footprint.	Monitoring or all major site clearance and excavation work for fossil remains. Substantial well-preserved fossils (stromatolites, vertebrate bones, teeth etc.) to be safeguarded, preferably in situ, and immediately reported to SAHRA. Fossil recording and sampling.	Best practice for palaeontological fieldwork.	Minimisation	Ongoing during construction phase. Following alert from ECO	ECO
Construction & Operational phase							
	Visual Resource	Dust generation during vegetation clearance and construction activities	Water down construction roads and large bare areas as frequently as is required to minimise airborne dust; Place a sufficiently deep layer of crushed rock or gravel at vehicle and machinery parking areas; Apply chemical dust suppressants if deemed necessary.	N/A	Minimisation	During construction phase	Project manager
	Visual	Reduction in visual	Potential Architectural Measures	N/A	Minimisation	During	Project / Facility

Section No.	Category	Potential impact/risk	Mitigation Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
	Resource	resource value due to presence of solar PV blocks, BESS and associated infrastructure	To reduce the visual intrusion of built infrastructure, wherever possible: Material used for on-site infrastructure should not be white or shiny (e.g., bare galvanised steel that causes glare); Construct and/or paint infrastructure in colours that are complementary to the surrounding landscape, such as light grey, grey green, blue grey, dark buff, rust, ochre variations of tan; and Utilise construction materials that have matt textures where possible. <u>General Site Management</u> Maintain the construction site in a neat and orderly condition at all times; Create designated areas for material storage, waste sorting and temporary storage, batching and other potentially intrusive activities; Limit the physical extent of areas cleared for material laydown and vehicle parking as much as possible, and rehabilitate these area as soon as is feasible; Repair unsightly and ecologically detrimental erosion to steep or bare slopes as soon as possible, and re-vegetate these areas using a suitable mix of indigenous grass species; and Retain existing shrubs/trees wherever possible, as they already provide valuable screening.			construction and operational phases	manager

Section No.	Category	Potential impact/risk	Mitigation Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
	Visual Resource	Reduction in visual resource value due to presence of telecommunications tower and associated infrastructure.	See above recommendations for solar PV blocks, BESS and associated infrastructure.	N/A	Minimisation	During construction and operational phases	Project / Facility manager
	Visual Resource	Light pollution at night	Utilise security lighting (if feasible) that is movement activated rather than permanently switched on, to prevent unnecessary constant illumination; Plan the lighting requirements of the facilities to ensure that lighting meets the need to keep the site secure and safe, without resulting in excessive illumination; Reduce the height and angle of illumination from which floodlights are fixed as much possible while still maintaining the required levels of illumination; Identify zones of high and low lighting requirements, focusing on only illuminating areas to the minimum extent possible to allow safe operations at night and for security surveillance Avoid up-lighting of structures by rather directing lighting downwards and focussed on the area to be illuminated; and	N/A	Minimisation	During Operational phase	Project manager

Section No.	Category	Potential impact/risk	Mitigation Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
			Fit all security lighting with 'blinkers' or specifically designed fixtures, to ensure light is directed downwards while preventing side spill. Light fixtures of this description are commonly available for a variety of uses and should be used to the greatest extent possible.				
Operational phase							
	Bats and other nocturnal mammals	Security lighting disturbing bats and other nocturnal fauna activity	Site lighting options should be managed to minimise effects on flying bats and other nocturnal fauna. Options that should be considered and applied where feasible include: Use of security lighting that is movement-activated rather than permanently switched on; Directional shading to prevent excessive light spillage; and Use of light bulbs that are not as attractive to insects (e.g., LED bulbs).	N/A	Minimisation	During operational phase	Facility manager
	Terrestrial Flora Communities	Establish and spread of alien invasive species	Active alien invasive species control should continue throughout the operational phase. Control actions should be informed by the findings of monitoring.	N/A	Minimisation	During operational phase	Facility manager
	Terrestrial Flora and Fauna Communities	Dust generation	Active dust suppression using suitable dust suppressant should be implemented during the operational phase, if required.	N/A	Minimisation	During operational phase	Facility manager

Section No.	Category	Potential impact/risk	Mitigation Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
	Avifaunal	Collision Mortality (PV arrays)	An operational monitoring programme, that includes carcass searches to provide an indication of fatality rates as a result of collisions, and if there are any spatial, temporal or conditional patterns to the frequency of collisions. Most importantly, operational monitoring should highlight if mitigation (i.e. modifications to the panel design to reduce the illusionary characteristics of the panels) is required to reduce impacts to acceptable levels.	Best practice for avifaunal fieldwork	Minimisation	Post construction monitoring for ≥ two years of operation. Additional monitoring requirements determined following an assessment of data collected over two-years.	Environmental Manager & ECO
	Avifaunal	Mortality as a result of electrocutions on the 33kV power line infrastructure	The 33kV power line must be constructed using a bird friendly structure (i.e. Inverted Delta-T Structure - the same structure used for the existing Rietfontein feeder). Additional mitigation in the form of insulating sleeves on jumpers present on strain poles, terminal poles and box transformers should also be considered. Annual CNC maintenance monitoring to include power line surveys to evaluate electrocution mortality (if any) and assess the efficacy of mitigation measures.	Best practice for avifaunal fieldwork	Minimisation	Post construction monitoring for ≥ five years of operation. Additional monitoring requirements determined following an assessment of data collected over five-years.	Environmental Manager & ECO
	Avifaunal	Collision Mortality (33kV Power Line)	If collision impacts are recorded once the 33kV power line is operational It is recommended that the Eskom-	Best practice for avifaunal fieldwork	Minimisation	Post construction monitoring for ≥	Environmental Manager, ECO & Eskom-

Section No.	Category	Potential impact/risk	Mitigation Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
			Endangered Wildlife Trust Strategic Partnership investigate the mortalities and provide recommendations for site-specific mitigation to be applied reactively. Annual CNC maintenance monitoring to include power line surveys to evaluate collision mortality (if any) and assess the efficacy of mitigation measures.			five years of operation. Additional monitoring requirements determined following an assessment of data collected over five-years.	Endangered Wildlife Trust Strategic Partnership
	Avifaunal	Nest building on PV infrastructure	If on-going impacts are recorded once the solar PV and BESS site and telecommunication tower are operational, it is recommended that these impacts be assessed by the Eskom-Endangered Wildlife Trust Strategic Partnership and site-specific mitigation be applied reactively.	Best practice for avifaunal fieldwork	Minimisation	Nest management strategies identified and implemented reactively, if required.	Environmental Manager, ECO & Eskom-Endangered Wildlife Trust Strategic Partnership
	Basic services: Potable water	Impact of an increase in pressure on potable water supply.	Water tankered to site or borehole water is to be used for cleaning of PV modules. Potable water is only to be used for domestic purposes.	Best practice	Avoidance Minimisation	Duration of operational phase.	HSE Manager
	Basic services: Sanitation	Increase in pressure on sewerage treatment and disposal infrastructure	Ablution facilities must be fitted with low flow fixtures.	Best practice	Mitigation	Duration of operational phase.	HSE Manager

Section No.	Category	Potential impact/risk	Mitigation Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
	Basic Services: Sanitation	Impact of an increase in pressure on sewage treatment facilities	If no onsite sewerage treatment system is available, sewerage must be transported by a licenced contractor to the Rietfontein Oxidation Ponds for treatment and disposal.	Best practice	Mitigation	Duration of operational phase.	HSE Manager
	Basic services: Solid waste	Impact of an increase in pressure on solid waste disposal facilities	The waste management hierarchy approach will be used, where practically and technically possible, when facilities are available in the Northern Cape. This may include separate bins for the separation of mainline recyclables (i.e., plastics, paper, glass, and cans/tins) from the general waste stream. Where possible, mainline recyclables will be transported to a licensed recycler for recycling. Residual general waste must be transported to the Rietfontein Landfill for disposal.	Best practice	Minimisation	Duration of operational phase.	HSE Manager
	Basic services: Solid waste	Increase in pressure on waste disposal facilities	Hazardous waste must be transported to a licensed hazardous waste disposal facility for disposal	Best practice	Minimisation	Duration of operational phase.	HSE Manager
	Health and Safety	Increase of the risk of overheating or flammable substance and/or gases being released from the battery technology	Sophisticated battery management systems to monitor cell performance and limit operations to safe and acceptable performance ranges. Prevent the misuse of the substance.	Best practice	Minimisation	Duration of operational phase.	HSE Manager

Section No.	Category	Potential impact/risk	Mitigation Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
	Livelihoods	Risk that Eskom's SLO may be negatively affected if the local community's expectations, with respect to local jobs and business opportunities, are not being met.	Annual meetings with key representatives from the Mier community and ǂKhomani San. Identify jobs that can be undertaken by people from Rietfontein and nearby villages, based on the skills register obtained from the DKLM. Set targets for local jobs in consultation with key representatives from the Mier community and ǂKhomani San. Include local employment targets in operational requirements. Identify goods and services that can be procured locally. Set targets for local procurement in consultation with key representatives from the Mier community and ǂKhomani San. Include local procurement targets in operational requirements.	Best practice	Minimisation	Start and duration of operational phase.	Project Manager
Closure phase							
	Terrestrial Flora Communities	Establish and spread of alien invasive species	Active alien invasive species control should continue during the decommissioning phase and follow up control should be carried out for a five-year period following closure.	N/A	Minimisation	During closure and for a five-year period after closure	Facility manager
	Terrestrial Flora and	Dust generation	The site should be actively rehabilitated using indigenous and locally sourced grass species. Seeding	N/A	Minimisation / Rehabilitation	During closure phase	Facility manager

Section No.	Category	Potential impact/risk	Mitigation Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
	Fauna Communities		should be conducted prior to the first summer rains.				
	Terrestrial Fauna Communities	General habitat restoration	Restoration/rehabilitation of the Project footprint should include consideration of compatible measures for habitat enhancement for bat species. Such measures include planting of native species trees and shrubs; and demarcation of rehabilitated areas as conservation areas only.	N/A	Minimisation / Rehabilitation	During closure phase	Facility manager
	Avifaunal	Displacement as a result of disturbance	Where possible decommissioning to occur outside of the Karoo Korhaan breeding season (September - February) to ensure minimal disturbance to the pairs that are resident both on site and in the immediate surrounds. Access to the remainder of the site should be strictly controlled to prevent unnecessary disturbance of priority species. Measures to control noise should be applied according to current best practice in the industry.	Best practice for avifaunal fieldwork	Minimisation	Commencement until completion of the decommissionin g phase.	Environmental Manager, ECO & Avifaunal specialist
	Visual Resource	Dismantling of all proposed solar PV blocks, BESS and associated infrastructure and subsequent	Dismantle and remove all visible surface infrastructure during decommissioning; Re-shape all footprint areas to be as natural in appearance as possible;	N/A	Minimisation / Rehabilitation	During closure phase	Facility manager

Section No.	Category	Potential impact/risk	Mitigation Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
		rehabilitation of footprint areas	Actively revegetate using grasses to establish a vigorous and self-sustaining vegetation cover.				
	Visual Resource	Dismantling of all proposed telecommunications tower and associated infrastructure and subsequent rehabilitation of footprint areas	See above recommendations for solar PV blocks, BESS and associated infrastructure.	N/A	Minimisation / Rehabilitation	During closure phase	Facility manager
	Visual Resource	Visible dust plumes during rehabilitation	The site should be actively rehabilitated using indigenous and locally sourced grass species. Seeding should be conducted prior to the first summer rains.	N/A	Minimisation / Rehabilitation	During closure phase	Facility manager
	Dust	Negative impact of dust from demolition activities.	Where possible, limit demolition activities to the wetter months (January to April) when soil moisture content and vegetation cover is the greatest. Where possible, shelter (e.g., using shade clothe fencing) onsite sources of dust (e.g., soil stockpiles) to reduce wind speeds. Exposed surfaces and material stockpiles must be dampened periodically to avoid excessive dust. Where possible, surfactants should be used to reduce water usage.	NEM: AQA (2004) National Dust Control Regulations (2013)	Avoidance Minimisation	Duration of closure phase	Site Foreman

Section No.	Category	Potential impact/risk	Mitigation Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
			Limit speed of demolition vehicles to maximum 20 km/hr while onsite. Dust track-onto the R31 must be cleaned at the end of each day. A complaints register must be kept at the site office or security office. All complaints about dust must be recorded in writing in the complaints register. Complaints must be addressed as soon as possible.				HSE Manager
	Noise	Negative impact of noise from demolition vehicles, equipment, and workers.	Demolition activities must be limited to daytime hours (06h00 to 18h00). No demolition activities are permitted on Sundays. People living nearby the preferred site must be notified in advance of any particularly noisy activities, such as jackhammers and blasting. Demolition vehicles and equipment that are excessively noisy due to poor maintenance are not permitted to be used onsite. A complaints register must be kept at the site office or security office. All complaints about noise must be recorded in writing in the complaints register. Complaints must be addressed as soon as possible.	SANS 10103	Minimisation	Duration of closure phase	HSE Manager

Section No.	Category	Potential impact/risk	Mitigation Description	Prescribed standards or practices	Mitigation type	Time period	Responsible person
	Livelihoods	During the construction phase, the entire site footprint of 10 ha will be cleared of vegetation.	Post-closure rehabilitation of the preferred site to grazing land.	Best practice	Rehabilitation	During the closure phase.	HSE Manager
	Livelihoods	Risk that Eskom's SLO may be negatively affected if the local community's expectations, with respect to local jobs and business opportunities, are not being met.	All fleet vehicles (Eskom and contractors) must be fitted with telemetry and adherence to the speed limits strictly enforced. Develop and implement a road safety awareness campaign targeting schools in Rietfontein, Klein Mier, Groot Mier and Askham. Erect warning signs on the R31 at major pedestrian crossing points.	Best practice	Minimisation	During the closure phase	Project manager

14.0 ENVIRONMENTAL IMPACT STATEMENT

The following section presents a summary of the key findings of the BAR.

Table 17 presents a summary of the potential impacts/risks associated with the proposed Project in the pre-construction, construction, operational, closure, and post-closure phases.

Table 17: Summary of potential environmental impacts/risks

Aspect	Potential impact/risk	Significance without mitigation	Significance with mitigation
Construction			
Terrestrial ecology	Habitat loss and modification – Study Area	High	Moderate
Terrestrial ecology	Habitat loss and modification – Telecommunications tower area	Low	Low
Terrestrial ecology	Establishment and spread of alien invasive species	Moderate	Low
Terrestrial ecology	Mortality and disturbance of fauna	Moderate	Low
Terrestrial ecology	Loss and disturbance of individual bats	Low	Low
Terrestrial ecology	Reduction in extent of foraging habitats for bats	Moderate	Low
Terrestrial ecology	Dust generation	Moderate	Low
Terrestrial ecology	Loss of flora of conservation concern	Moderate	Low
Socio-economic	Negative impact of dust from site clearance activities, earthworks, and materials handling.	Moderate	Moderate
Socio-economic	Negative impact of noise from construction vehicles, equipment, and workers.	Moderate	Low
Socio-economic	Impact of an increase in pressure on basic services.	Moderate	Moderate
Socio-economic: Indigenous people	Loss of vegetation of livelihood.	Moderate	Moderate
Socio-economic: Indigenous people	Increased risk of road traffic death or serious injury.	Moderate	Low
Socio-economic: Indigenous people	Increase in the spread of communicable diseases with more people living and working in the region.	Moderate	Low
Socio-economic: Indigenous people	Increase in anti-social behaviours with more people living and working in the region.	Moderate	Low
Socio-economic: Indigenous people	Risk that Eskom's SLO may be negatively affected if the local community's expectations, with respect to local jobs and business opportunities, are not being met.	Moderate	Low

Aspect	Potential impact/risk	Significance without mitigation	Significance with mitigation
Socio-economic: Indigenous people	Risk that Eskom's SLO may be negatively affected if the local community's expectations, with respect to education, skills training, and skills development opportunities, are not being met.	Moderate	Low
Socio-economic: Indigenous people	Risk that the cultural integrity of indigenous people may be compromised due to more people living and working in the region.	Moderate	Low
Palaeontological heritage	Disturbance, damage or destruction of legally-protected fossil heritage within the development footprint.	Low	Low
Archaeological heritage resource	Disturbance, damage or destruction of archaeological remains.	Moderate	Low
Construction & Operation			
Visual resource	Dust generation during vegetation clearance and construction activities	Moderate	Low
Visual resource	Reduction in visual resource value due to presence of solar PV blocks, BESS and associated infrastructure	Moderate	Moderate
Visual Resource	Reduction in visual resource value due to presence of telecommunications tower and associated infrastructure.	Moderate	Moderate
Visual Resource	Light pollution at night	Moderate	Low
Operational			
Terrestrial ecology	Security lighting disturbing nocturnal fauna	Low	Low
Terrestrial ecology	Establishment and spread of alien invasive species	Moderate	Low
Terrestrial ecology	Dust generation	Low	Low
Socio-economic	Increase in pressure on basic services.	Moderate	Low
Socio-economic: Indigenous people	Risk that Eskom's SLO may be negatively affected if the local community's expectations, with respect to local jobs and business opportunities, are not being met.	Moderate	Low
Closure			
Terrestrial ecology	Establishment and spread of alien invasive species	Moderate	Low
Terrestrial ecology	Dust generation	Moderate	Low
Visual Resource	Dismantling of all proposed solar PV blocks, BESS and associated	Positive	Positive

Aspect	Potential impact/risk	Significance without mitigation	Significance with mitigation
	infrastructure and subsequent rehabilitation of footprint areas		
Visual Resource	Dismantling of all proposed telecommunications tower and associated infrastructure and subsequent rehabilitation of footprint areas	Positive	Positive
Visual Resource	Visible dust plumes during rehabilitation	Moderate	Low
Socio-economic	Negative impact of dust on demolition workers and people living and working nearby the Project site	Moderate	Moderate
Socio-economic	Negative impact of noise on people living and working nearby the Project site.	Moderate	Low
Socio-economic: Indigenous people	Increased risk of road traffic death or serious injury.	Moderate	Low

Figure 15 presents an overlay of the preferred Solar PV and BESS site on the sensitive environmental areas identified in preparation of this BAR. The areas to be avoided, including buffers, are also shown.

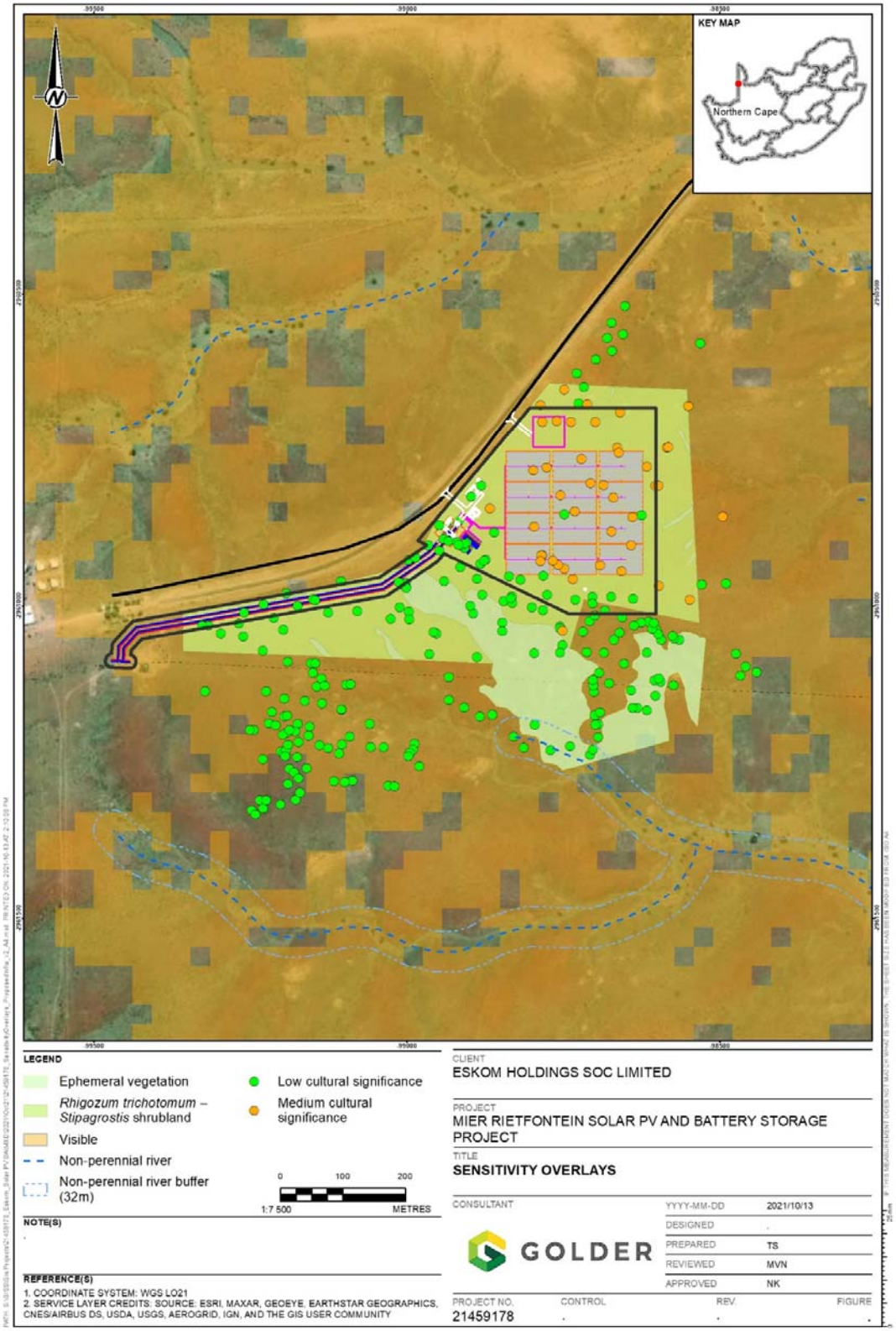


Figure 15: Preferred solar PV and BESS on the sensitive environmental and social areas

14.1 Conditions to be Included in the EA

In addition to the impact mitigation measures presented in Section 13.0, it is recommended that the following conditions be included in the EA:

- Terrestrial Biodiversity
  - A 10 m buffer should be demarcated around the sensitive ephemeral vegetation, with no project infrastructure demarcated around these areas, in order to protect the sensitive ephemeral vegetation from disturbance or degradation.
  - Significant residual impacts associated with the permanent loss of approximately 10 ha of natural habitat (Rhigozum trichotomum – Stipagrostis shrubland) need to be addressed through the implementation of additional conservation actions. These should include actively controlling alien invasive flora species (Prosopis species) around the farm dams that are located downstream of the study area, and implementing anti-erosion control measures (e.g., rock packs) at points susceptible to erosion.
- Avifaunal
  - During pre-construction inspection, and avifaunal walk-through of the proposed Project site layout, road and power line routes, and telecommunication tower site should be undertaken to identify Red List species that may be breeding within footprint of the sites road and power line servitudes to ensure that the impacts to breeding species (if any) are adequately managed.
  - Construction activities (i.e. all staff, vehicle and machinery) and access to the site should be restricted to the immediate footprint of the infrastructure to prevent unnecessary disturbance of avifaunal species.
  - The 33kV power line must be constructed using a bird friendly structure (i.e. Inverted Delta-T Structure - the same structure used for the existing Rietfontein feeder).
  - Post construction monitoring to be conducted by Eskom as part of the yearly maintenance to evaluate mortalities and assess the efficacy of mitigation measures to the Project site and 33kV power line. This is to be reported to the Endangered Wildlife Trust Strategic Partnership to better inform requirements at the site and any future solar facility assessment and recommendations.
  - A carefully considered operational surface water/drainage management plan must be developed for the site including attention to the use of environmentally friendly cleaning chemicals on the solar panels.
- Socio-economic
  - Uphold the cultural integrity of the indigenous people.
- Palaeontology
  - Should there be any chance fossil finds during the construction phase of the proposed Project, safeguarding of the fossils (preferably *in situ*) must be undertaken, the finds must be reported to SAHRA, and a qualified paleontologist contacted.
- Archaeology
  - Sampling and collection of Stone Age resources must be undertaken. For this, a permit to collect the archaeological remains must be requested from the SAHRA prior to construction. In addition, in the unlikely event of human burials being uncovered, they must not be removed, work in the immediate

area must be halted, the area must be inspection by a professional archaeologist and the find must be reported to the SAHRA.

14.2 EAP Affirmation

As per Appendix 1(3)(r) of the NEMA EIA Regulations, 2014, as amended, the EAP affirms the following in relation to the final BAR:

a) the correctness of the information provided in the reports;

b) the inclusion of comments and inputs from stakeholders and I&APs;

c) the inclusion of inputs and recommendations from the specialist reports where relevant; and

d) 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".

14.3 Specialist Opinion

In accordance with the outcomes of the impact assessment (Section 12.0), and taking cognisance of the baseline conditions as presented in Section 11.0, as well as the impact management measures (Section 13.0), the proposed Mier Rietfontein Solar PV and Battery Storage Project, is not deemed to present significant negative environmental issues or impacts, and it should thus be authorised.

15.0 ASSUMPTIONS, LIMITATIONS, AND GAPS IN KNOWLEDGE

The following sections lists the assumptions, uncertainties, and gaps in knowledge, that were identified in the preparation of this BAR and the attached specialist reports.

- Terrestrial Biodiversity
  - Field work was conducted over a three-day period in mid-April and thus represents a 'snap-shot' survey of on-site ecology, undertaken during the late-wet season. It is thus possible that small short-lived annuals, geophytes or very cryptic species that are only visible when in flower may be overlooked during field visit;
  - The absence or non-recording of a specific fauna species, at a particular time, does not necessarily indicate that (1) the species does not occur there; (2) the species does not utilise resources in that area; or (3) the area does not play an ecological support role in the ecology of that species;
  - The delineation of vegetation communities for the vegetation map was conducted using available Google Earth imagery, and is therefore limited to the spatial and resolution accuracy of the imagery; and
  - Field work focused on the Study Area for the solar PV and BESS site. No flora and fauna sampling was conducted in the small footprint (225 m^2) of the telecommunications tower site.
- Avifaunal
  - The report is the result of a short-term study and is based on a three-day site visit to the proposed Study Area. No long-term, seasonal monitoring was conducted by the avifaunal specialist**.** This assessment relies upon secondary data sources with regards to bird occurrence and abundance such as the SABAP2 and IBA projects.
  - The site visit to the solar PV and BESS Project Study Area and the resultant observations were made in a single season (austral autumn), during which time migrant species may not have been present.

- The telecommunication tower site alternatives were evaluated based on a desktop assessment of the proposed sites.
- Although the proposed Solar PV, BESS Project and telecommunication tower are located within single pentad grid cell (2645_2000 and 2645_2020 respectively), a larger area is necessary to obtain a dataset that is large enough (encompassing six and five pentad grid cells respectively) to ensure that reasonable conclusions about species diversity and densities, in a particular habitat type, can be drawn. The SABAP2 data is regarded as a fairly rudimentary record of the avifauna occurring within the Study Area. These surveys provide an adequate snapshot of the avifauna in the Study Area.
- The focus of this assessment is primarily on the potential impacts on regional Red List and priority species i.e., species that are vulnerable to the displacement and collision impacts associated with the construction and operation of the proposed solar PV and BESS site and telecommunication tower site.
- Predictions in this study are based on experience of these and similar species in different parts of South Africa, through the authors' experience working in the avifaunal specialist field since 2006. However, bird behaviour can't be reduced to formulas that will hold true under all circumstances.

- Visual
  - Determining the value, quality and significance of a visual resource or the significance of the visual impact that any activity may have on it, in absolute terms, is not achievable. The value of a visual resource is partly determined by the viewer and is influenced by that person's socio-economic, cultural and specific family background, and is even subject to fluctuating factors, such as emotional mood. This situation is compounded by the fact that the conditions under which the visual resource is viewed can change dramatically due to natural phenomena, such as weather, climatic conditions and seasonal change.
  - Visual impact cannot therefore be measured simply and reliably, as is for instance, the case with water, noise or air pollution. It is therefore impossible to conduct a visual assessment without relying to some extent on the expert professional opinion of a qualified consultant, which is inherently subjective. The subjective opinion of the visual consultant is however unlikely to materially influence the findings and recommendations of this study, as a wide body of scientific knowledge exists in the industry of VIA, on which findings are based.
- Socio-economic
  - The Census 2011 data that was used in the description of the baseline conditions is relatively old. While there are more recent data sets available, such as the household surveys, these do not go down to ward level. To counter the age of the census data, the description of the baseline conditions, was supplemented with information collected from the focus group meetings.
  - The ward boundaries in the Dawid Kruiper Local Municipality changed in 2016. As a consequence, the census data from 2001 is not directly comparable to the census data from 2011, and no trends could be established at the ward level.
- Archaeology
  - It is assumed that all the information pertaining to the Project is accurate. The Study Area is archaeologically relatively unknown, but several HIAs have recently been undertaken in Rietfontein, and villages in the surrounding area.
- Palaeontology

- Inadequate database for fossil heritage for much of the RSA, given the large size of the country and the small number of professional palaeontologists carrying out fieldwork here. Most development areas have never been surveyed by a palaeontologist.
- Variable accuracy of geological maps which underpin these desktop studies. For large areas of terrain these maps are largely based on aerial photographs alone, without ground-truthing. The maps generally depict only significant ("mappable") bedrock units as well as major areas of superficial "drift" deposits (alluvium, colluvium) but for most regions give little or no idea of the level of bedrock outcrop, depth of superficial cover (soil *etc*), degree of bedrock weathering or levels of small-scale tectonic deformation, such as cleavage. All of these factors may have a major influence on the impact significance of a given development on fossil heritage and can only be reliably assessed in the field.
- Inadequate sheet explanations for geological maps, with little or no attention paid to paleontological issues in many cases, including poor locality information.
- The extensive relevant palaeontological "grey literature" - in the form of unpublished university theses, impact studies and other reports (*e.g*. of commercial mining companies) - that is not readily available for desktop studies.
- Absence of a comprehensive computerised database of fossil collections in major RSA institutions which can be consulted for impact studies. A Karoo fossil vertebrate database is now accessible for impact study work.
- In the case of palaeontological desktop studies without supporting Phase 1 field assessments these limitations may variously lead to either:
  - (a) *underestimation* of the palaeontological significance of a given Study Area due to ignorance of significant recorded or unrecorded fossils preserved there, or
  - (b) *overestimation* of the palaeontological sensitivity of a Study Area, for example when originally rich fossil assemblages inferred from geological maps have in fact been destroyed by tectonism or weathering, or are buried beneath a thick mantle of unfossiliferous "drift" (soil, alluvium *etc*).
- Since most areas of the RSA have not been studied paleontologically, a palaeontological desktop study usually entails *inferring* the presence of buried fossil heritage within the Study Area from relevant fossil data collected from similar or the same rock units elsewhere, sometimes at localities far away. Where substantial exposures of bedrocks or potentially fossiliferous superficial sediments are present in the Study Area, the reliability of a palaeontological impact assessment may be significantly enhanced through field assessment by a professional palaeontologist.
- In the case of the present Study Area in the Kalahari region of the Northern Cape exposure of potentially fossiliferous bedrocks is very limited due to the largely flat terrain with extensive sand / soil / gravel cover. However, a number of relevant field-based palaeontological studies have been carried out in the broader region by the author and others so confidence levels for this desktop level assessment are rated as medium.

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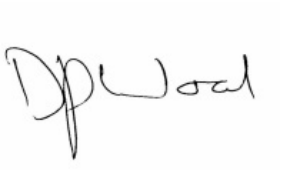

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APPENDIX A

Details of the EAP, Declaration of Interest, Undertaking under Oath/Affirmation and CV

APPENDIX B

PPP Supporting Documents

APPENDIX C

Terrestrial Ecology

APPENDIX D

Avifaunal

APPENDIX E

Visual

APPENDIX F

Socio-Economic & Indigenous Peoples Plan

APPENDIX G

Palaeontology

APPENDIX H

Archaeology

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