



**SolarReserve
Vogelstruisfontein
Photovoltaic Project: GAUT
002/17-18/E2033**

Draft Basic Assessment Report

07 September 2017

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Executive summary

Project Overview

SolarReserve South Africa Management (Pty) Limited (SolarReserve) proposes installing the SolarReserve Vogelstruisfontein Photovoltaic Project (SR PVP) (GAUT 002/17-18/E2033) and associated infrastructure (integrated battery storage and transmission lines etc.) on the Remaining Extent of Portion 4 of the Farm Vogelstruisfontein 231IQ with a total size of 65.78ha, located in Roodepoort area within the City of Johannesburg municipal district (GPS location: 26°11'8.56"S 27°55'0.35"E). The project will be constructed on a portion of the larger property, 16.616ha portion, which will be "leased" by the Applicant from the land owner. During the construction phase, access to the property will be via a constructed temporary gravel access road from Hebbard Road, off Main Reef Road. The permanent access road to the site for the operational phase of the site will be via Kloppers street, off Albertina Sisulu road.

The interconnection point for the proposed 33kV buried power transmission line is still under investigation and has not been concluded. Two interconnection options are under consideration. The application process to secure an interconnection point is very lengthy and detailed. Only once this process has been concluded will City Power Commit to the interconnection evacuation point. Once the evacuation point has been agreed and environmental authorisation received from GDARD, the selected transmission line route will be constructed by SolarReserve's EPC Contractor. Ownership and further responsibility for the transmission line will then be past across to City Power.

Project Environmental Assessment Practitioner

This Draft Basic Assessment Report (DBAR) was compiled by Mr Adam Bennett, the Mott MacDonald appointed Environmental Assessment Practitioner (EAP) for the SR PVP (GAUT 002/17-18/E2033). Adam holds a professional registration with the South African Council for Natural Scientific Professions in the field of Environmental Sciences (Reg: 400142/08).

Proposed infrastructure

The proposed SR PVP will include the following key infrastructure, but not limited to:

- PV array (9.9MW) comprising of the photovoltaic modules/panels, mounting structures and associated balance of system (tracking/fixed hardware, protection systems i.e. masts and electronics)
- 7000m² hard standing battery storage facility platform. Vanadium flow batteries (60MWh) housed in 40ft containers consisting of cell stacks and vanadium electrolyte contained in tanks with all associated balance of plant (piping, pumps, and control equipment)
- Inverters, transformers and switchgear with integrated battery storage
- An on-site substation consisting of a 40ft container split with Project and City Power equipment in each respective section of the substation. 33kV transmission line buried from City Power substation:
 - Option A) Florida substation (±47 meters – Yellow line) located on Vogelstruisfontein 231IQ Portion 4 (Remaining extent)
 - Option B) Sentraal substation connecting into City Power's 33kV (±1.7km – Blue & green line) located on located on Vogelstruisfontein 231IQ Portion 4 (Remaining extent) and Vogelstruisfontein 231IQ, portion 152
- Cabling between the project components

- Pre-fabricated housing for administration offices, security and guard houses, maintenance and storage
- Temporary construction laydown area of approximately 1ha
- Internal gravel service roads constructed by removing 300mm topsoil and backfilling with type 1 crushed stone, compacted to 97% Mod Ashto. Roads shall \pm 4m in width cantilevered either side for storm water run-off
- Raw water storage tank
- Project primary and/or secondary access road/s, associated access point/s, internal distribution roads and crossings
- Fencing and perimeter security system around the project development footprint, and all other necessary related infrastructure.

The associated interconnection solution will include the following key infrastructure, but not limited to:

- Vogelstruisfontein Project substation and City Power substation both housed in a single 40ft container measuring 12.5m x 3m x 3m
- 33kV MV XLPE 300mm copper cable buried and secured (concrete) minimum depth 1m from City Power Substation to either substation Florida (circa 100m length) or Sentraal substation (circa 1.2km west) of the proposed site.
- The grid connection solution
- 48 Core optical ground wire (OPGW)
- One additional breaker in the existing Florida and Sentraal substations;
- Cable trenches and cabling
- One 25m lighting/lightning masts
- Short access roads to the substations
- Standard control room located within the combined 40ft container substation
- Control Plant, AC/DC, Metering, SCADA and Telecoms

Note: The proposed transmission line will be a City Power owned asset, and only constructed by the Applicant under a self-build agreement with City Power.

Cumulative Impacts of the Proposed SR PVP and Associated Transmission Line (Option A or Option B)

The following key cumulative impacts are anticipated:

- **Air quality impacts:** Fugitive particulate emissions from the proposed SR PVP and associated transmission line during the construction and operational phases may negatively influence the local ambient air quality. Appropriate dust control measures (i.e. water / dust suppressant sprayed onto gravel roads) or other suitable best practice techniques will be required to mitigate the impacts. The residual impacts post mitigation is anticipated to be **moderate**.
- **Reduction in agricultural potential, soil, and land use capability:**
 - The SR PVP project footprint and transmission line corridor will sterilise surface land uses within throughout the life of the project. No mitigation measures are applicable however the servitude will be placed as close as possible to existing servitude or within existing servitudes where possible to limit land sterilization. The physical servitude will be a maximum of 3m wide within a 50m wide corridor. The residual impact is anticipated to be **minor**.

- The change of land use from "vacant defunct brownfield" land to a land use with an economic value (I.e. SR PVP) is a **major positive** benefit to the COJ and surrounding communities.
- **Socio-economic character impacts:**
 - Should the proposed SR PVP and associated transmission line be authorised and developed, **moderate** to **substantial positive** socio-economic benefits will be experienced as the project will provide significant benefit to the local economy surrounding the site via stimulating the local economy and providing employment opportunities
 - Conversion of current unmanaged vacant "defunct brownfield" land (I.e. the SR PVP project footprint) to a secure access controlled site will have a **substantial positive** benefit regarding vagrancy and crime in the near vicinity of the site
- **Visual impacts:** Construction activities, fugitive dust emission, and construction vehicles traversing the proposed SR PVP site and transmission line corridor, as well as the presence of new infrastructure will transform the landscape and have a **moderate** impact. With the implementation of appropriate dust control measures (i.e. water / dust suppressant sprayed onto gravel roads) or other suitable best practice the residual impacts post mitigation is anticipated to be **minor**.

Environmental Assessment Practitioner Independent Opinion

Based on the assessed impacts, it is recommended that the environmental authorisation be granted subject to the following conditions:

- On condition that SolarReserve SA Management and the SR PVP must implement and adhere to all the stipulations in the EMPr and the Environmental Authorisation.
- A vegetation survey needs to be conducted during the wet season (i.e. flowering and growing season between the months of November to March) to confirm whether plant species of conservation concern are present on the site. The survey needs to be undertaken before the project site is cleared (i.e. prior to construction).

Acronyms

AC/DC	:	Alternating current / Direct current
AoI	:	Area of influence
BA	:	Basic assessment
BAR	:	Basic assessment report
BID	:	Background information document
CBA	:	Critical Biodiversity Area
COJ	:	The City of Johannesburg
cm	:	Centimetre
CRR	:	Comment and response report
°C	:	Degree centigrade
Db	:	Decibel
DBAR	:	Draft basic assessment report
DEA	:	Department of Environmental Affairs
DMR	:	Department of Mineral Resources
DWA	:	Department of Water Affairs
EAP	:	Environmental Assessment Practitioner
EIA	:	Environmental impact assessment
EMPr	:	Environmental Management Program Report
EPC	:	Engineering, Procurement and Construction
ESA's	:	Ecological support areas
ESIA	:	Environmental social impact assessment
GDARD	:	Gauteng Department of Agriculture and Rural Development
GHG	:	Greenhouse Gas
GIIP	:	Good Industry International Practice
GN	:	Government Notice
Ha	:	Hectare
I&APs	:	Interested and Affected Parties
IDP	:	Integrated Development Plan
IPPPP	:	Independent Power Producer Procurement Programmes
Km	:	Kilometre
Km/h	:	Kilometre per hour
kV	:	Kilovolt
m	:	Meter
Mott MacDonald	:	Mott MacDonald Africa (Pty) Limited
MPRDA	:	Mineral and Petroleum Resources Development Act, Act No. 28 of 2002
MWac	:	Mega Watt alternating current
MWh	:	Mega Watt hour

m ³	:	Meters cubed / Cubic meters
NAAQS	:	South African National Ambient Air Quality Standards
NEMA	:	National Environmental Management Act, Act No. 107 of 1998
NEMAQA	:	National Environmental Management: Air Quality Act, Act No. 39 of 2004\
NEM/BA	:	National Environmental Management: Biodiversity Act, Act No 10 of 2004.
NEMWA	:	The National Environmental Management: Waste Act, Act No. 59 of 2008
NHRA	:	National Heritage Resources Act, Act No. 29 of 1999
NWA	:	The National Water Act, Act No. 36 of 1998
PAA	:	Project affected area
PPP	:	Public Participation Process
PV	:	Photovoltaic
%	:	Percentage
SMMEs	:	Small Medium Micro Enterprises
SOC	:	Specialist Ornithological Consultant
SolarReserve	:	SolarReserve South Africa Management (Pty) Limited
SR PVP	:	SolarReserve Photovoltaic Project
USF	:	Urban solar farm
V	:	Volt
WUL	:	Water Use Licence
WUL-GA	:	Water Use Licence General Authorisation

1 Background Information

1.1 Project applicant details

Table 1: Project Applicant Details

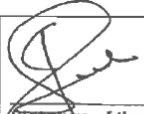
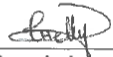
Applicant	SolarReserve South Africa Management (Pty) Limited
Contact person	Jason Gerber
Physical address	Office L-11C, 11th Floor, Sinosteel Plaza 159 Rivonia Road, Sandton, Johannesburg, Gauteng, South Africa, 2010
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Cell	079 515 0225
Fax	011 784 7549
Email	Jason.Gerber@solarreserve.com

Source: SolarReserve, 2017

1.1.1 Applicant Declaration of Independence


I, **Jason Gerber** declare under oath that:

- I am the applicant in this application for SolarReserve Vogelstruisfontein Photovoltaic Project (SR PVP) (GDARD Ref. #: GAUT 002/17-18/E2033);
- I have appointed an environmental assessment practitioner to act as the independent environmental assessment practitioner for this application
- Will provide the environmental assessment practitioner and the competent authority with access to all information at my disposal that is relevant to the application;
- Will be responsible for the costs incurred in complying with the Environmental Impact Assessment Regulations, 2010, including but not limited to –
 - costs incurred in connection with the appointment of the environmental assessment practitioner or any person contracted by the environmental assessment practitioner;
 - costs incurred in respect of the undertaking of any process required in terms of the Regulations;
 - costs in respect of any fee prescribed by the Minister or MEC in respect of the Regulations;
 - costs in respect of specialist reviews, if the competent authority decides to recover costs; and
 - the provision of security to ensure compliance with conditions attached to an environmental authorisation, should it be required by the competent authority;
- Will ensure that the environmental assessment practitioner is competent to comply with the requirements of these Regulations and will take reasonable steps to verify whether the EAP complies with the Regulations;
- Will inform all registered interested and affected parties of any suspension of the application as well as of any decisions taken by the competent authority in this regard;
- Am responsible for complying with the conditions of any environmental authorisation issued by the competent authority;
- Hereby indemnify the Government of the Republic, the competent authority and all its officers, agents, and employees, from any liability arising out of the content of any report, any procedure, or any action which the applicant or environmental assessment practitioner is responsible for in terms of these Regulations;
- Will not hold the competent authority responsible for any costs that may be incurred by the applicant in proceeding with an activity prior to obtaining an environmental authorisation or prior to an appeal being decided in terms of these Regulations;
- Will perform all other obligations as expected from an applicant in terms of the Regulations;
- All the furnished by me in this form/document are true and correct; and
- I am aware that a false declaration is an offence in terms of regulation 71 and is punishable in terms of section 24F of the Act.

 Signature of the Applicant: Company Name: SolarReserve South Africa Management (Pty) Limited Date: <u>06/09/2017</u>	 Signature of the Commissioner of Oaths: Designation: <u>HR MANAGER</u> Date: <u>6/9/2017</u> Commissioner of Oaths Official stamp (attached):
--	---

I certify that the DEPONENT has acknowledged that he/she knows and understands the contents of this affidavit, that he/she does not have any objection to taking the oath, and that he/she considers it to be binding on his/her conscience. This was sworn to and signed before me

at SANDTON on this the 6 day of SEP, 2017
 and the administering oath complied with the regulations contained in Government Gazette No. R1258 of 21 July 1972, as amended.



GYLNIS EVANGELINE CHETTY
 COMMISSIONER OF OATHS (RSA)
 HR Professional (HRP)
 Member number: 10673

SABPP™

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 Setting HR standards

159 Rivonia Road
 Sandton
 2193

1.2 Landowner Details

Table 2: Landowner Details

Land owner	Industrial Zone (Pty) Limited
Contact person	Jeanie Pelser
Postal address	PO Box 27 Crown Mines, 2025
Telephone	0114961777
Cell	0828703042
Fax	0114961222
Email	jeanie@iprop.co.za

Source: SolarReserve, 2017

1.2.1 Consent of Use

Industrial Zone (Pty) Limited has granted SolarReserve South Africa Management (Pty) Limited (The Applicant) consent of use of the land via an Option Agreement and signed Consent of Use form (Consent of Use form: Appendix A).

1.3 Local Municipal Details

Table 3: Local Municipal details

Municipal details	City of Johannesburg
Contact person	Gift Mabasa
Postal address	118 Jorissen Street, 6th Floor Traduna Building, Braamfontein, 2001
Telephone	011 578 4229
Email	Giftmab@joburg.org.za

Source: City of Johannesburg, 2017

1.4 Appointed EAP and Contact Details

This Draft Basic Assessment Report (DBAR) was compiled by Mr Adam Bennett, the Mott MacDonald appointed Environmental Assessment Practitioner (EAP) for the SolarReserve Vogelstruisfontein Photovoltaic Project (SR PVP) (GAUT 002/17-18/E2033). Adam holds a professional registration with the South African Council for Natural Scientific Professions in the field of Environmental Sciences (Reg: 400142/08). Adam's career and project experience is summarised below.

Table 4: EAP Contact Details

Company details	Mott MacDonald Africa (Pty) Limited
Contact person	Adam Bennett
Postal address	PO Box 346 Pinegowrie, South Africa, 2124
Physical address	25 Scott street, Waverly, Johannesburg, 2090
Telephone	011 0521000
Cell	0835389424
Fax	0867503563
Email	Adam.bennett@mottmac.com

Source: Mott MacDonald, 2017



Adam Bennett

Principal Environmental
Consultant - Senior Air Quality
Specialist

Personal summary

Year of birth: 1978

Nationality: South African

Languages:

- English – Mother Tongue
- Afrikaans - Fair

Qualifications:

- BSc (Hons) Environmental Sciences/Geography, University of the Witwatersrand (WITS)
- BSc, WITS
- Manager Excellence: Golder Associates Africa
- Project Management 24: Golder Associates Africa
- NFPA 472
- ISO 14001

Key skills:

- Air quality management
- Noise monitoring
- EAP - integrated environmental management projects
- Management and leadership
- Project management skills
- Business development and strategy
- Administration, analytical and organisational skills enabling the ability to work under pressure
- Attention to detail with good technical reporting
- HAZMAT incident response, clean up and rehabilitation

Adam has widespread air quality, environmental, noise and project management consulting experience (>14 years) in a diverse range of markets including: industry; energy & power; transport; waste management (i.e. general, hazardous & medical); mining, ore processing & refining; urban development; oil & gas, petrochemical; contaminated land & rehabilitation; HAZMAT including emergency incident response & incident commanding. Adam is professionally registered with SACNASP (# 400142/08) in the field of Environmental Science.

Experience and skills

Mott MacDonald (2016-present)

Principal Environmental Consultant
Senior Air Quality Specialist

Golder Associates Africa (2011-2016)

Group/Divisional Leader Atmospheric
Management Services (2012-2016);
Senior Air Quality Specialist (2011)

Gondwana Environmental Solutions (2006-2010)

Senior environmental and air quality specialist

Strategic Environmental Focus (2005-2006)

Project manager in the Mining & Industrial Unit

Dept. of Agriculture & Environmental Affairs (2003-2005)

Environmental officer in the Hazardous
Chemicals & Waste Management Unit

Selected projects/experience

- **Mott MacDonald (2016- Present):** To Project Manage (PM) and carry out all responsibilities associated with air quality management/monitoring projects, noise management/monitoring projects and integrated environmental management projects as an Environmental Assessment Practitioner (EAP). Scientific technical reporting, data analysis and quality control on various environmental data sets and types. Quality control and review of developed client deliverables. Business development regarding the growth of Mott MacDonald's market share including:
 - Leadership and technical development and mentorship of junior colleagues through collaborative project work, discussion, and mentoring sessions;
 - Strategic planning regarding Mott MacDonald air quality, noise and environmental management services and contributing to the wider corporate business strategy;
 - Client relationship management; and
 - Compilation of tenders, proposals, and expressions of interest.Past project experience includes: The establishment, operation, maintenance & calibration of air quality and meteorological monitoring networks; atmospheric emission licensing (AEL), specialist air quality assessments (baseline & full impact assessment); noise monitoring and reporting, due diligence auditing; and a variety of other integrated environmental management projects including: BA, EIA, SEIA, EMP, EMPr, WUL, environmental auditing construction monitoring, IFC Performance Standards & Equator Principles etc.
- **Golder Associates Africa (2011-2016):** To manage and carry out all responsibilities associated with the Golder Atmospheric Management Services Division including: team leadership, mentoring & management, client relationship management, project management of all responsibilities associated with air quality management/monitoring projects, compilation of tenders, proposals, and expressions of interest to secure projects and the general development and growth of the services within the African air quality market. Country experience extends into the following countries: South Africa, Zambia, Ghana, Mozambique, Ethiopia, Botswana, Congo, Malawi, Uganda, Senegal, Democratic Republic of the Congo etc. Has undertaken projects in alignment with the following international standards and/or guidelines including: IFC performance standards, World Bank, European Union etc.
- **Gondwana Environmental Solutions (2006-2010):** Project management of various air quality management and monitoring projects. Business development including: marketing, client relationship management, preparation of proposals/tenders/EOI's.

- **Strategic Environmental Focus (Pty) (2005-2006):** Project management of various integrated environmental management projects, marketing and business development.
- **Dept. of Agriculture & Environmental Affairs (2003-2005):** Project management of various pollution and waste management projects, HAZMAT response to hazardous chemical incidents including environmental rehabilitation.

1.4.1 EAP Declaration of Independence

I **Adam Bennett** declare under oath that:

- I act as the independent environmental practitioner for this application SolarReserve Vogelstruisfontein Photovoltaic Project (SR PVP) (GDARD Ref. #: GAUT 002/17-18/E2033);
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting environmental impact assessments, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in regulation 8 of the regulations when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by interested and affected parties in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report;
- I will keep a register of all interested and affected parties that participated in a public participation process; and
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- all the furnished by me in this form are true and correct;
- will perform all other obligations as expected from an environmental assessment practitioner in terms of the Regulations; and
- I realise that a false declaration is an offence in terms of regulation 71 and is punishable in terms of section 24F of the Act.

For **Basic Assessment applications**, I further declare under oath that:

- I will fix the site notice(s) in a conspicuous place, on the property(ies) where it is intended to undertake the activity(ies)
- I will place a notice in the required newspaper(s)
- I will provide the following with all the project information and give I&AP's an opportunity to register as an I&AP
 - landowners and occupiers of adjacent land
 - landowners and occupiers of land within 100 metres of the boundary of the property
 - the ward councillor
 - any organisation that represents the community in the area of the application
 - the municipality which has jurisdiction over the area in which the proposed activity will be undertaken
 - any organ of state that may have jurisdiction over any aspect of the activity of the applicant's intention to submit an application to the competent authority; and

- I will include on the register all persons as required per Regulation 55 (1) (c)
- The Reports as submitted will contain the same information (including layout, project design and mitigation) as provided to the registered I&APs for comment
- All issues raised by the I&APs during the public participation process will be included in the Comments and Response Report as attached

 Signature of the Environmental Assessment Practitioner: Company Name: Mott MacDonald Africa (Pty) Limited Date: 07/09/2017	 Signature of the Commissioner of Oaths: Designation: Date: 07/09/2017 Commissioner of Oaths Official stamp (attached): 
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2 Property / Site Description

2.1 Locality

The SR PVP and associated infrastructure will be located on the Remaining Extent of Portion 4 of the Farm Vogelstruisfontein 231IQ with a total size of 65.78ha, located in Roodepoort area within the City of Johannesburg municipal district. (Figure 1, Figure 2 and Table 5). The project will be constructed on a portion of the larger property, 16.616ha portion, which will be “leased” by the Applicant from the land owner. The lease area is clearly delineated in the survey diagram provided in Figure 3Figure 4 below. During the construction phase, access to the property will be via a constructed temporary gravel access road from Hebbard Road, off Main Reef Road. The permanent access road to the site for the operational phase of the site will be via Kloppers street, off Albertina Sisulu road.

Table 5: Locality Details

Physical address of the site	The property is accessed from Hebbard Road, off Main Reef Road, located in Roodepoort area
Farm name	Vogelstruisfontein 231IQ
Portion/Erf	Portion 4 (Remaining extent)
Surveyor-General 21 digit code for the site	T0IQ0000000023100004
GPS location	26°11'8.56"S 27°55'0.35"E
Extant of farm	65.78ha
Project footprint	16.616ha
Elevation Above Mean Sea Level (m)	1706m
Province	Gauteng
Local Municipality	City of Johannesburg

Source: Mott MacDonald, 2017

2.1.1 Transmission line corridors

The interconnection point for the proposed 33kV buried power transmission line is still under investigation and has not been concluded. Two interconnection options are provided for (Figure 2) (*Note: The two options are not to be seen as alternatives*):

- Option A) Florida substation (± 47 meters – Yellow line) located on Vogelstruisfontein 231IQ Portion 4 (Remaining extent)
- Option B) Sentraal substation connecting into City Power's 33kV (± 1.7 km – Blue & green line) located on located on Vogelstruisfontein 231IQ Portion 4 (Remaining extent) and Vogelstruisfontein 231IQ, portion 152

The application process to secure an interconnection point is very lengthy and entails the following:

- The IPP makes an application to the City Power Infrastructure Planning Department for connection of the proposed generation facility to the City Power electrical network
- Based on the merit of the proposed project/facility, the applicant presents the concept design of the generation facility to the Planning Evaluation Committee (PEC) of the City Power Planning Department

- On evaluation and approval of the concept design, City Power Planning department issues a non-binding letter of support (see attached) to the IPP confirming the technical feasibility of connecting the proposed connection facility to the City Power electrical network. This Letter is issued for the purposes of NERSA generation license application and / or completion of other regulatory process
- On successful approval of generation license and/or other pertinent approvals, City Power Planning Department invites the applicant to present the detailed technical design of the generation facility (up to the point of connection to the city power grid) at its Technical Evaluation Committee (TEC). On approval of the detailed technical design by the TEC, City Power issues the IPP with a 'letter of quotation' for part of grid connection works that City Power needs to undertake. A separate self-built agreement will need to be signed between City Power and applicant for the part of grid connection works that needs to be undertaken by the applicant. On successful completion of the works, City Power commissioning team will perform necessary technical checks and commissioning tests prior to commissioning and export of power by the proposed facility

Only once this process has been concluded will City Power Commit to the interconnection evacuation point. Once the evacuation point has been agreed and environmental authorisation received from GDARD, the selected transmission line route will be constructed by SolarReserve's EPC Contractor. Ownership and further responsibility for the transmission line will then be past across to City Power.

Note: The coordinates presented below represent the approximate centre line of the envisaged transmission line corridor. Variation off this centre line (if required) will be limited to 25m in radius either side

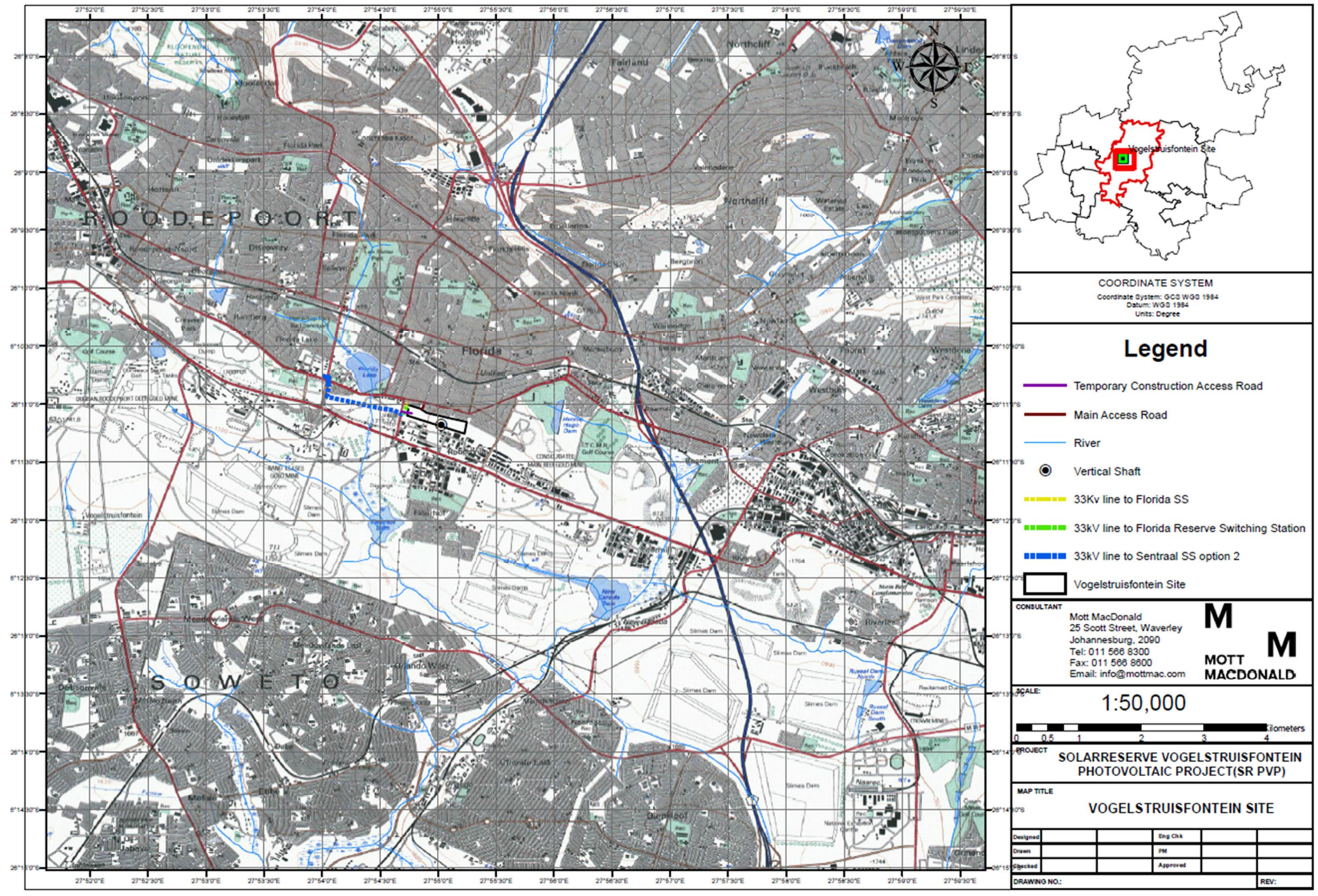
Table 6: GPS coordinate locations of the proposed transmission line route options

OPTION A: 33kV line to Florida SS: total length 47m		
Starting point of the activity	26°11'0.37"S	27°54'43.86"E
Middle point of the activity	26°10'59.84"S	27°54'43.60"E
End point of the activity	26°10'59.55"S	27°54'42.99"E
<i>Note: No significant turning points are anticipated for the yellow route transmission line as the route is an approximate straight-line connection</i>		
OPTION B: 33kV line to Sentraal SS: total length 1515m		
Starting point of the activity	26°10'45.08"S	27°54'0.31"E
Turning point 1	26°10'46.32"S	27°54'3.11"E
250 m	26°10'51.74"S	27°54'3.36"E
Turning point 2	26°10'56.12"S	27°54'2.53"E
500 m	26°10'57.04"S	27°54'6.50"E
750 m	26°10'58.84"S	27°54'15.42"E
1000 m	26°11'0.87"S	27°54'24.43"E
1250 m	26°11'2.64"S	27°54'32.89"E
1500 m	26°11'5.27"S	27°54'41.23"E
End point of the activity	26°11'5.33"S	27°54'41.81"E
Starting point of the activity	26°10'45.08"S	27°54'0.31"E

Option B continued: 33kV line to Florida Solar Reserve Switching Station: total length 152m		
Starting point of the activity	26°11'5.33"S	27°54'41.81"E
Middle point of the activity	26°11'3.02"S	27°54'42.78"E
End point of the activity	26°11'0.41"S	27°54'43.87"E

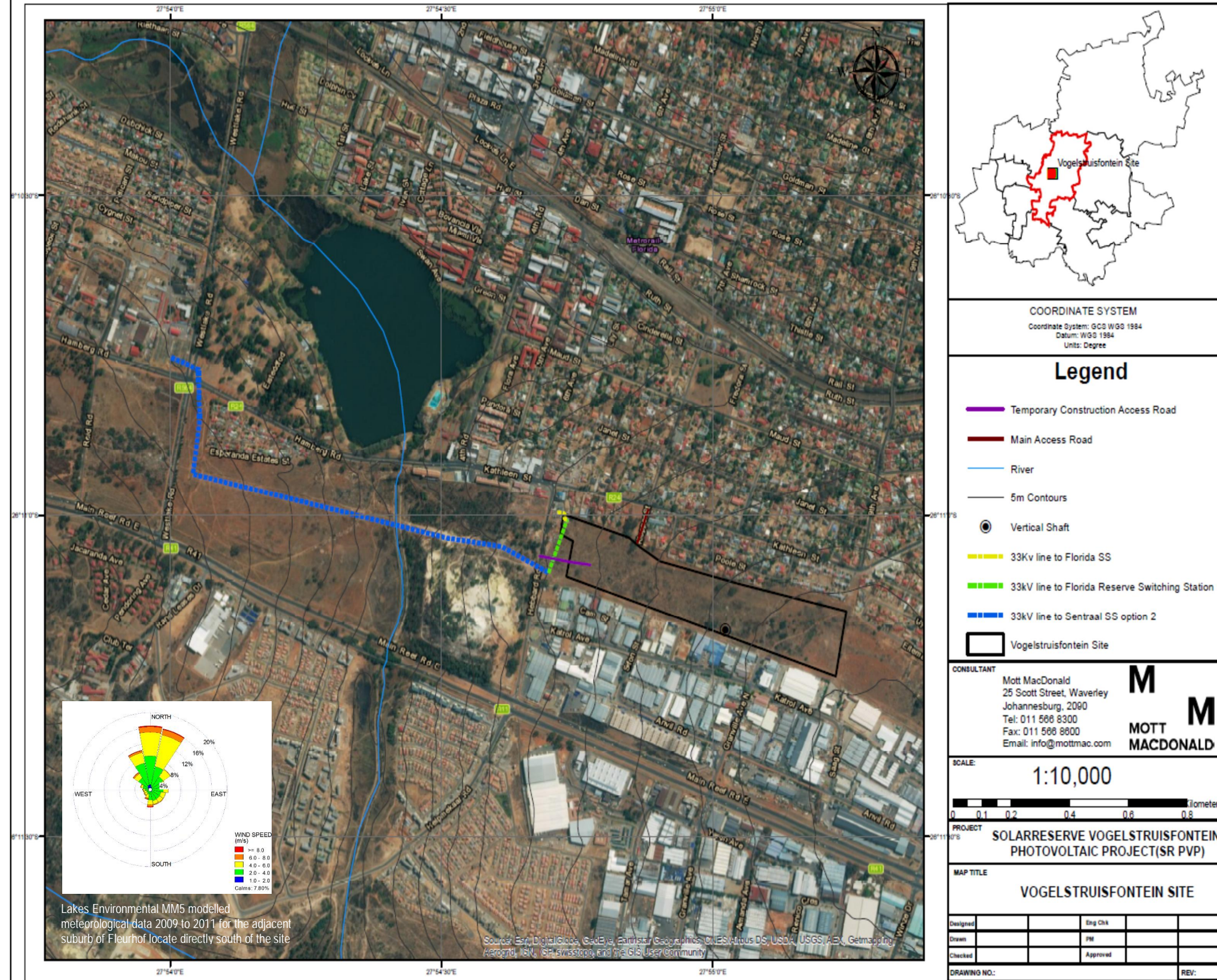
Source: Mott MacDonald, 2017

Figure 1: Regional Location of the of the proposed SolarReserve Vogelstruisfontein Photovoltaic Project (SR PVP) Project and Associated Transmission Line Corridors



Source: Mott MacDonald, 2017

Figure 2: Location of the proposed SR PVP Project and Associated Transmission Line Corridors



Source: Mott MacDonald, 2017

2.2 Land Uses

2.2.1 On-site

It is understood that the current land use zoning of the parcel of land to be developed is that of Vacant Land as the land is de-proclaimed mining land and therefore not part of any town planning scheme (VBDG Town Planners, 2017).

VBDG Town Planners (on behalf of SolarReserve) undertook discussions with the City of Johannesburg Senior Legal Advisor Mr Alwyn Nortje regarding the land use planning who provided the following opinions regarding land use planning requirements (Appendix B):

- No town planning process is necessary as “as the land is de-proclaimed mining land and therefore not part of any town planning scheme”
- A lease diagram should be created and registered, and a lease agreement should be drafted with a private servitude over the property in favour of the user SolarReserve
- The servitude should be registered in the interim because as and when the new Land Use Scheme for the City of Johannesburg comes into operation, these old parcels of mining land will automatically get a zoning
- Once zoned, a consent use application should be made and the servitude cancelled.

As the land is vacant and unmaintained, many areas on site are being used on a regular basis for illegal dumping of waste including: domestic garden waste, waste construction materials, building rubble and general domestic waste.

2.2.2 Transmission line corridor

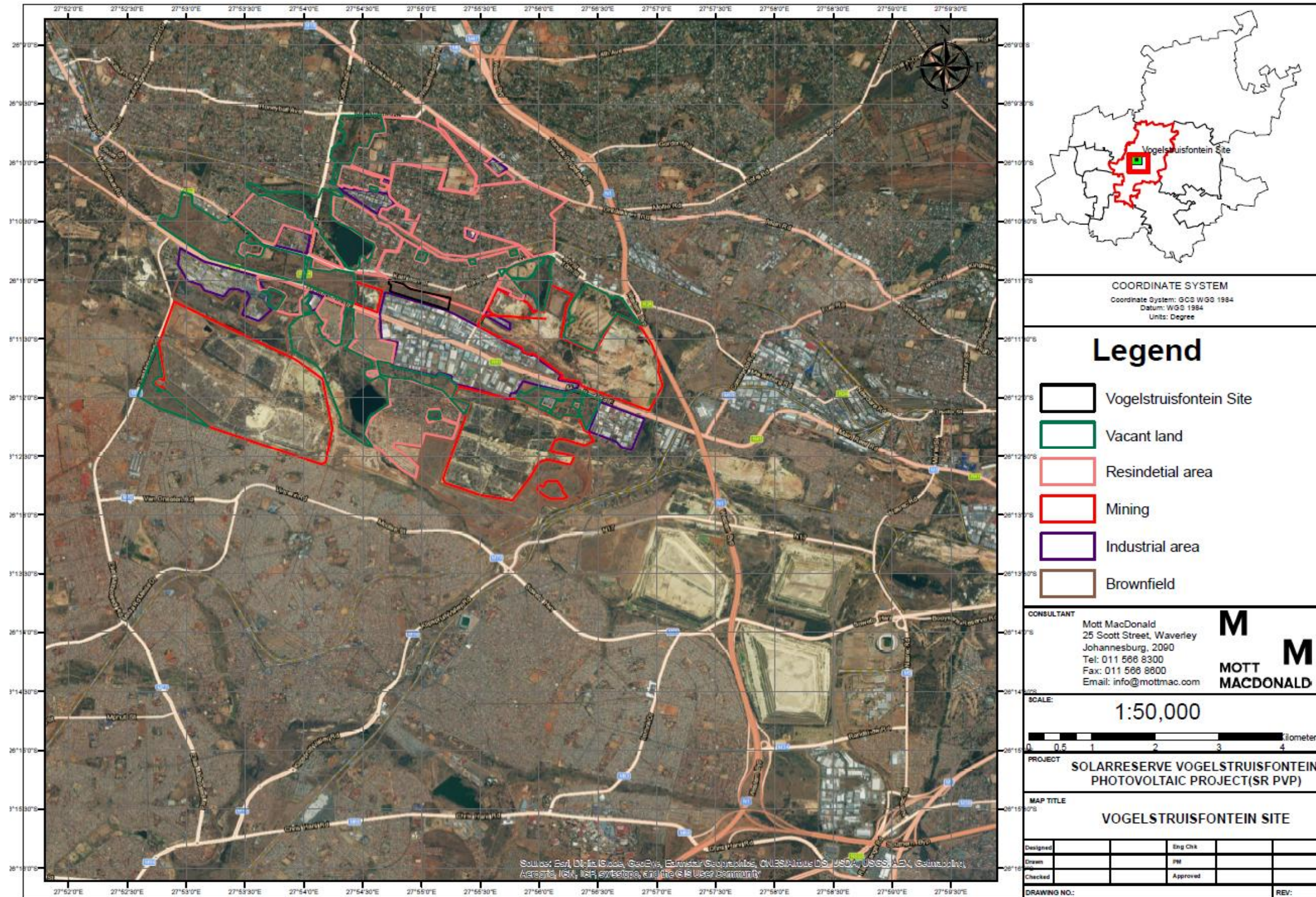
The current land use zoning of the parcel of land to the west of the SR PVP site, where the transmission line will traverse is assumed to be that of vacant de-proclaimed mining land based on the evidence of possible historical mining operations on site. Should this prove to be the case, the land will not fall part of any town planning scheme as in the case of the SR PVP parcel of land. Confirmation regarding the land use status in this regard is still under investigation by SolarReserve.

2.2.3 Surrounding land uses

Land uses in the near vicinity of the proposed SR PVP include the following (Figure 5):

- Residential
- Mining (Active and/or inactive historical mining activities)
- Light industry and/or commercial
- Vacant land
- Brownfield land
- Regional road infrastructure
- Recreational parks and/or sports facilities

Figure 5: Key Surrounding Land Uses



Source: Mott MacDonald, 2017

2.3 Site Photographs

Figure 6 provides a series of site photographs in alignment with eight key cardinal directions from site.

Figure 6: Project Footprint Photographs



Source: Mott MacDonald, 2017

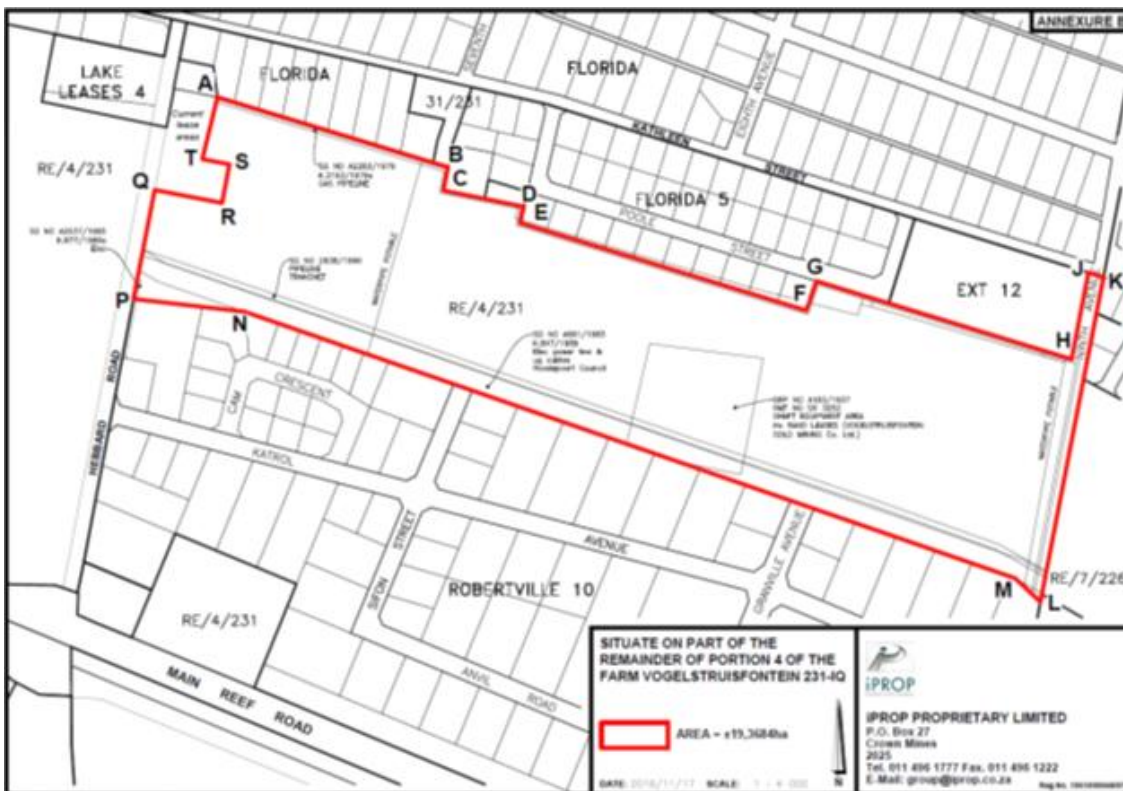
3 Detailed Description of the Proposed Activities

3.1 Activity description

The SR PVP is proposed to include several arrays of photovoltaic (PV) panels as well as utility scale integrated storage system (60MWh of flow battery storage) with a combined export capacity limit of 9.9 MW (Figure 2). The “leased area” (Leased based on the Options Agreement) includes a number of servitudes which run along the north, south and eastern boundaries of the property include the following (Figure 4 & Figure 7):

- Transnet pipeline
- 88kV City Power OHL servitude
- Mining ventilation shaft, Gold Mining Co.
- Gas pipeline
- Water pipeline

Figure 7: Servitude Locations within the SR PVP Project Footprint



Source: Iprop, 2016

The site identified (Figure 7) for the PV Solar with integrated storage project will consist of both the solar PV panels, utility scale vanadium flow batteries as well as the associated infrastructure required for such a facility including, but not limited to (refer to Figure 8 & Figure 9) for an illustration:

- PV array comprising of the photovoltaic modules/panels, mounting structures and associated balance of system (tracking/fixed hardware, protection systems i.e. masts and electronics)
- 7000m² hard standing battery storage facility platform. Fifteen 1MW/4MWh vanadium flow batteries (total capacity of 60MWh) housed in 40ft containers consisting of cell stacks and vanadium electrolyte contained in tanks with all associated balance of plant (piping, pumps, and control equipment)
- Inverters, transformers and switchgear with integrated battery storage
- An on-site substation consisting of a 40ft container split with Project and City Power equipment in each respective section of the substation. 33kV transmission line buried from City Power substation to option a) Florida substation ($\pm 47\text{m}$ – yellow line) or option b) Sentraal substation connecting into City Power's 33kV ($\pm 1.7\text{ km}$ – blue & green line) (Figure 2)
- Cabling between the project components
- Pre-fabricated housing for administration offices, security and guard houses, maintenance and storage
- Temporary construction laydown area of approximately 1ha
- Internal gravel service roads constructed by removing 300mm topsoil and backfilling with type 1 crushed stone, compacted to 97% Mod Ashto. Roads shall $\pm 4\text{m}$ in width cantilevered either side for storm water run-off
- Raw water storage tank
- Project primary and/or secondary access road/s, associated access point/s, internal distribution roads and crossings
- Fencing and perimeter security system around the project development footprint, and all other necessary related infrastructure.

The interconnection solution will evacuate the power generated by the SR PVP via a 33kV power line from the on-site Project Substation and City Power substation to the existing City Power Florida (Option A) or Sentraal substation (Option B). Approval in principle to connect to both substations have been provided by City Power, subject to Generation License.

The Vogelstruisfontein Project's interconnection infrastructure will comprise of the following (Figure 11):

- Vogelstruisfontein Project substation and City Power substation both housed in a single 40ft container measuring 12.5m x 3m x 3m
- 33kV MV XLPE 300mm copper cable buried and secured (concrete) minimum depth 1m from City Power Substation to either substation Florida (circa 100 m length) or Sentraal substation (circa 1.2km west) of the proposed site.
- The grid connection solution
- 48 Core optical ground wire (OPGW)
- One additional breaker in the existing Florida and Sentraal substations;
- Cable trenches and cabling
- One 25m lighting/lightning masts
- Short access roads to the substations
- Standard control room located within the combined 40ft container substation
- Control Plant, AC/DC, Metering, SCADA and Telecoms

The proposed transmission line will be a City Power owned asset, and only constructed by the Applicant under a self-build agreement with City Power.

Figure 8: A typical example of installed Solar Photovoltaic Panels and Container Substations which will be used at the SR PVP project



Source: (Left) Jasper Power Company, 2014 & (Right) SolarReserve, 2013

Figure 9: An Aerial Conceptual Model Displaying the proposed SR PVP Solar Farm on the Project Footprint



Source: SolarReserve, 2017

3.1.1 Associated Project Services

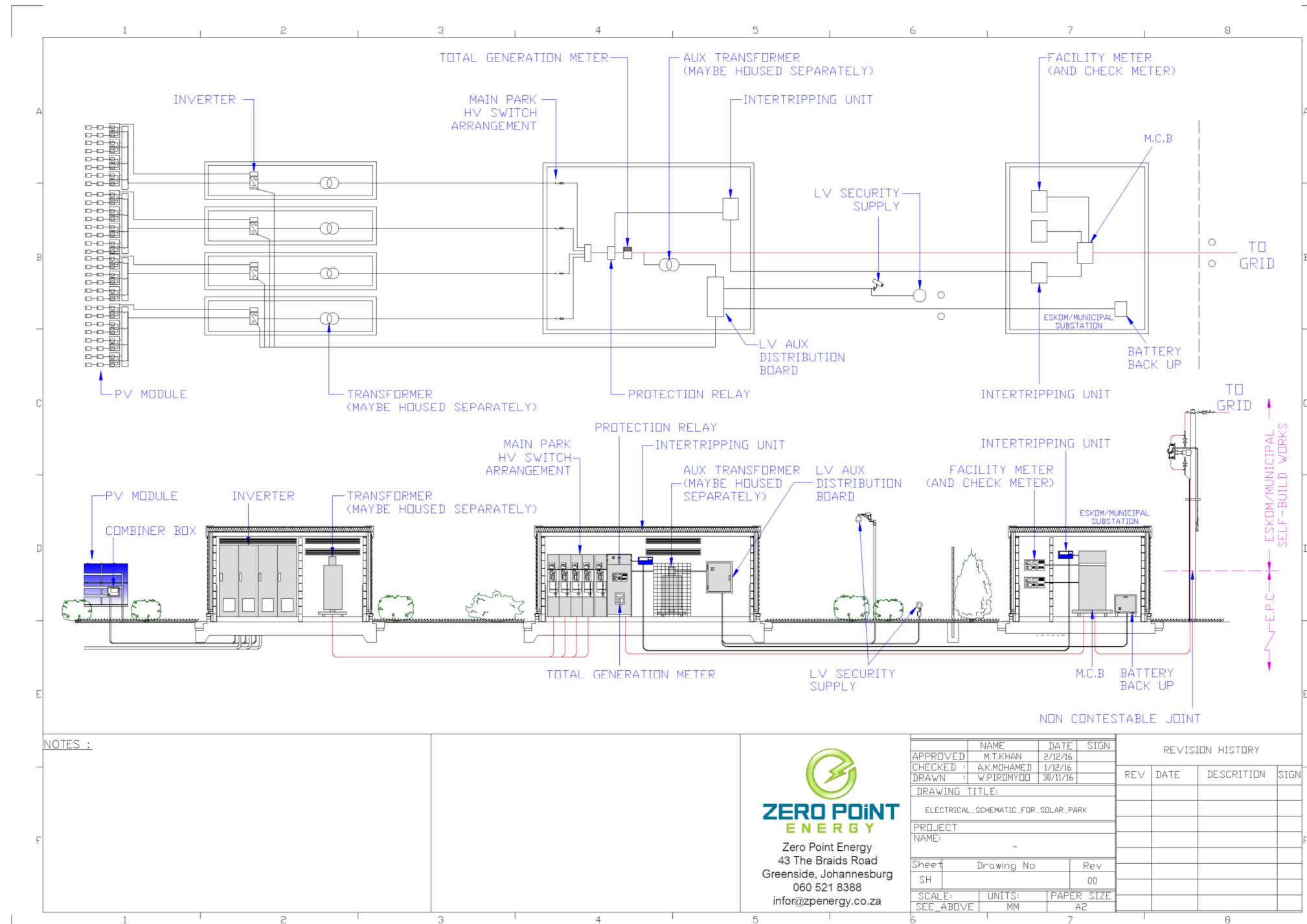
Services required for the SR PVP will include:

- Waste Management - all refuse material generated from the proposed development will be collected by a contractor and disposed of at a licensed waste disposal site. It is most likely

that the waste will be disposed of at the Marie Louise landfill site. This service will be arranged with the municipality and/or waste management services provider when required.

- Sanitation – The project will construct and utilise its own sanitation services as the City of Johannesburg Municipality does not service the project site. All sewage/effluent water originating from the facilities will be managed utilising temporary portable chemical toilets during construction and via a portable modular sewage treatment facilities (package plants) during operations. The volume of sewage proposed during the operational phase will be very low – with only security personnel occupying the site full time. Operational and Maintenance Contractors will periodically visit the site for facility maintenance when required.
- Water for the construction phase will be transported to the site, using water tankers. During the operational phase, the need is minimal and will be trucked to site.
- Construction electricity – the use of generators will be required during the construction phase of the plant.
- Operational power – power for all auxiliary power services shall be drawn from the 33kV connection to the City Power network. On site step-down auxiliary transformers will step down the 33kV MV supply to 400V.
- Storm Water Management – Based on the planned construction activities, no significant scaled ground works will act to change the flow of surface water across the site other than the gravel access roads to the infrastructure. The existing grass vegetation will be retained as far as possible and managed as stipulated in the Environmental Management Programme report (EMPr). No asphalt or layer works will cover any section of the site requiring storm water channelling and associated drainage. Surface water on site is thus anticipated to naturally infiltrate and drain in alignment with the existing topography of the site.

Figure 11: Schematic of the Solar Photovoltaic Infrastructure and Linkages



NOTES :



ZERO POINT ENERGY
 Zero Point Energy
 43 The Braids Road
 Greenside, Johannesburg
 060 521 8388
 info@zpenegy.co.za

APPROVED	NAME	DATE	SIGN	REVISION HISTORY		
	M.T.KHAN	2/12/16		REV	DATE	DESCRIPTION
CHECKED	A.K.MOHAMED	1/12/16				
DRAWN	W.PIROMYDD	30/11/16				
DRAWING TITLE:						
ELECTRICAL SCHEMATIC FOR SOLAR PARK						
PROJECT NAME:						
Sheet	Drawing No	Rev				
SH		00				
SCALE:	UNITS:	PAPER SIZE				
SEE ABOVE	MM	A2				

Source: Zero Point Energy, 2016

3.1.2 Proposed Construction Activities and Facilities

The duration of the construction phase is estimated to be 6 to 8 months and will involve the construction and assembly of the PV panels, electrical systems, buildings, and other infrastructure required for the operation of the plant. In this regard, the activities and/or facilities relevant to the construction phase are listed below, with further details provided thereafter.

- Site establishment and the construction of access roads and services
- Site clearing and earthworks
- Bulk material laydown and assembly plant
- Consumable stores
- Temporary workshop
- Power supply and use
- Water supply, storage, and use
- Construction site camp office
- Staff facilities
- Management and administration
- Waste management

3.1.2.1 Site Establishment

Prior to construction of the project infrastructure, the necessary security and access controls will be implemented and temporary access route established off Hebbard road. Access control and security will be required for health, safety, and security reasons. The project site will be enclosed by means of the relevant security measures. This will keep both the surrounding residents and land user's safe from possible incidents and keep the project proponents' investment safe. A security office with security personnel and associated communication network will be maintained throughout the project phases. The most intensive road use is expected to take place during the constructions phase.

On-site gravel access roads will be developed to facilitate access to the infrastructure including storm water management adjacent to the roads. In summary, the gravel access roads will be developed in alignment with the following basic specifications:

- Maximum of 4m wide with 1m ditches for the support of the drainage system (if necessary)
- Built with gravel aggregate (i.e. crushed stone, gravel/quarry-run) sourced from local aggregate suppliers, where possible
- Base layer up to 15cm thick compacted to the 95% Proctor (AASHTO)
- 40cm minimum of subgrade preparation

3.1.2.2 Clearing and Earthworks

Earthworks may be required prior to the establishment of infrastructure and for the preparation of foundations of the PV panel mounting structures, inverter and transformer units, the electrical control structures and buildings and other structures. In this regard, vegetation and topsoil will be stripped at the location of surface infrastructure. Topsoil will be stockpiled for use in decommissioning and rehabilitation of construction facilities.

3.1.2.3 Laydown

The final activity layout within this area will be finalised in conjunction with the appointed construction contractor to ensure that the options are practical as well as environmentally sound. This area may be of a temporary nature and would be decommissioned and rehabilitated (as required) once construction is finished.

3.1.2.4 Stores

Consumables will be stored according to use and pollution potential in appropriately designed and operated storage facilities. Bulk chemicals will be stored in storage tanks, and most other chemicals will be stored in returnable delivery containers. This area may also be used for assembly and construction of the PV panels prior to installation on mounting structures. Following the construction phase, it is envisaged that this area continues to operate as the operational materials and consumables storage facility or be used for the installation of additional PV panels.

3.1.2.5 Fuelling

Various construction equipment and vehicles will require refuelling during the construction phase. All refuelling will be undertaken at offsite refuelling stations.

3.1.2.6 Maintenance

On-site maintenance and repairs of construction equipment and vehicles will be undertaken in a temporary workshop maintenance facility. Drip trays will be used to prevent contamination of the ground when the vehicles are parked.

3.1.2.7 Power Supply

Power will be required during the construction phase of the project. It is proposed that this power be sourced from the existing transmission lines / point of connection. The necessary applications for the connection to the grid will be submitted to the City Power for approval. In the event the project cannot draw its construction supply from the City Power network, diesel generators will be brought to site as auxiliary/construction power supply.

3.1.2.8 Water Supply

Water will be required during the construction phase for general building activities, washing of equipment, dust suppression as well as for staff use (potable water). The water consumption requirements for the proposed project during construction is estimated at approximately 1 000m³ per month for the duration of the construction period (± 6-8 months).

Due to the location of the site it is proposed that the project will utilise and develop its own water provision services since these services do not reach the project site.

Accordingly, construction water may need to be sourced through the following options until the operational water supply system is in place.

- Municipal potable water from a nearby municipal connection point or
- Trucked to site with a water bowser (i.e. Water sourced from a suitable municipal source)

3.1.2.9 Construction Site Camp

During the construction phase, management and administration facilities with associated kitchen and ablutions will be required to facilitate construction activities, manage procurement, maintenance, and waste management activities as well as for the daily running of the construction camp and associated staff facilities. No construction camp will be erected on site as workers will enter and exit the site on a daily basis.

3.1.2.10 Waste Management

During the construction phase, general and inert building waste, as well as hazardous construction waste will be generated. Sewage/effluent waste will also be generated at the construction camp and ablution and sanitation facilities. The duly authorised service provider will provide all waste management services. All wastes will be disposed at appropriate full permitted facilities and/or licenced landfills. Records of the volumes of waste removed and safe waste disposal certificates will be kept on site for inspection purposes. This will be the responsibility of the appointed contractor and a copy of such records are to be provided to SolarReserve for record and audit purposes. The service agreement with the appointed contractor will be put in place once the contract has been awarded.

3.1.2.8.1 General and Inert Building Waste

General and inert building waste will be collected in bins and skips and temporarily stored in the designated general and building waste storage area in covered, tip proof waste skips for collection and disposal by an appropriate waste contractor. The burying and/or burning of refuse/waste will not be permitted at any time. The mixing of general and building waste with hazardous materials will not be permitted on-site. Waste separation will occur before waste is placed in the waste skips, where possible.

3.1.2.8.2 Hazardous Waste

Hazardous waste material generated during the construction phase (such as used lubricants and chemicals and empty containers/packaging from potentially contaminating consumables) will be temporarily stored on site prior to collection and disposal at a license hazardous waste disposal facility. This storage area will be bunded, under cover and located on an impermeable surface. The storage facility will be designed to ensure compliance with the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEMWA).

3.1.2.8.3 Sewage/effluent

Ablution and sanitation facilities will be located within the contractors' site offices/camp and readily accessible to all employees. All sewage/effluent water originating from the construction camp will be managed utilising temporary portable chemical toilets and portable modular sewage treatment facilities. These facilities will be maintained and serviced regularly by an appropriate services provider who will dispose of the sewage/effluent at municipal sewage treatment works.

3.1.2.11 Fire Protection

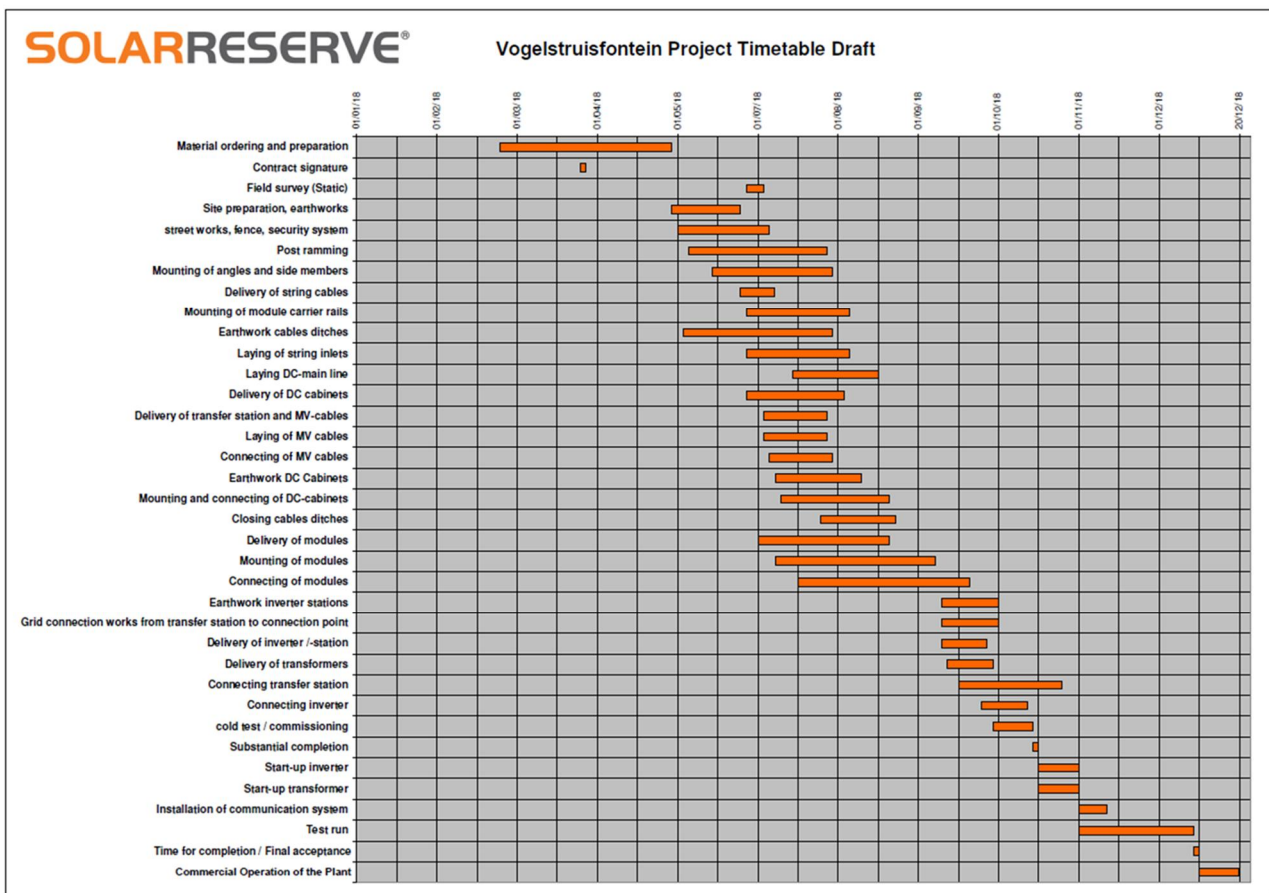
A fire protection and prevention plan will be prepared for the construction phase of the project. The primary aim of this system will be to preserve and protect human life as well as tangible goods and equipment in the event of a fire. The fire protection system will employ measures to reduce the occurrence of fire in the event of an explosion as well as to contain and prevent fires from happening or entering the site/plant. A construction phase fire protection and prevention

plan will be instituted accordingly. During construction, the SR PVP will be serviced with an intermediate fire protection system which may entail an auxiliary pressure pump, fire extinguishers and other portable fire-fighting equipment. In addition, a fire break along the site perimeter will be maintained.

3.1.2.12 Envisaged Construction Schedule and Operational Hours

The construction phase is anticipated to last approximately 6 to 8 months, depending on the City Power connection works time schedule. Construction hours will be according to standard industry practice and/or as any deviation that is approved by the relevant authorities. Figure 12 provides an overview of the envisaged construction activities and schedule for the proposed SR PVP development.

Figure 12: Envisaged SP PVP Construction Activities and Schedule



Source: SolarReserve, 2017

3.1.2.13 Decommissioning of Construction Activities

Upon completion of the construction phase, all temporary construction facilities may be decommissioned and removed from site. Cement/concrete slabs allowed for foundation structures would then be removed and compacted and disturbed soils will be ripped and rehabilitated with appropriate natural vegetation in alignment with the sites rehabilitation plan.

Some facilities such as stores and maintenance areas, may be utilised during the operation phase of the project and will remain on site and be managed as operational facilities accordingly.

3.1.3 Proposed operational activities and facilities

The operational phase will commence with the commissioning of the PV plant and automated electrical systems, as well as the day-to-day management and maintenance of associated support services and infrastructure. The envisaged lifespan of the proposed SR PVP is approximately 20-25 years however this could be extended via future equipment and system upgrades and/or replacement.

The activities and/or facilities relevant to the operational phase are listed below, with further details provided thereafter.

- Access and security services
- Generation of electricity using PV technology
- Operational power supply and use
- Maintenance and repair to operational equipment
- Storm-water management infrastructure
- Fire protection for plant services and infrastructure.

3.1.3.1 Access and Security

During the construction phase, access to the property will be via a constructed temporary gravel access road from Hebbard Road, off Main Reef Road. The permanent access road to the site for the operational phase of the site will be via Kloppers street, off Albertina Sisulu road. During operations, Klopper street road usage will mostly be limited to staff, for cleaning of PV panels and deliveries of consumables.

Access control and security will be required for health, safety, and security reasons. The project site will be enclosed by means of the relevant security measures. This will keep both the surrounding residents and land user's safe from possible incidents and keep the project proponents' investment safe. A security office with security personnel and associated communication network will be maintained throughout the project phases.

3.1.3.2 Operational Power Supply

Electricity produced via the proposed SR PVP will be exported to the City Power network. The exact operational profile of the plant would be dependent on generation controlled by the power purchaser's economic dispatch decisions and portfolio resource scheduling, transmission constraints and other factors, as well as on weather conditions. It is anticipated that the plant itself will supply in its own operational power requirements during the day, whilst power will be drawn from the grid at night.

3.1.3.3 Water Supply and Use

The proposed PV plant will require approximately 1000m³ of water per annum during the operational phase of the project. Water during this phase will be required for the uses listed below:

- PV panel cleaning
- Service water for maintenance

- Potable use and ablutions
- Dust suppression
- Irrigation during rehabilitation
- Fire protection water

3.1.3.4 Procurement, Storage, and Use of Consumables

It is envisaged that all general consumables will be stored on-site, however maintenance related consumables, such as panels or speciality items will be stored at an off-site and dispatched to site as and when required.

3.1.3.5 Maintenance and Repair Facilities

It is envisaged that maintenance teams will be based off-site and dispatched to the plant as and when required to undertake routine operational management and maintenance. PV panel cleaning will be done via tanker trucks specially fitted with high-pressure washers. These trucks are filled with demineralized water and then driven slowly through the PV array, spraying high pressure water onto the panels effectively removing any accumulated dust or foreign matter. Biodegradable detergents may be used in this regard.

Any bird nests on the infrastructure will be removed to reduce fire risks. Removal of the nets will be undertaken in alignment with an avifauna specialist's recommendations.

3.1.3.6 Waste Management

The operation phase of the SR PVP may generate both liquid and solid waste streams, comprising general/domestic, hazardous waste and sewage. The liquid waste shall mainly include sewage effluent. In addition to the above, limited emissions from equipment and machinery are also expected. It is noted that no waste will be disposed of on-site. The service agreement with the appointed contractor will be put in place once the contract has been awarded.

Primary Wastewater Collection System

The SR PVP is expected to create a minimal amount of wastewater. The source of waste water would be the water used for washing the PV panels at set intervals and dirty area surface runoff. To the extent practicable, wastewater will be recycled and reused to reduce the amount of effluent generated and removed for disposal.

Plant Drains and Oil/Water Separator

General plant drains may be used to collect containment area wash down and drainage from facility equipment and maintenance area drains. Water from these areas may be collected in a system of floor drains, hub drains, sumps, and piping and routed to a primary wastewater collection system. Drains that potentially could contain oil or grease would first be routed through an oil/water separator.

Operational Sewage/Effluent

Sewage/effluent waste streams may be generated from the ablution facility. As and when required, the septic tank (solids holding tank) will be cleaned out by a vacuum truck and the wastes trucked and disposed at a licensed facility. This activity will adhere to the plant safety program as administered by plant personnel.

Solid Waste

The plant will produce solid wastes typical of PV power generation operations. All waste generated on site will be subject to the principal of “Reduce, Reuse and Recycle” as far as possible before disposal is regarded as an option. Plant wastes include broken and rusted metal and machine parts, defective or broken electrical materials, empty containers, broken PV panel components and other solid wastes including the typical domestic refuse generated by staff. Solid wastes will be temporarily stored on site and trucked offsite for recycling or disposal at a suitable recycling facility or licensed landfill site in the vicinity once sufficient volume is available warranting disposal and/or recycling. The responsibility regarding the management of the wastes generated on site will be that of the O&M contractor.

Management of Hazardous Waste

Hazardous wastes generated by the proposed SR PVP such as used oil from electrical systems, empty chemical containers, and lubricants from maintenance of equipment will be properly managed and disposed of. These waste materials will be temporarily stored on site in appropriate containers (depending on whether in liquid or solid state) in an impermeable bunded and covered area prior to collection by a licenced waste contractor for recycling or disposal at an appropriately licensed facility. The storage facility will be designed as per the typical Good Industry International Practice (GIIP) regarding the storage and management of hazardous wastes. Plant personnel and maintenance workers will be trained to handle hazardous wastes generated at the site in accordance with all applicable regulations and protocols.

Emissions

Powered equipment such as operational and maintenance vehicles and equipment and stand-by generators will be well maintained in order to ensure exhaust emissions are within manufacturer specifications. Powered fire pumps and emergency generators will only be operated during bona fide emergencies and periodically for brief periods, as required by relevant codes and standards, for reliability testing or maintenance within strict limitations on acceptable fuels and maximum allowable run hours.

3.1.3.7 Storm Water Management

The proposed SR PVP will be maintained in a relatively natural state, with regard to natural vegetation and soil type. Most of the rainfall falling in this area will infiltrate into the ground whilst surface runoff that does occur will drain towards a preferential flow paths exiting the project site. A clean water channel will have to be constructed to limit the width of flow in this preferential flow path, such that surface runoff is collected and safely removed from the project site.

The clean water runoff will be diverted around the project area and discharged to the nearest low point. A silt trap is proposed at the outlet of one of the clean water channels and was sized based on daily anticipated flows which are taken conservatively as the 1:2 year storm event, whilst the spillway sizing for the silt trap is designed to cater for the 1:50 year storm event. The conceptual design will feed into the detailed storm water management plan which will be finalised prior to construction.

4 Need and Desirability of the proposed SR PVP

4.1 Need and Desirability of the Activity

The bulk of South Africa's power is generated by coal-fired power stations and several new coal-fired power stations are being planned to meet the ever-increasing demand for power. This makes coal South Africa's primary energy resource. Beyond the fact that coal is not a renewable resource, the burning of coal for the generation of electricity has a very negative impact on the environment from the point of view that vast amounts of CO₂ and other hazardous air pollutants are released into the atmosphere. These pollutants are contributing to the ever-growing concern of the greenhouse effect and global warming. Currently, Johannesburg is facing issues of environmental decay. The city is ranked 13th in the world of Greenhouse Gas (GHG) emitters, which is the largest GHG City is South Africa (City of Johannesburg IDP, 2017).

South Africa is a signatory to the United Nations Framework Convention on Climate Change committing to the stabilization of atmospheric greenhouse gas concentrations at a level that would prevent dangerous anthropogenic interference with the climate system. With this commitment in place and the ever-growing need for power, South Africa needs to expand its generation capacity through the development and utilisation of alternative resources, which are renewable and more environmentally sustainable (SolarReserve, 2014). South Africa's climate is ideal with regards to solar resources, with a broad time band of sunlight and a high level of energy delivered by area of land. Utilising this solar resource in combination with the proposed battery storage makes it an ideal system in the generation of renewable energy.

The proposed SR PVP is designed to meet the increasing demand for clean, renewable electrical power in South Africa, not only on a national scale but also for the smaller offtakers. The multiple benefits associated with developing renewable energy infrastructure have been recognized by local, regional, and national policy makers. Development of solar resources reduces the reliance on foreign sources of fuel, promotes national energy security, diversifies energy portfolios, and contributes to the reduction of GHG emissions at the same time creating many jobs within a new industry while at the same time raising the core knowledge bases of the country (SolarReserve, 2014).

The Johannesburg IDP 2017 highlights a number of outcomes and priorities to create an enabling economic environment by making Gauteng more responsive in the delivery of quality services. The proposed SR PVP promotes a green economy that is in line with the Integrated Development Plan (IDP) of the City of Johannesburg (COJ) as well as the Gauteng Vision 2055 Economic Development white paper. In addition, Priority 1 of the IDP aims to "promote economic development and attract investment towards achieving 5% economic growth in COJ" (IDP, 2017), which can be accomplished through investment in infrastructure, more specifically strategic infrastructure. Electricity is key to attracting investment, as well as to foster and stimulate a climate where investment can grow. This plays reference to Priority 7 and Priority 9, which aims to "enhance our financial sustainability" and "preserve our resources for future generations" respectively (IDP, 2017). The Spatial Development Framework 2040 (SDF, 2040) also highlights the importance of taking inefficient land use and unsustainable land markets to synchronizing public and private investment around transformation areas. This project aims to take electricity constrained brownfield areas and transforming them into growth nodes for local municipalities, surrounding communities and commercial industries.

4.2 Benefits that the Activity will have for Society in General

The following benefits are anticipated for society in general should the project receive a positive environmental authorisation and be developed include but is not limited to:

- Contribute towards the R20 billion investment to be facilitated within the City of Johannesburg (COJ) (IDP 2017):
 - The SR PVP will result in an approximate R4 billion investment into the COJ over a five-year period and will foster, socio-economic and economic upliftment as well as increase the city's Gross Domestic Product.
- Contribute towards the 10 000 additional Small Medium Micro Enterprises (SMMEs) supported in the city (IDP 2017). The SR PVP will result in:
 - Procurement from local manufacturers and suppliers will promote the development of secondary industries.
 - Retaining local businesses that seek access to affordable sustainable electricity.
- Enhance service delivery by contributing towards meeting the current energy demand in Johannesburg.
- Contributes towards the expansion of renewable energy sector in the country, aiding in the reduction of emissions to the atmosphere.
- The project will allow for spatial connectivity and integration by establishing the ability for the area to support a wide range of urban users and operators, through the distribution of clean energy around Johannesburg (SDF 2040, 2017).
- Improve city-wide infrastructure through the development of cleaner energy
- The additional generation capacity will assist in grid stabilisation and thereby reduce potential negative impacts to businesses and GDP, stimulating economic growth in areas where there were previous power shortages.
- Decreases the frequency of electricity outages by providing additional generating capacity from an alternative renewable energy source.

4.3 Benefits that Activity will have for the Local Community where the Activity is Located

In line with the IDP KPIs this project will allow the COJ, in association with City Power to achieve its goals of creating a culture of enhanced service delivery as well as creating a city that responds to the needs of its residents. This project will benefit the local community where the activity is located by:

- Providing clean renewable energy to the surrounding residential and industrial/commercial community.
- Creating employment opportunities (temporary and permanent) and skills development of those employed during the life of the project, both directly and peripheral.
- Community upliftment with improved health and safety in the near vicinity of the Urban Solar Farms (USF) by the conversion of brownfield defunct, vacant land to land of a commercial nature:
 - Re-utilisation of a site currently being used for illegal dumping and mining and transforming it into a commodity for commercial and local usage.
 - Enhance security of the area by controlling access between the residential areas to the north and industrial/commercial area to the south, acting as a high-tech buffer zone.

- This project will ensure high productivity and quality of life through higher levels of equity and social inclusions during all aspect of the projects development and during operation phase of the project.

The project will consolidate and grow the primary economic area by diversifying the economy of the region from primarily residential and industrial to more commercial value thus allowing the primary residential area to function as an urban area in its own right (SDF 2040, 2017)

The following benefits for the local community are expected:

- Employment creation (temporary and permanent) and skills development of those employed during the life of the project:
 - A total of ± 200 new employees will be sourced for the project over 6 to 8 months during the construction phase. Where possible, those to be employed will be sourced from previously disadvantaged backgrounds.
 - Approximately 10 permanent employees will be employed during the operational phase of the project to operate and maintain the facility.
- Community upliftment with improved health and safety in the near vicinity of the PVP by the conversion of brownfield defunct, vacant land to land of a commercial nature.
- Rehabilitation of a site currently being used for illegal dumping.
- Enhance security of the area by controlling access between the residential areas to the north and industrial/commercial area to the south.

5 Project alternatives

5.1 Alternatives assessment method statement

In accordance with Appendix 1 – Basic Assessment Process, as promulgated under the 2014 EIA Regulations and as amended in 2017, no “alternatives” underwent a comparative assessment in terms of (a) property on which or location where the activity is proposed to be undertaken (b) type of activity to be undertaken (c) design or layout of the activity (d) technology to be used in the activity or (e) operational aspects of the activity; and includes the option of not implementing the activity.

This section will provide the required motivation as to why no alternative comparative assessment was undertaken for the activity in accordance with section 3 (h) (x), of Appendix 1 of the 2014 EIA Regulations as amended in 2017.

(a) Property on which or location where the activity is proposed to be undertaken

SolarReserve (The Applicant) undertook pre-feasibility site selection assessment in order to determine if the Project Site complies with the primary feasibility parameters for a facility of this scale and nature and in order to ensure the site proposed for the solar power development is secured by means of a commercial Option Agreement. Project sites for these facilities, are subject to several external (non-environmental) parameters which could ultimately deem a project unfeasible if they do not comply with the minimum requirements, thus site selection i.e. location alternatives are derived before the environmental impact assessment process commences. These parameters include:

- Location to substation/evacuation point
- Resource determination
- Location and availability of services
- Point of delivery (where the electricity is needed)
- Topographical constraints
- Land use & Site ownership
- Environmental constraints such as surface water resource features¹

Three potential candidate project sites (Vogelstruisfontein USF, Heriotdale USF and Robertsham USF) were identified by SolarReserve via a rapid site selection assessment process (Figure 13). The three USF candidate sites were pre-selected based on location, land availability, land ownership, cost, ease of permitting, financial viability based on facility MW capacity and potential environmental and social constraints.

5.1.1.1 Heriotdale USF

The proposed alternative Heriotdale site (GPS location: 26° 12' 50,58" S 28° 05' 49,35" E) is located approximately 7km south east of Johannesburg central business district. Planned land-use for the 5ha parcel of land is that of mixed-use development including warehousing and office development. Development of an USF would provide 3MW's of power to the surrounding area and its industries. After further investigation, it was determined that this site was too small for the development of an USF.

¹ This is considered as a fatal flaw analysis – where the environmental features prominent and present on site will deem the surface area too small for development if the required buffers and no-go area are implemented such as water resources or ridges.

5.1.1.2 Robertsham USF

The proposed alternative Robertsham site (GPS Location: 26°15'4.77" S 28°1'25.02" E) is located approximately 5km south west of Johannesburg central business district. The 60ha parcel of land is a historical tailings facility. Option on the site surface rights with property owner i-Prop to develop the old mine dump into a 40MW (Approximately 81 000MWh annual yield) USF with connection into City Power network was initially feasible however early into the option and lease agreement negotiations, a number of issues developed with regards to ownership of the property and thus SolarReserve could no longer proceed with this site.

5.1.1.3 Vogelstruisfontein (Selected Project Site – SR PVP)

The Vogelstruisfontein site (GPS Location: 26° 11' 8.56" S 27° 55' 0.35" E) is accessed from Hebbard Road, off Main Reef Road, located in Roodepoort area within City of Johannesburg Municipal district. The site was selected as the project site as it was large enough for the proposed solar farm. There are limited environmental challenges regarding the development of the site compared to the alternatives. Grid connection points are available close to the site. Compatibility of land use and the opportunity to convert historical defunct mining land to an economically viable land use.

5.1.1.4 Preferred location alternative

Of the three considered alternative candidate sites, the proposed Vogelstruisfontein site was identified as the preferred site for the establishment of a USF as the site had the least environmental and social constraints and the site was sufficiently large to allow for a financially viable USF development.

(b) Type of activity to be undertaken

The type of activity assessment was not undertaken as part of this assessment and was discounted based on the needs and desirability of the activity. The project aligns directly and indirectly with the City of Johannesburg' development programme for the next 5 years and their intent and support for a project of this nature is captured in their IDP

The Johannesburg IDP 2017 highlights a number of outcomes and priorities to create an enabling economic environment by making Gauteng more responsive in the delivery of quality services. The proposed SR PVP promotes a green economy that is in line with the Integrated Development Plan (IDP) of the City of Johannesburg (COJ) as well as the Gauteng Vision 2055 Economic Development white paper. In addition, **Priority 1** of the IDP aims to "promote economic development and attract investment towards achieving 5% economic growth in COJ" (IDP, 2017), which can be accomplished through investment in infrastructure, more specifically strategic infrastructure. Electricity is key to attracting investment, as well as to foster and stimulate a climate where investment can grow. This plays reference to **Priority 7 and Priority 9**, which aims to "enhance our financial sustainability" and "preserve our resources for future generations" respectively (IDP, 2017). The Spatial Development Framework 2040 (SDF, 2040) also highlights the importance of taking inefficient land use and unsustainable land markets to synchronizing public and private investment around transformation areas. This project aims to take electricity constrained brownfield areas and transforming them into growth nodes for local municipalities, surrounding communities and commercial industries.

(c) Design or layout of the activity

The design or layout assessment was not undertaken as part of this assessment and was discounted as the layout was finalised in order to ease connectivity to the Florida/Sentraal substation, as well as optimise the feasibility and efficiency of the solar power plant. However, it should be noted that the transformers and battery storage containers were located closest to the substation and within the acceptable distance from the Florida Lake and man-made canal to minimise the environmental impacts. Based on this evaluation SolarReserve has indicated that this is their preferred design and layout as it has the shortest connection point with the least environmental impacts.

(d) Technology to be used in the activity or

The environmental impacts differ between PV technologies. The primary differences which affect the potential for environmental impacts relate to the extent of the project development area, or land-take (disturbance or loss of habitat), as well as the height of the facility (visual impacts). Two solar energy technologies were considered for the proposed project and include:

- Fixed / static PV panels
- Tracking PV panels (with solar panels that rotate to follow the sun's movement)

The PV panels will be fixed to a support structure, set at an angle so to receive the maximum amount of solar radiation, or mounted to a tracking frame. The angle of the fixed panel is dependent on the latitude of the proposed Project and the angles may be adjusted to optimise for summer or winter solar radiation characteristics. Alternatively tracking technology (which tilts to follow the sun's movement) ensures, in terms of energy production, an advantage of about 25% capacity compared to the fixed or static technology.

5.1.1.5 Fixed mounted PV system

In a fixed mounted PV system (fixed-tilt), PV panels are installed at a pre-determined angle from which they will not move during the lifetime of the plant's operation. The limitations imposed on this system due to its static placement are offset by the fact that the PV panels are able to absorb incident radiation reflected from surrounding objects. In addition, the misalignment of the angle of PV panels has been shown to only marginally affect the efficiency of energy collection. There are further advantages which are gained from fixed mounted systems, including:

- The maintenance and installation costs of a fixed mounted PV system are lower than that of a tracking system, which is mechanically more complex given that PV mountings include moving parts
- Fixed mounted PV systems are an established technology with a proven track record in terms of reliable functioning. In addition, replacement parts are able to be sourced more economically and with greater ease than with alternative systems
- Fixed mounted systems are robustly designed and able to withstand greater exposure to wind than tracking systems
- Fixed mounted PV systems occupy less land space than the tracking systems as tracking systems must be spaced in order to avoid shading one another as they track the sun

5.1.1.6 Tracking system

Tracking PV System (single axis or dual axis trackers) are fixed to mountings which track the sun's movement. There are various tracking systems. A 'single axis tracker' will track the sun from east to west, while a dual axis tracker will in addition be equipped to account for the

seasonal waning of the sun. These systems utilise moving parts and complex technology, including solar irradiation sensors to optimise the exposure of PV panels to sunlight. The tracking system can generate up to 25% more energy than fixed mounting systems. Tracking systems are a newer technology and require consideration of the following:

- A high degree of maintenance is required due to the nature of the machinery used in the system, which consists of numerous components and moving parts. A qualified technician is required to carry out regular servicing of these parts, which places a question on the feasibility of this system given the remote location of the proposed project site
- A larger project development site is required for this system given that the separate mountings need to be placed a distance apart to allow for their tracking movement and avoid shading of PV arrays.

The PV panels are designed to operate continuously for more than 20 years, unattended and with low maintenance.

5.1.1.7 Preferred technology alternative

A fixed / static PV panel technology is considered the preferred alternative for the SR PVP due to the lower maintenance requirements, reduced project footprint and the installation costs are lower.

(e) Operational aspects of the activity

In line with the technology alternatives that were considered during the pre-feasibility phase of the project, the operation aspects of the project were assessed. The preferred technology is a very low maintenance installation which will reduce and limit possible future social impacts associated with PV project maintenance and management operations such as nuisance dust generation via cleaning vehicles. Based on these operational benefits, the operation aspects of the facility were not assessed but aligned with the lower impact technology alternative.

and includes the option of not implementing the activity.

The No-Go option regarding the proposed development of the SR PVP was discounted as the needs and desirability of the activity far outweighs the potential negative impact the facility will have on the receiving environment. *Please refer to Section 4 above which substantiates this decision.*

5.2 Interconnection and Power Export Options for the SR PVP

5.2.1 Background

The interconnection points for the proposed 33kV buried power transmission line is still under investigation and has not been concluded. Two interconnection options are under consideration, pending approval (Figure 2).

PLEASE NOTE: *These two options are not to be seen as alternatives for comparative assessment, but a singular evacuation alignment, which is solely dependent on approval by City Power. The power lines asset will not be owned by SolarReserve, but by City Power.*

- Option A) Florida substation (± 47 meters – Yellow line) located on Vogelstruisfontein 231IQ Portion 4 (Remaining extent) The applicant has indicated that this is their preferred option as it is the shortest connection point with the least environmental impacts (Figure 2).
- Option B) Sentraal substation connecting into City Power's 33kV (± 1.7 km – Blue & green line) located on located on Vogelstruisfontein 231IQ Portion 4 (Remaining extent) and Vogelstruisfontein 231IQ, portion 152 (Figure 2). This alignment will trigger a Water Use Licence - General Authorisation (WUL – GA) due to the corridor crossing an artificial man-made canal which is considered as wetland under the National Water Act, 1998 (Act No. 36 of 1998).

As stated the two interconnection alignments are subject to an approval process from City Power. The application process is a very lengthy and detailed process in order to secure the interconnection point and entails the following phases:

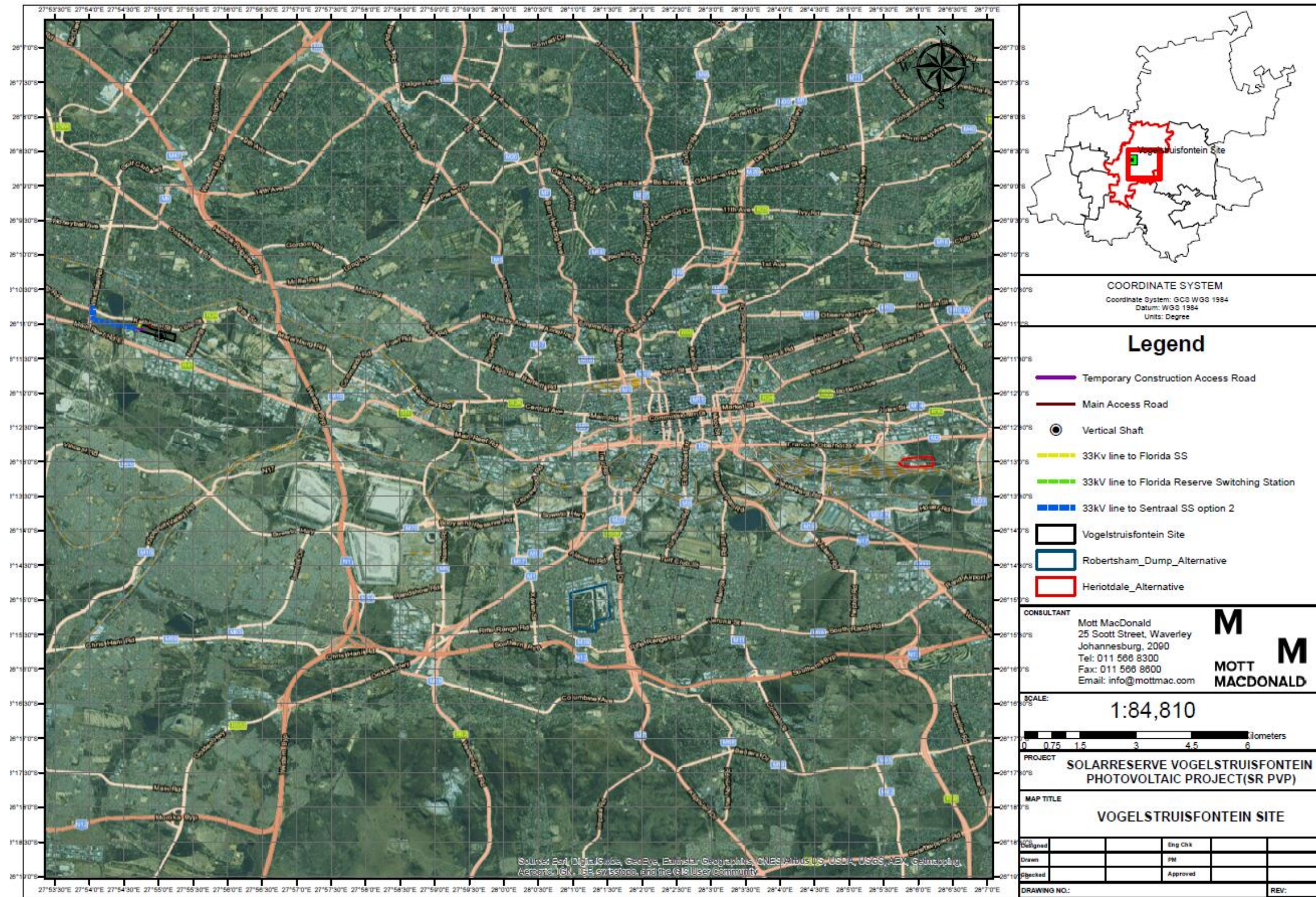
- The IPP makes an application to the City Power Infrastructure Planning Department for connection of the proposed generation facility to the City Power electrical network
- Based on the merit of the proposed project/facility, the applicant presents the concept design of the generation facility to the Planning Evaluation Committee (PEC) of the City Power Planning Department
- On evaluation and approval of the concept design, City Power Planning department issues a non-binding letter of support (see attached) to the IPP confirming the technical feasibility of connecting the proposed connection facility to the City Power electrical network. This Letter is issued for the purposes of NERSA generation license application and / or completion of other regulatory process
- On successful approval of generation license and/or other pertinent approvals, City Power Planning Department invites the applicant to present the detailed technical design of the generation facility (up to the point of connection to the city power grid) at its Technical Evaluation Committee (TEC). On approval of the detailed technical design by the TEC, City Power issues the IPP with a 'letter of quotation' for part of grid connection works that City Power needs to undertake. A separate self-built agreement will need to be signed between City Power and applicant for the part of grid connection works that needs to be undertaken by the applicant. On successful completion of the works, City Power commissioning team will perform necessary technical checks and commissioning tests prior to commissioning and export of power by the proposed facility

Only once this process has been concluded will City Power Commit to the interconnection evacuation point.

5.2.2 Preferred transmission line connection option

Based on the, it is requested that both alignments be approved, as City Power ultimately holds the authority to instruct the Applicant where to evacuate power. It needs to be noted, that only one of the alignments will be constructed and the asset handed over to City Power for the life of asset.

Figure 13: Considered Alternative Sites in Relation to the proposed SR PVP Vogelstruisfontein site



Source: Mott MacDonald, 2017

6 Applicable Legislation, Policies and Guidelines Considered

6.1 National Environmental Management Act, 1998 (Act no. 107 of 1998 as amended) and Associated EIA Regulations

In terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), as amended and the EIA Regulations, 2014 as amended by the 2017 regulations, an application for environmental authorisation (EA) for certain listed activities must be submitted to either the provincial environmental authority, for this project - the Gauteng Department of Agriculture and Rural Development (GDARD), or the national authority the Department of Environmental Affairs (DEA), depending on the nature of activities being applied for. In the case of the SR PVP project and due to the small scale of the project it is likely that the provincial department GDARD will undertake the assessment of the application rather than the national department DEA as the project is not part of the larger Independent Power Producer Procurement Programmes (IPPPP) currently underway in South Africa.

The current EIA regulations, GN R. 982, GN R. 983, GN R. 984 and GN R. 985, promulgated in terms of Sections 24(5), 24M and 44 of the NEMA, commenced on 8 December 2014. These regulations have subsequently been amended as of 7 April 2017 by GN R. 324, GN R. 325, GN R. 326 and GN R. 327. GN R. 983 (amended by GN R. 327) lists those activities for which a Basic Assessment (BA) is required GN R. 984 (amended by GN R. 325) lists the activities requiring a full EIA (Scoping and Impact Assessment. GN R. 985 (amended by GN R. 324) lists those activities for which a Basic Assessment (BA) is required within a specific identified geographical area and via the respective competent authority. GN R. 982 (amended by GN R. 326) defines the BA/EIA processes that must be undertaken to apply for an EA under NEMA.

Regarding the proposed SR PVP project, the following listed NEMA activities are triggered as displayed in Table 7.

Table 7: SR PVP NEMA Triggered Listed Activities

Government Notice:	Activity No	Listed activity description as per the listing notices:	SR PVP activity triggering the listed activity
GN 983 (2014) Listing notice 1, (amended by GN R327, 2017)	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.	Integrated battery storage units include dangerous goods (i.e. wet cell deep cycle batteries)
	26	Residential, retail, recreational, tourism, commercial or institutional developments of 1 000 square metres or more, on land previously used for mining or heavy industrial purposes; excluding — (i) where such land has been remediated in terms of part 8 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies; or (ii) where an environmental authorisation has been obtained for the decommissioning of such a	Commercial development exceeding a footprint in excess of 1000m ²

Government Notice:	Activity No	Listed activity description as per the listing notices:	SR PVP activity triggering the listed activity
		mine or industry in terms of this Notice or any previous NEMA notice; or (iii) where a closure certificate has been issued in terms of section 43 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) for such land.	
	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.	Clearance of an area of greater than 1ha hectare of indigenous vegetation but less than 20 hectares
GN 985 (2014), Listing notice 3, (amended by GN R324, 2017)	4	The development of a road wider than 4 metres with a reserve less than 13,5 metres. c. Gauteng xii. Sites zoned for conservation use or public open space or equivalent zoning.	Development of the temporary construction access road and infrastructure access roads for equipment maintenance etc.
	10	The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres. iv. Sites identified as Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans vi. Sensitive areas identified in an environmental management framework adopted by the relevant environmental authority xi. Sites zoned for conservation use or public open space or equivalent zoning	Integrated battery storage units include dangerous goods (i.e. wet cell deep cycle batteries)
	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. c. Gauteng 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 or Ecological Support Areas identified in the Gauteng conservation Plan or bioregional plans; or iii. 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.	Clearance of an area of greater than 300m ² of indigenous vegetation
	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. b. Gauteng i. All areas.	The transformation of land bigger than 1000m ² to, commercial use, where, such land was zoned open space, conservation or had an equivalent zoning

Source: NEMA (Act No. 107 of 1998): EIA Regulations, 2014 as amended by the 2017 regulations

Note: NEMA EIA Activity 11 as per GN 983 (2014), Listing notice 1, amended by GN R327, 2017: “*The development of facilities or infrastructure for the transmission and distribution of electricity: (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts; or (ii) inside urban areas or industrial complexes with a capacity of 275 kilovolts or more*” is not triggered as the proposed project falls within an urban environment and the proposed transmission line voltage falls below the 275 kilovolts limit.

6.2 National Water Act, 1998 (Act No. 36 of 1998) (NWA)

The National Water Act, 1998 (Act No. 36 of 1998) (NWA) is South Africa’s primary legislation regulating the use of water as well as the pollution of the water resources. Application and enforcement of the Act falls within the mandate of the Department of Water & Sanitation (DWS).

Section 19 of the Act regulates water resource pollution, defined as “*the direct or indirect alteration of the physical, chemical or biological properties of a water resource so as to make it:*

- *Less fit for any beneficial purpose for which it may reasonably be expected to be used; or*
- *Harmful or potentially harmful to:*
 - *The welfare, health, or safety of human beings*
 - *Any aquatic or non-aquatic organisms*
 - *The resource quality*
 - *Property”*

The persons held responsible for taking measures to prevent pollution from occurring, recurring, or continuing include persons who own, control, occupy or use the land. This obligation or duty of care is initiated where there is any activity or process performed on the land (either presently or in the past) or any other situation which could lead or has led to the pollution of water.

The following measures are prescribed in Section 19(2) of the Act regarding pollution prevention:

- Cease, modify or control any act or process causing the pollution
- Comply with any prescribed standard or management practice
- Contain or prevent the movement of pollutants
- Eliminate any source of the pollution
- Remedy the effects of pollution
- Remedy the effects of any disturbance to the bed or banks of a watercourse

Section 21 of the Act lists activities for which a Water Use Licence (WUL) is required include the following activities:

- a. *Taking water from a water resource;*
- b. *Storing water;*
- c. *Impeding or diverting the flow of water in a watercourse*
- d. *Engaging in a stream flow reduction activity contemplated in Section 36;*
- e. *Engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);*
- f. *Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;*
- g. *Disposing of waste in a manner which may detrimentally impact on a water resource;*

- h. Disposing in any manner of water which contains waste from or which has been heated in, any Industrial or power generation process;*
- i. Altering the bed, banks, course, or characteristics of a watercourse:*
- j. Removing, discharging, or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and*
- k. Using water for recreational purposes.*

In addition, any development proposed within or within 500m of a watercourse requires a WUL. The proposed SR PVP project footprint falls outside the 500m limit however the proposed Option 2 buried 33kV transmission line from the onsite substation to the Sentraal substation (blue-green route) will cross and artificial HDPE and geotextile lined outflow canal from the Florida lake which drains southwards to the Fleurhof dam (Figure 2). Section 21 (c) and (i) water uses are therefore applicable to the SR PVP project.

Regarding the canal, any development within the flood line of the canal or its riparian zone needs to be authorised by DWS. Whether the transmission line therefore goes across the stream (overhead) or underneath via pipe jacking as in the case of the SR PVP, it will still cross the water resource stream and thus requires an authorisation.

Regarding the required WUL authorisation for the proposed SR PVP, the water use can be authorised in terms of a General Authorisation (GA) under GN R 509 of 26 August 2016. The WUL-GA authorisation is only applicable if the water use is of a low risk as determined according to the WUL-GA risk matrix. If the risk assessment yields a medium and/or high risk, a detailed WUL application will be required.

Considering that:

- The proposed SR PVP transmission line will be pipe jacked under the water resource from outside the riparian zone
- Considering that the canal is lined (i.e. an artificial canal)
- That there will be no water abstraction from the water resource
- Nor the discharging waste or water containing waste into the resource

It is anticipated that the construction and operation of the transmission line will provide a low risk rating as per the WUL-GA risk matrix thus allowing the activity to be licenced as a WUL-GA rather than as WUL.

6.3 National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEMWA)

The National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEMWA) was promulgated on 1 July 2009. One of NEMWA's key objectives is to reform the law regulating waste management within South Africa in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation while securing ecologically sustainable development and to provide for:

- National norms and standards for regulating the management of waste by all spheres of government
- Specific waste management measures
- Remediation of contaminated land

- Licensing and control of waste management activities
- Provide for the national waste information system
- Compliance and enforcement

Under NEMWA, certain waste management activities require licencing under Section 44 of the Act. The licensing procedure and process must be integrated with an EIA process in accordance with the EIA Regulations promulgated under NEMA. The proposed SR PVP project does not trigger any listed activities requiring a waste management license however waste management practices on site (throughout the project life cycle) will need to be managed in alignment with the project specific EMPr and accepted GIIP regarding waste management and waste management activities

6.4 National Heritage Resources Act, 1999 (Act No. 29 of 1999) (NHRA)

The National Heritage Resources Act, 1999 (Act No. 29 of 1999) (NHRA) governs the management of heritage resources which are of cultural significance within South Africa. The South African Heritage Resources Agency is the national body responsible for the protection of South Africa's cultural and heritage resources.

No significant mining infrastructure was observed on site other than remnant historic mine building foundation scars left behind when the mines were decommissioned. There is a vertical shaft located on the southern boundary of the SR PVP project footprint however this shaft was closed formally in October 2016 by the Department of Mineral Resources (DMR) A 40m buffer around the shaft has been proposed and will be maintained for safety reasons and to ensure that this infrastructure remains undisturbed by the project. No visible graves were observed on site nor other areas of potential cultural significance. These opinions are based on the site observations of the Mott MacDonald EAP's who undertook field site visits on the project footprints

6.5 Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA)

The Mineral and Petroleum Resources Development Act, 2000 (Act No. 28 of 2002) (MPRDA) came into effect on 1 May 2004 and governs mineral legislation in South Africa. The Department of Mineral Resources (DMR) is the mandated regulatory authority regarding the MPRDA and associated regulations. When the MPRDA came into effect, mineral rights that were privately owned were transferred to the State, to make provisions for equitable access to, and sustainable development of South Africa's mineral and petroleum resources.

The proposed SR PVP project is not a mining and or mining related project however as the project footprint and associated transmission lines are situated on historical mining land, some of which has been de-proclaimed, the MPRDA and associated regulations must be considered. For example, the project applicant, is required to undertake a Section 53 application regarding surface rights, communicate the nature of the project with any person holding a prospection and/or prospecting right on land to ensure that the project does not sterilization of any mineral resources.

6.6 National Environmental Management: Air Quality Act, 2004 (NEMAQA) (Act No. 39 of 2004)

NEMAQA shifted the approach of air quality management within South Africa from emission source based controls to the control of the receiving environment. NEMAQA's objectives are to protect the environment by providing legislative and other measures that:

- Prevent air pollution
- Reduce ecological degradation and promote conservation
- Secure ecologically sustainable development while using natural resources
- Promoting justifiable economic and social development in alignment with Sections 24a and 24b of the Constitution of the Republic of South Africa.

NEMAQA also devolved the mandate of air quality management in South Africa from the national sphere of government to the local sphere of government (district and local municipal authorities). Local municipalities are thus tasked with baseline characterisation, management and operation of ambient monitoring networks, licensing of listed activities, and emissions reduction strategies. Where local municipalities lack such capacity, the mandate is placed on the district municipalities.

6.6.1 Section 21 listed activities

NEMAQA made provision for the formulation and setting of national ambient air quality and emission standards. These standards may be set more stringently at a local and/or provincial level if required. The control and management of emissions in NEMAQA is achieved via Section 21 of the Act which relates to the listing of activities that are sources of emission and the issuing of Atmospheric Emission Licences (AEL's). In terms of Section 21 of NEMAQA, a listed activity is an activity which *'results in atmospheric emissions that are regarded to have a significant detrimental effect on the environment, including human health'*. The proposed SR PVP does not include any Section 21 listed activities and thus no AEL.

6.6.2 Ambient air quality standards

The South African National Ambient Air Quality Standards (NAAQS) for common atmospheric pollutants prescribe the allowable ambient concentrations of pollutants which are not to be exceeded during a specified time period in a defined area (Table 8). If the standards are exceeded, the ambient air quality in the area is defined as poor and potential adverse health impacts are likely to occur. If authorised to operate, the SR PVP's emission contributions to the ambient air quality levels must not exceed or cause exceedances of the ambient air quality standards.

Regarding SR PVP's ambient air emissions, it is anticipated that air emissions will only be experienced during the construction phase and are likely to include fine particulates (PM₁₀), dust fallout, and combustion emissions from construction vehicles and portable generators on site (*Note: combustion emissions are anticipated to be negligible due to their temporal nature*).

Table 8: South African Ambient Air Quality Standards for Criteria Pollutants

Pollutant	Averaging Period	Limit Value (µg/m ³)	Limit Value (ppb)	Frequency of Exceedance	Compliance Date
Sulphur dioxide (SO ₂) (a)	10 minute	500	191	526	Immediate
	1 hour	350	134	88	Immediate
	24 hours	125	48	4	Immediate
	1 year	50	19	0	Immediate
Nitrogen dioxide (NO ₂)(b)	1 hour	200	106	88	Immediate
	1 year	40	21	0	Immediate
Particulate matter <10 micrograms in	24 hour	75	-	4	Immediate
	1 year	40	-	0	Immediate

Pollutant	Averaging Period	Limit Value ($\mu\text{g}/\text{m}^3$)	Limit Value (ppb)	Frequency of Exceedance	Compliance Date
diameter (PM ₁₀)(c)					
Particulate matter <2.5 micrograms in diameter (PM _{2.5})(d)	24 hours	65	-	4	Immediate
	24 hours	40	-	4	01/01/2016 – 31/12/2029
	24 hours	25	-	4	01/01/2030
	1 year	25	-	0	Immediate
	1 year	20	-	0	01/01/2016 – 31/12/2029
	1 year	15	-	0	01/01/2030
Lead (P) (e)	1 year	0.5	-	0	Immediate
Ozone (O ₃)(f)	8 hours	120	61	11	Immediate
Carbon monoxide (CO)(g)	1 hour	30,000	26,000	88	Immediate
	8 hour (1 hour averages)	10,000	8,700	11	Immediate
Benzene (C ₆ H ₆)(h)	1 year	5	1.6	0	Immediate

Source: NAAQS

- The reference method for the analysis of SO₂ shall be ISO 6767
- The reference method for the analysis of NO₂ shall be ISO 7996
- The reference method for the determination of the particulate matter fraction of suspended particulate matter shall be EN 12341
- The reference method for the analysis of PM_{2.5} shall be EN14907
- The reference method for the analysis of lead shall be ISO 9855
- The reference method for the analysis of ozone shall be the UV photometric method as described in ISO 13964
- The reference method for analysis of CO shall be ISO 4224
- The reference methods for benzene sampling and analysis shall be either EPA compendium method TO-14 A or method TO-17

6.6.3 NEMAQA: National Dust Control Regulations (GN R.827 1 November 2013)

Dust fallout is one of the common causes of complaints regarding air pollution. Generally, coarse dust greater than 10 μm in diameter poses little risk to human health however poses a nuisance. The NEMAQA National Dust Control Regulations (GN R.827 1 November 2013) prescribe the allowable dust fallout level, which are not to be exceeded during a specified time period in a defined area (Table 9).

As per the regulations, the monitoring method to be used for measuring dust fall rate and the guideline for locating sampling points shall be ASTM D1739:1970, or equivalent method approved by any international recognised body. During the construction phase of the SR PVP, monitoring of the dust fallout levels will be required to ensure regulatory compliance.

Table 9: National Dust Fallout Regulations Acceptable Dust Fall Rates

Restriction areas	Dust rate (D) (mg/m ² /day, 30 days average)	Permitted frequency of exceeding dust fallout rate
Residential areas	D < 600	Two within a year, not sequential months
Non-residential areas	600 < D < 1200	Two within a year, not sequential months

Source: NEMAQA National Dust Control Regulations (GN R.827 1 November 2013)

6.7 Other legislation, Policies, Plans, and Guideline Documents

Other legislation policies, municipal plans and guideline documents that are relevant to the SR PVP project are listed below:

- The Constitution of the Republic of South Africa
- Integrated Development Plan (IDP) of the City of Johannesburg (COJ), 2017
- Gauteng Vision 2055 Economic Development white paper
- Guidelines published in terms of the NEMA and associated EIA Regulations
- The City of Johannesburg Municipal By-Laws
- City of Johannesburg spatial development framework
- The Spatial Development Framework 2040 (SDF 2040)
- Environmental Impact Assessment Guidelines for Renewable Energy Projects, GNR 989 of 2015 in terms of NEMA (Act No 107 of 1998)
- Electricity Regulation Act, 2006 (Act No. 4 of 2006) as amended by the Electricity Regulation Amendment Act, 2007 (Act o. 28 of 2007)
- National Environmental Management Biodiversity Act (NEMBA), 2004 (Act No. 10 of 2004)
- Electricity Act, 1987 (Act No, 41 of 1987)
- Promotion of Administrative Justice Act, 2000 (Act No. 2 of 2000)
- Civil Aviation Act, 2009 (Act No. 13 of 2009) and Civil Aviation Regulations (CAR) of 1997
- Civil Aviation Authority Act, 1998 (Act No. 40 of 1998)
- White Paper on Renewable Energy (2003)
- Integrated Resource Plan for South Africa (2010)
- Conservation of Agricultural Resources Act, 1993 (Act No. 43 of 1983)
- South African National Standard Method for environmental noise impact assessment (SANS 10328:2008)
- SANS 10103:2008, the measurement and rating of environmental noise with respect to annoyance and to speech communication
- The SANS 10103 Code of Practice provides typical ambient noise rating levels ($L_{Req,T}$) in various districts
- National Road Traffic Act (Act No. 93 of 1996)
- Draft Birds and Solar Energy Best Practice Guidelines, BirdLife South Africa, November 2015.

7 Description of the Existing Environment

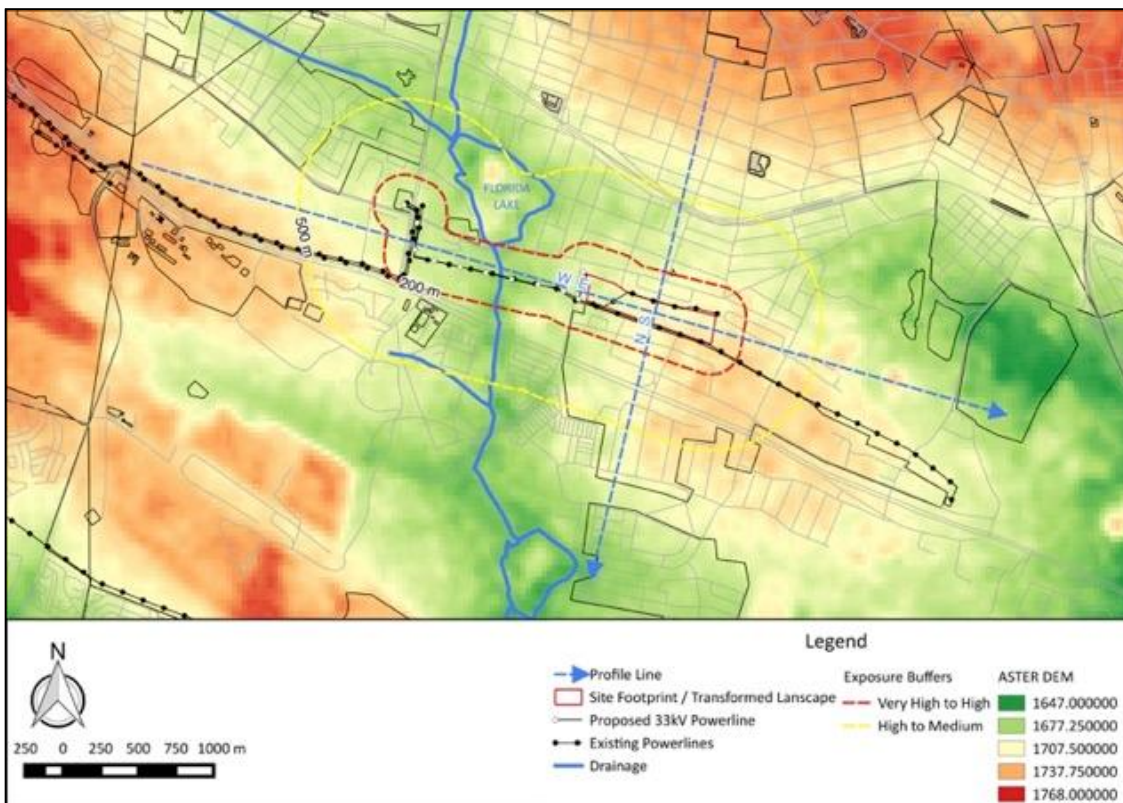
The following section describes the biophysical and socio-economic environment that may be affected by the proposed SR PVP development. The description of the existing environment is based on the following:

- Baseline environmental screening studies undertaken for the SR PVP project
- Literature review of publicly available background information relevant to the proposed project site
- Review and analysis of publicly available baseline environmental data for the proposed project area

7.1 Topography

The proposed SR PVP project site is gently sloping. Elevation across the site in an approximate north-south orientation ranges between 1705m and 1713m above sea level with the terrain sloping towards the north (2.2% slope) as well as towards the south (1.7% slope) (Figure 14). Elevation across the site in an approximate east-west orientation ranges between 1696m and 1711m above sea level with the terrain sloping towards the west with an average slope of 3.4% towards the west.

Figure 14: Regional Digital Elevation and Profile Locality Map



Source: VRM, 2017

7.2 Geology

Note: *The geology of the site has been interpreted from published geological maps. The available geological maps show bedrock geology only and therefore, an understanding of the superficial geology is subject to site specific ground investigations.*

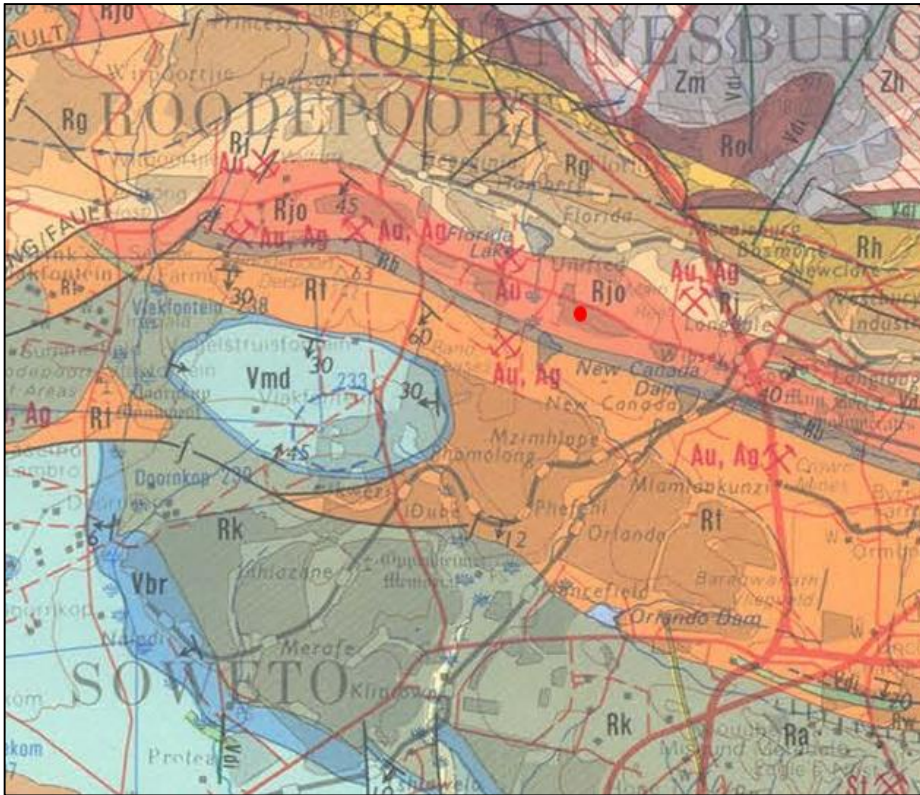
The proposed SR PVP project footprint is underlain quartzite and conglomerate of the Johannesburg formation, the Turfontein subgroup and the Central Rand Supergroup (Figure 15). The presence of dolomitic formations in the stratigraphy are not anticipated as the site falls outside the dolomitic risk area of Gauteng.

During the qualitative geotechnical field investigations, it was noted that there were several current illegal dumping sites within the project footprint. In addition to these current dumping sites, the presence of historical rubble dumping grounds were found in places. The historical mining activities are likely to have introduced man-made ground in certain areas on site. Artificial ground formed from building rubble typically don't pose significant environmental risks however can cause challenges regarding construction due to stability, differential settlement, heave and shrinking and swelling.

The proposed project area is affected by shallow undermining in the Witwatersrand goldfields of southern Gauteng which is approximately 40km long and 50km wide and covers the proposed SR PVP project footprint. It stretches from Randfontein (in the West Rand) to Boksburg (in the East Rand) and is located immediately south of Main Reef Road in central Johannesburg. Although undermined, no tension cracks and/or subsidence basins were observed during the site visit. A few areas however did exhibit crown-hole development (Figure 16). In the absence of further detailed geotechnical ground investigation data, the subsidence at the project site can be characterised as medium risk, which may give rise to general subsidence and fracturing of the ground, as previous mining activity may cause voids at shallow or intermediate depths, which lead to the formation of crown-holes in the ground above.

Note: *SolarReserve has commissioned further geotechnical studies in order to obtain additional information on the underlying geology and history of the mining operations on site. This study is currently underway and could not be completed prior to the drafting of this report.*

Figure 15: Approximate Location of the proposed SR PVP in Relation to the Geology (Red Dot Indicates the Approximate Site Location)



SUPERGROEP WITWATERSRAND SUPERGROUP	KLIPRIVIERSBERG (Rk)	Alberton (Ra) Westonaria (Rw)	Rk Ra Rw
	SENTRALE RAND CENTRAL RAND	Turffontein (Rt)	Rt
		Johannesburg (Rjo)	Booyensens (Rb) Rjo
		Jeppestown (Rj)	Rj
	WES-RAND WEST RAND	Goerment (Rg) Government (Rg)	Rg
		Hospitaalheuwel (Rh) Hospital Hill (Rh)	Rh
		Orange Grove (Ro)	Ro

Source: Council of Geoscience, 2625 WES-RAND

Figure 16: An Example of Crown-Hole Development Observed On Site



Source: Mott MacDonald, 2017

A DMR closed vertical mine shaft (CMR-R66, 18/10/2016) is located on the southern section of the site and is marked by a DMR closure headstone (Figure 17). Presently the depth of the vertical shaft and undermining on site is unknown. A 40m radius exclusion zone is thus recommended around the vertical shaft.

Note: For further detail on geotechnical aspects of the SR PVP site, please refer to the Geotechnical Desk Study in Appendix E

Figure 17: DMR Closed Vertical Mine Shaft (CMR-R66 Vertical Shaft 18/10/2016)



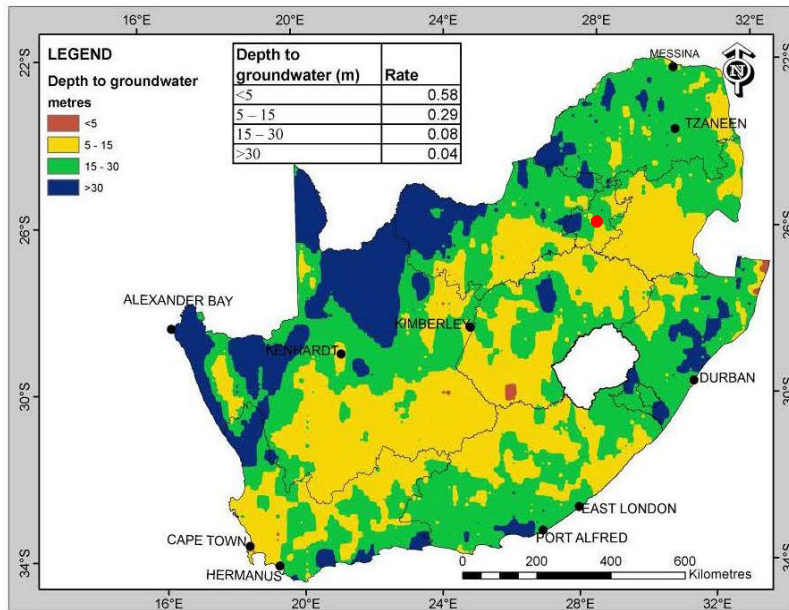
Source: Mott Macdonald, 2017

7.3 Geohydrology

Qualitative assessment of the geohydrology of the site indicates possible rich groundwater prospects within the region. Based on the mapped data, the depth of water table near the site is likely to range at a depth of 15m to 30m (Figure 18).

There are indications that within the area, intergranular and fractured aquifers show groundwater yields in the range of 0.5ℓ/s to 2ℓ/s. However, the groundwater is likely to be in hydraulic continuity with the adjacent Florida Lake and so groundwater levels may fluctuate in alignment with fluctuations of the water levels within Florida Lake.

Figure 18: Map Showing the Depth to Water Table. The Red Dot Denotes the Approximate Site Location



Source: Department of Water Affairs, 2014

Note: For further detail on geohydrological aspects of the SR PVP site, please refer to the Geotechnical Desk Study in Appendix E

7.4 Surface Hydrology

Florida Lake is located approximately 1km north west of the site. The lakes outflow flows through an artificial high density polyethylene plastic and geotextile lined canal on the western boundary of the historical tailings facility west of the proposed SR RVR project. The proposed power distribution transmission line Option 2 to the Sentraal substation will be pipe jacked via directional drilling under the canal to avoid impacting on the surface hydrology of the canal.

The proposed SR PVP will be maintained in a relatively natural state, regarding natural vegetation and soil type. Most of the precipitation falling in this area will infiltrate into the ground whilst surface runoff that does occur will drain towards a preferential flow paths exiting the project site. No wetlands and/or specific drainage features are observed directly on the SR PVP project footprint. Any surface water runoff from the site is anticipated to flow in alignment with the surface topography and/or infiltrate on site.

7.5 Regional Climate

Note: The baseline characteristics of the climate, wind field and air quality in the project area were determined from available literature sources.

7.5.1 Meteorology

As there is no meteorological monitoring station available on site, the meteorological overview presented below is based on historical MM5 modelled meteorological data for the years 2009 to 2011 from a nearby suburb in relation to the SR PVP project (i.e. within 3 kms). The analysis of

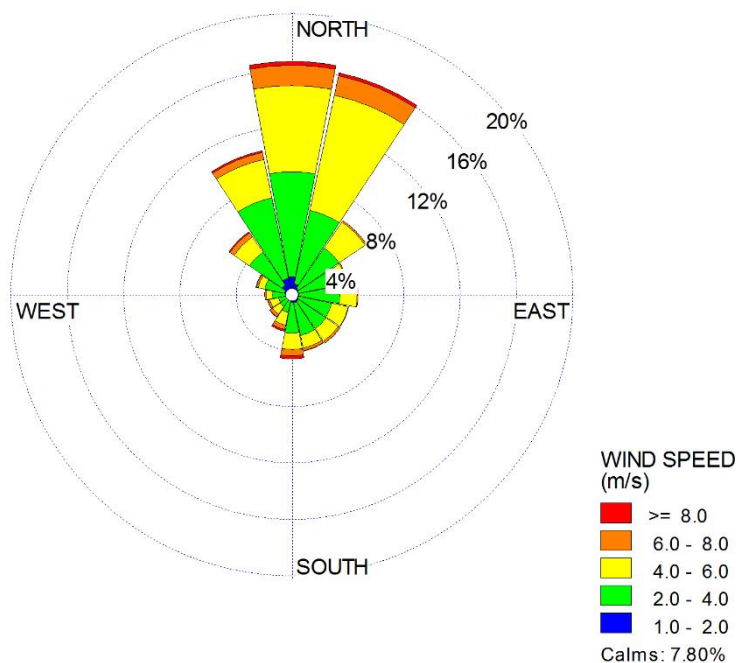
the data is assumed and expected to be representative of the actual experienced meteorological conditions on site.

Note: Wind roses summarise the occurrence of winds at a specified location by representing their strength, direction, and frequency. Calm conditions are defined as wind speeds of less than 1m/s which are represented as a percentage of the total winds in the centre circle. Each directional branch on a wind rose represents wind originating from that specific cardinal direction (16 cardinal directions). Each cardinal branch is divided into segments of different colours which represent different wind speed classes.

7.5.1.1 Annual Wind Rose

The annual wind rose for the SR PVP is presented in Figure 19. Winds originate predominantly throughout the year from the northern sector. Winds are typically moderate, and 7.8% calms (<1 m/s).

Figure 19: Modelled Wind Rose for SR PVP (2009-2011)



Source: Lakes Environmental MM5 Modelled data set 2009-2011

7.5.2 Diurnal Wind Roses

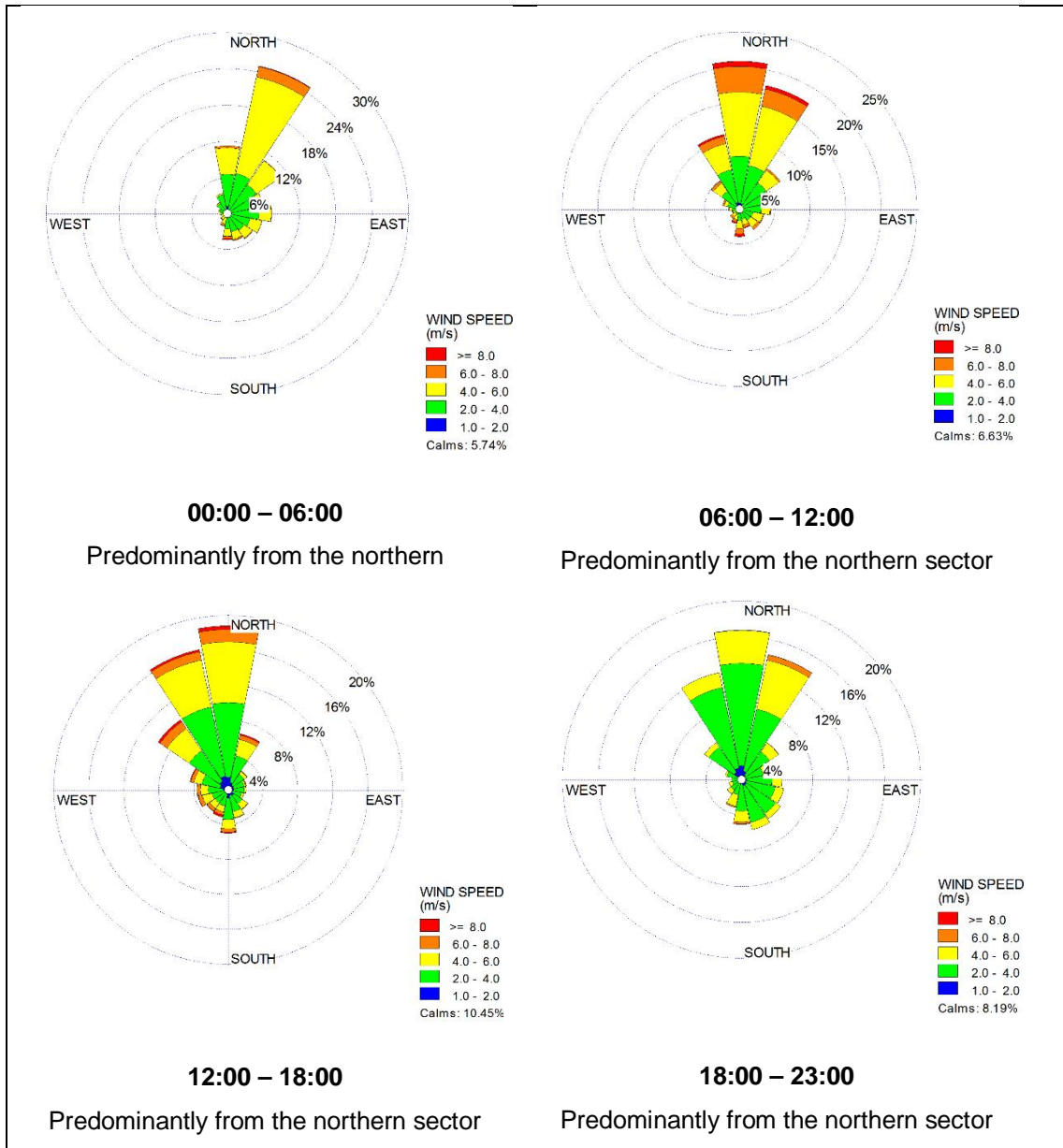
No significant diurnal shift in the predominant wind direction is observed on site (Figure 20). Winds originate predominantly throughout the day from the northern sector and are typically moderate in speed.

7.5.3 Seasonal Wind Roses

A significant seasonal shift in the predominant wind direction is observed on site (Figure 21). Winds originate predominantly from the northern sectors during summer and spring. During autumn, the winds predominate from the northern sector and to a lesser degree from the

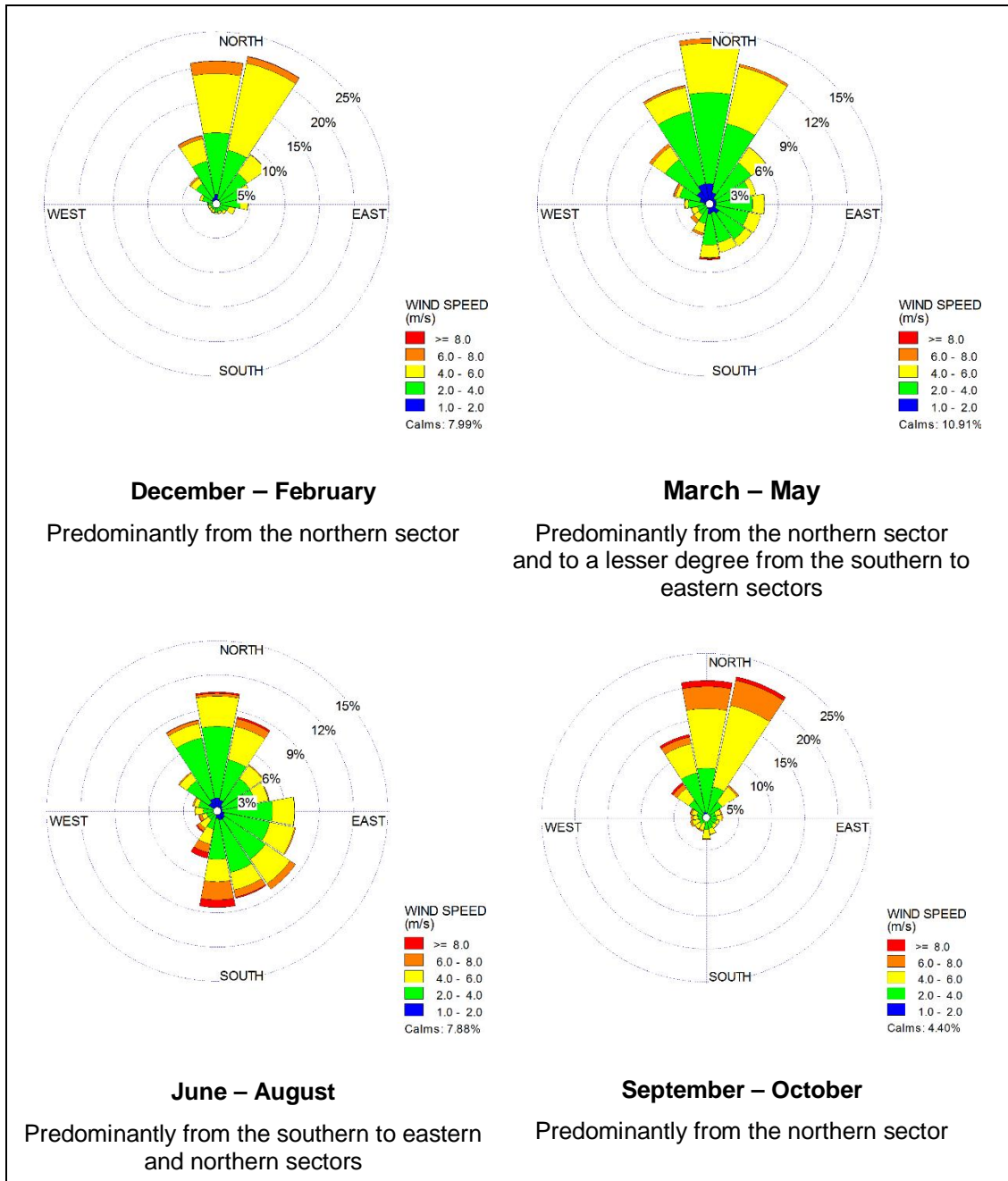
southern to eastern sectors. During winter, the winds predominate from the southern to eastern and northern sectors.

Figure 20: Modelled Diurnal Wind Rose for SR PVP (2009-2011)



Source: Lakes Environmental MM5 Modelled data set 2009-2011

Figure 21: Modelled Seasonal Wind Rose for SR PVP (2009-2011)



Source: Lakes Environmental MM5 Modelled data set 2009-2011

7.5.4 Precipitation and Temperature

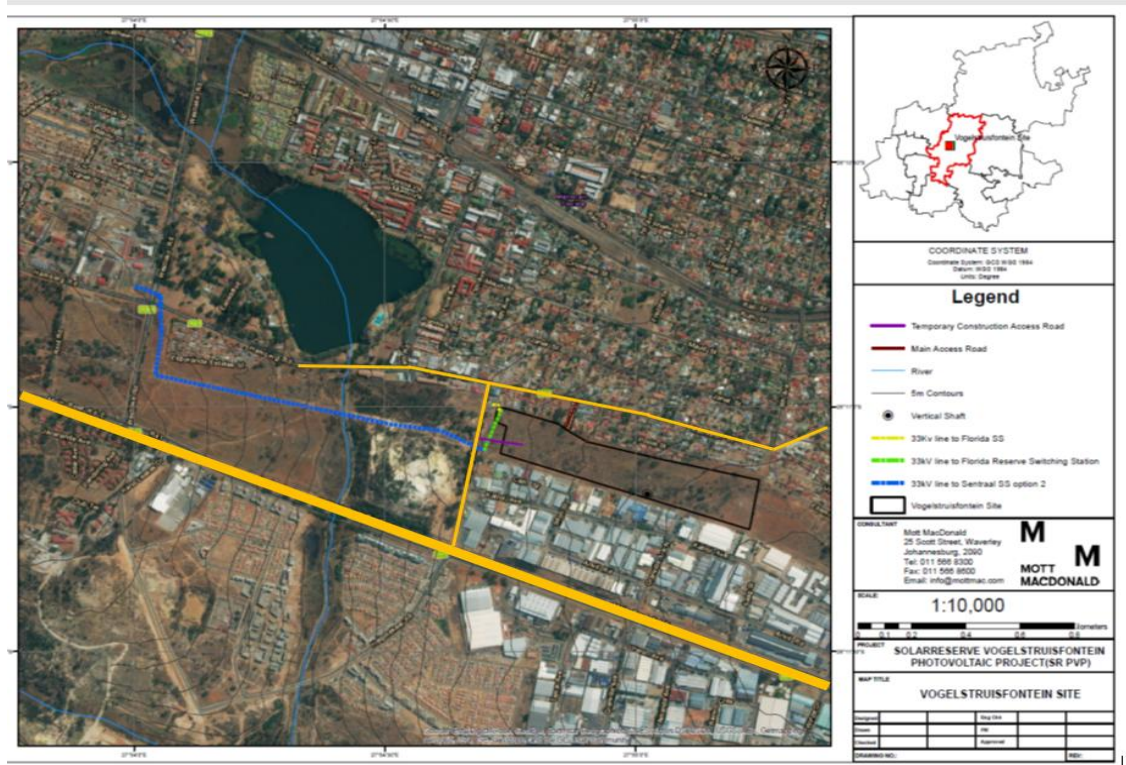
Based on available rainfall and temperature data in the near vicinity of the SR PVP the annual average rainfall for the site is likely to be approximately 607mm, most of which will occur during the rainy season of September to May. Average daily maximum temperatures from approximately 16.3°C in June to 26.1°C in January. During mid-winter (July), the average night temperature drops to 0.5°C.

7.6 Local Traffic Flows

A temporary gravel access road will be build off Hebbard road to provide temporary access to the site during the construction phase (Figure 2). No traffic count data is available for Hebbard street thus any quantitative analysis of the traffic flows is not possible.

Based on site observations, the traffic volumes along Hebbard road were noted as being relatively high as the road serves as a linkage road for Main Reef Road (R41) to Albertina Sisulu (R24), both of which are regional roads (Figure 22). Additionally, it was observed that the frequency of light delivery vehicles and heavy vehicles are common along Hebbard road due to the Robbertville industrial area being directly adjacent to the proposed SR PVP site. During the operational phase of the proposed SR PVP, access to the site will be via Klopper street north of the site.

Figure 22: Qualitative map local traffic flows based on site visit observations. Orange lines depict zones of high traffic flows in close proximity to the SR PVP site



Source: Mott MacDonald, 2017

7.7 Cultural and Heritage Resources

The proposed project footprints for the SR PVP and the transmission line corridors are located on vacant parcels of defunct “brownfields” land with a history of undermining mining. No significant mining infrastructure was observed on site other than remnant historic mine building foundation scars left behind when the mines were decommissioned. There is a vertical shaft located on the southern boundary of the SR PVP project footprint however this shaft was closed formally in October 2016 by the Department of Mineral Resources (DMR) (**Error! Reference source not found.**). A 40m buffer around the shaft has been proposed and will be maintained

for safety reasons and to ensure that this infrastructure remains undisturbed by the project. No visible graves were observed on site nor other areas of potential cultural significance. These opinions are based on the site observations of the Mott MacDonald EAP's who undertook field site visits on the project footprints.

7.8 Agricultural Potential, Soil, and Land Use Capability

The proposed project footprints for the SR PVP and the transmission line corridors are located on vacant parcels of defunct "brownfields" land with an extensive history of undermining. The likely value of the land regarding agricultural potential, soil and land capability is therefore considered low.

7.9 Noise

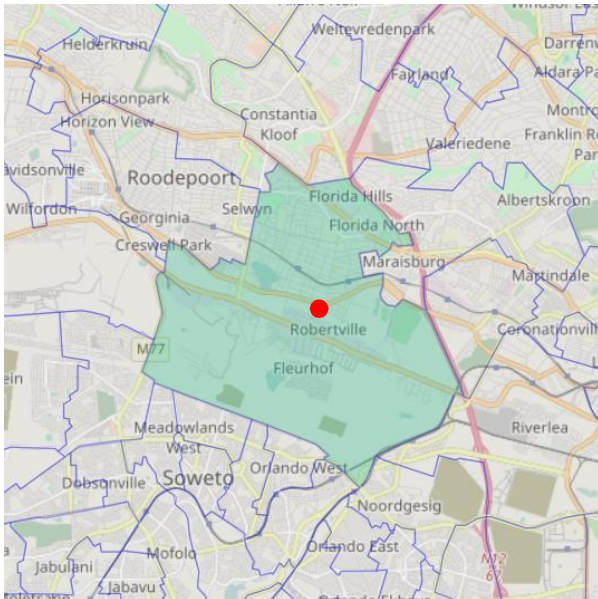
No baseline noise monitoring information is available for the SR PVP project site. In the absence of available monitoring data, we have qualitatively assumed that the baseline noise levels on site are likely to be in alignment with the typical environmental rating level per applicable environment as provided in The South African National Standard 10328:2008. Based on the urban location of the proposed project site, and that the site is near light industrial workshops, commercial business premises and several main roads, we anticipate that the site meets the district type classification as per SANS 10328:2008 and thus the anticipated baseline ambient noise levels on site are likely to be in the order of 60dB during the day and 50dB during the night.

7.10 Socio Economic Character of the Area

Note: The socio-economic character of the local area surrounding the proposed SR PVP was determined from available literature sources, census 2011 and electoral data for Ward 70.

The proposed SR PVP project site is located within the greater Roodepoort region within Ward 70 on a parcel of vacant defunct "brownfield" land with a history of undermining (Figure 23 and Figure 2). Roodepoort has traditionally been regarded as the West Rand, however was integrated into the COJ following the re-organisation of local government post 1996, post the apartheid period. Robbertville, adjacent to the proposed SR PVP site is characterised by a very diverse selection of land uses, ranging from light manufacturing to large distribution companies and vehicle repair businesses. Land uses are fragmented within the region due to the mining operations and the presence of historic mine dumps. The road networks need upgrading as well as the electricity and storm water systems (City of Johannesburg, Region C Economic Development Plan, 2012). There is potential for economical infill within the general area to facilitate integrated development and thus the location gives it a lot of potential to grow and develop (City of Johannesburg, Region C Economic Development Plan, 2012).

Figure 23: Ward 70 Delineation Map (Red Dot Indicated Approximate SR PVP Location)



Source: www.wazimap.co.za/profiles/ward-79800070-city-of-johannesburg-ward-70-79800070/; 21 August 2017

The following list data from Census 2011 and electoral data for Ward 70 summarizes the socio-economic character of the ward:

- Approximately 68% of the population within the ward fall within the economically active age group of 18 to 65 (median age of population is 31).
- Demographics of the population are 36% black, 28% white, 27% coloured, 7% indian or asian and 2% are defined as other. Of the population, approximately 51 % are female.
- English is the most common spoken home language in the ward (44%) followed by Afrikaans (25%), Isizulu (7%), Setswana (5%), Sesotho (3%) and other languages (4%).
- Approximately 85% of those within the ward were born in South Africa and 55% within Gauteng province. Approximately 88% hold South African citizenship.
- Housing within the ward ranged from formal to informal. 42.3% are houses, 34.1% are apartments, 5.7% are informal shack dwellings, 5.3% are townhouses and 12.8% are classified as other.
- Regarding property ownership, 40.9% are rented, 25.9% are owned but not paid off as yet, 17.3% owned and paid off, 9.5% occupied rent free and 6.3% are listed as other.
- Approximately 64% of the households are headed by the male gender.
- Annual average income within the ward is R115 100 per annum (50% of the population fall within the annual income range of R75 000 to R600 000). The area is thus typically categorised as the middle-income class
- Regarding municipal services, approximately 93.5% are obtaining potable water from a regional and/or local service provider. Approximately 98% have access to flush or chemical toilets ablation facilities (1.6% have no access to ablation facilities). Approximately 94.9% receive local authority or private company refuse disposal services
- Approximately 65.5% are employed, 23% are not economically active, 11.5% are unemployed. Regarding the sector of employment approximately 80.4% are in the formal

sector, 11.6% in private households (i.e. domestic workers) and 6.2% are in the informal sector and 1.8% in other non-defined sectors

- Approximately 65.1% of the population within the ward have matric or tertiary education (85% have higher than Grade 9 or higher)
- School attendance of children within the ward is approximately 87%

The proposed SR PVP will impact the socio-economic environment as follows:

- Employment creation (temporary and permanent) and skills development of those employed during the life of the project:
 - During the construction phase a total of ± 200 employees will be employed by the project over 6 to 8 months during the construction phase. Where possible, those to be employed will be sourced from the local communities
 - Approximately 10 permanent employees will be employed during the operational phase of the project to operate and maintain the facility
- Community upliftment with improved health and safety in the near vicinity of the SR PVP by the conversion of brownfield defunct, vacant land to land of a commercial nature
- Rehabilitation of a site currently being used for illegal dumping
- As the existing land use is that of vacant unsecure land, vagrancy, illegal dumping, and other security risks are associated with the parcel of land. The proposed SR PVP will enhance security of the area as the site will be fenced and include controlled access to the power plant. Infilling of this vacant land and the conversion of the land from defunct land to that of an economic use will increase the security level for both the residential areas to the north and industrial/commercial area to the south of the project footprint.

7.11 Flora and Fauna

The Biodiversity Company undertook a screening review to identify the flora and fauna risks at the site proposed SR PVP site. The proposed SR PVP site is situated in the Endangered (EN) Soweto Highveld Grassland vegetation community however the site was found to be highly degraded and encroached by alien invasive species. The extent of remaining grassland and its conservation value can only be confirmed following a wet season survey.

According to the Gauteng Conservation Plan (C-plan), the eastern boundary of the proposed SR PVP site overlaps with a Critical Biodiversity Area (CBA): other Ecological Support Areas (ESAs) and CBAs occur within 500m of the project boundary.

The most significant anthropogenic impacts identified on site included:

- Loss of habitat due to the encroaching developments
- Historical mining activities
- Habitat fragmentation
- Dumping of rubble and waste; and
- Encroachment of alien invasive plant species

Ten category 1b alien invasive plant species were recorded on the site and must be removed by implementing an alien invasive plant management programme in compliance of section 75 of the National Environmental Management: Biodiversity Act, 2004 (Act No, 10 of 2004) (NEM/BA).

Nine (9) potential plant species of conservation concern were identified that could occur on the site. Of these species:

- One (1) is listed as Critically Endangered (CE). *Brachycorythis conica* subsp. *transvaalensis* (Albertina Sisulu orchid) is a severely threatened orchid species which is suffering ongoing habitat loss to urban expansion (SANBI, 2017). It occurs in short, open grassland and wooded grassland in Gauteng and Mpumalanga (SANBI, 2017). In Gauteng, it is only currently known from a single remaining subpopulation near to Krugersdorp. Although the likelihood of occurrence was rated as low, the possibility of this species occurring on the site cannot be excluded and will need to be verified during the flowering season (late summer) before the site can be cleared
- *Melolobium subspicatum* is listed as Vulnerable (VU) on the Red List of South African Plants (SANBI, 2017). It only occurs in very small pockets of remaining habitat in the Gauteng Province and development is currently prohibited in any locations where it occurs (SANBI, 2017). It occurs in grassland communities including Carletonville Dolomite Grassland, Egoli Granite Grassland, and Soweto Highveld Grassland such as which would historically have occurred in the project area. Although the likelihood of occurrence was rated as moderate the possibility of this species occurring on the site cannot be excluded and will need to be verified during the flowing season (summer) before the site can be cleared
- Three (3) plants species are listed as Near Threatened (NT), of these the likelihood of occurrence was rated as good for 2 and moderate for 1 based on habitat preference
- A further 4 plant species are listed as Least Concern (LC) but decreasing. These are plants that are decreasing in abundance due to excess harvesting for the medicinal plant trade
- Of the 9 potential plant species of conservation concern 5 are listed as South African endemics, of these 2 have a high likelihood of occurrence on the site, 2 a moderate likelihood and 1 a low likelihood

Faunal diversity was low and the likelihood of faunal species of conservation concern occurring on the site was similarly rated as low.

The significance of the potential loss of plant species of conservation concern was rated as high prior to implementation of mitigation measures. If an additional wet season survey is conducted and it confirmed that no plant species of conservation concern are present on the site the significance of this impact will be reduced to low.

The significance of potential impacts on faunal communities was rated as low due to the low expected and observed faunal diversity.

Note: For further detail on the Flora and Fauna, please refer to the Biodiversity assessment in Appendix G

7.11.1 Avifauna

WildSkies Ecological Services undertook a desktop avifauna review to identify the avifaunal risks at the site proposed SR PVP site. The following key findings were identified:

- The proposed site is not considered an important bird and biodiversity area (Marnewick *et al*, 2015), the closest being approximately 15km north of site
- Approximately 344 bird species have been recorded in the broader area within which this site is located by the First and Second Southern African Bird Atlas Project (www.mybirdpatch.adu.org.za). Of these the 344 listed species, 18 are Red Listed and could possibly occur on site if the conditions were favourable for their presence
- The site is almost entirely surrounded by residential and industrial developments

- In WildSkies Ecological Services professional opinion, none of the Red Listed species are likely to occur on the site as the site appears to be highly impacted and degraded
- The avifauna assessment undertaken did not constitute a full avifaunal specialist study however it is important for the project to comply with the “GDARD requirements for Biodiversity Assessments Version 3” which state:
 - “The SOC (Specialist Ornithological Consultant) must determine whether the proposed development site falls within the known or expected distribution of any of the following Red List bird species prioritized by GDARD: - Cape Vulture, Blue Crane, Lesser Kestrel, African Grass-Owl, African Marsh-Harrier, White-backed Night-Heron, White-bellied Korhaan, Martial Eagle, African Finfoot, Lesser Flamingo, Secretary bird, Black Stork, Half-collared Kingfisher and Greater Flamingo”
 - The SOC must determine whether suitable habitat occurs on the proposed development site or neighbouring properties for the priority Red List species whose distribution overlaps with the proposed development site
 - Where distribution and habitat availability suggest a high probability of one or more priority Red List bird species occurring on site, the SOC must map suitable habitat as per the sensitivity mapping requirements for biodiversity assessments and indicate the number of individuals/pairs that could potentially be supported, given that it is unlikely that all birds will be located during a limited survey
- In WildSkies Ecological Services professional opinion:
 - There is no likelihood of any of these priority species occurring on the proposed SR PVP site thus there is no need for a full avifaunal specialist study to be conducted
 - Management of the risks to common bird species is recommended
 - The BirdLife SA Guidelines state: “*These guidelines are aimed at all SEFs that require environmental authorisation for electricity generation. These guidelines are not intended for small-scale, distributed solar facilities*”. The proposed SR PVP is a small-scale solar facility and thus it is concluded that this project does not need to comply with the BirdLife Guidelines.

Note: For further detail on the Avifauna, please refer to the Avifauna review in Appendix H

7.12 Visual Character of the Area

The overall project footprint scenic quality is graded as low, predominantly due to the lack of uniqueness of the site, the homogeneity of the vegetation and the degraded landscape due to illegal dumping across the site, semi-industrial development of Robertville to the south, and the historic undermining remnant scars on the landscape. The expected receptor sensitivity is graded as low to medium as the location of the site falls within an urban brownfields area, large numbers of people are located around the site (northern boundary) and large volumes of traffic would have views of the site. Due to the degraded and ‘vacant lot’ nature of the site, public interest towards landscape change is likely to be low.

Note: For further detail on the visual character of the proposed SR PVP footprint, please refer to the Visual Impact Assessment in Appendix F

8 Public Participation

8.1 Objectives

The objectives of public participation during the environmental authorisation process are to:

- Provide sufficient and accessible information to Interested and Affected Parties (I&APs) regarding the proposed development as per legal requirements
- Enable them to raise issues of concern and suggestions regarding the proposed development
- To obtain local relevant information and traditional knowledge for integration into the environmental assessment.

8.2 Public Participation Methodology

8.2.1 Database Development and Interested and Affected Parties Register

Mott MacDonald will develop a stakeholder data base via:

- A literature review of available information for the local project area to determine potential I&AP's such as: the landowners, servitude owners, regulatory authorities through the three spheres of government (local, provincial, national), local non-governmental organisations and other organisations who may hold an interest in the proposed project
- People who returned the I&AP registration forms and/or submitted comments during the Public Participation Process (PPP)
- Names and contact details of all registered I&APs and their raises queries/comments will be logged in an I&AP register to form a formal documented record

The full database and the I&AP register will be appended to the PPP report in the appendix of the final BAR.

8.2.2 Announcement of the Project and Review of the Draft Basic Assessment Report (DBAR) and Environmental Management Program report (EMPr)

The full project details of the proposed SR PVP and the availability of the DBAR and draft EMPr for public review for a period of 30 days (7 September 2017 – 8 October 2017) was announced by way of:

- A Background Information Document (BID) was distributed to adjacent landowners, relevant authorities, NGOs, and I&APs including an invitation to register as an I&AP and to participate in the public participation process
- The BID included the registration and comments sheet in order for the I&APs to register and request the DBAR and other relevant information
- Site notices were erected on site, within strategic locations the general project area and along the transmission line corridor
- A statutory media advertisement was placed in The Citizen newspaper on 7th September 2017 to satisfy both the NEMA, and WUL _GA requirements
- Hard copies of the documentation were placed at the Florida South African Police Station (5 Sauer street, Florida) and the Florida Community Library (Church street, Florida) for physical inspection by I&AP's

- Where requested by the I&AP's the copies of the documentation was made available electronically and distributed via email
- Project was advertised on the SolarReserve website (<http://www.solarreserve.com/en/global-projects/pv/USF>) instructing how to obtain access to the documentation
- The public could provide written comment on the DBAR and EMPr by completing the comment sheet accompanying the BID and mailing, e-mailing, or faxing it to the Public Participation Office.

8.2.3 Comment and Response Report (CRR)

The issues, comments and suggestions raised by the I&APs will be captured in the Comment and Response Report (CRR). The CRR will provide a record of the stakeholder issues, comments and suggestions raised throughout the process. The report will also provide the responses given by the project proponent and the EAP team. The CRR can be found appended to the Public Participation Report in Appendix C of the Final BA Report.

8.2.4 Public Participation Report

The Public Participation Report outlines the public participation process undertaken for the project and contains the physical proof of consultation. The report will also document the issues raised relating to the DBAR and WUL-GA.

8.2.5 Submission of Final Basic Assessment Report

The DBAR (this report), will then be updated, taking into account the issues, comments and suggestions raised by I&APs during the comment period. Once updated after the public consultation period, the Final BAR will be submitted to the relevant authorities/s for consideration.

8.2.6 Decision Making Phase

All I&APs will receive a notification of the authorities' decision regarding the environmental authorisation of the proposed project, thanking them for their contributions and explaining the appeal procedure.

9 Environmental Impact Assessment

9.1 Methodology for Assessing the Environmental Impacts

Following sections define Mott MacDonald's standardized approach regarding the assessment of impact significance for EIAs and ESIA's. The approach is in alignment with international best practices regarding impact assessment.

9.1.1 Assessment of Impact Significance

For each specialist chapter, the assessment will identify impacts and report the likely significant environmental or social impacts. The criteria for determining significance are specific for each environmental and social aspect and will be defined in the relevant specialist chapters. In broad terms, it can be characterised as the product of the degree of change predicted (the magnitude of impact) and the value of the receptor/resource that is subjected to that change (sensitivity of receptor). For each impact, the likely magnitude of the impact and the sensitivity of the receptor are defined, quantitatively to the extent possible. Generic criteria for the definition of magnitude and sensitivity are summarised below.

9.1.1.1 Magnitude Criteria

The assessment of impact magnitude is undertaken in two steps. Firstly, the identified impacts of the Project are categorised as beneficial or adverse. Secondly, impacts are categorised as major, moderate, minor, or negligible based on consideration of parameters such as:

- Duration of the impact – ranging from 'beyond decommissioning' to 'temporary with no detectable impact'
- Spatial extent of the impact – for instance, within the site boundary, within district, regionally, nationally, and internationally
- Reversibility – ranging from 'permanent thus requiring significant intervention to return to baseline' to 'no change'
- Likelihood – ranging from 'occurring regularly under typical conditions' to 'unlikely to occur'
- Compliance with legal standards and established professional criteria – ranging from 'substantially exceeds national standards or international guidance' to 'meets the standards' (i.e. impacts are predicted to be less than the standard would allow)

Table 10 presents generic criteria for determining impact magnitude (for adverse impacts). Each detailed assessment will define impact magnitude in relation to its environmental or social aspect.

9.1.1.2 Sensitivity criteria

Sensitivity is specific to each aspect and the environmental resource or population affected, with criteria developed from baseline information. Generic criteria for determining sensitivity of receptors are outlined in Table 11. Each detailed assessment will define sensitivity in relation to its environmental or social aspect.

Table 10: Criteria for Determining Impact Magnitude

Category	Description (adverse impacts)
Major	Fundamental change to the specific conditions assessed resulting in long term or permanent change, typically widespread in nature and requiring significant intervention to return to baseline; would violate national standards or Good International Industry Practice (GIIP) without mitigation.
Moderate	Detectable change to the specific conditions assessed resulting in non-fundamental temporary or permanent change.
Minor	Detectable but small change to the specific conditions assessed.
Negligible	No perceptible change to the specific conditions assessed.

Source: Mott MacDonald, 2017

Table 11: Criteria for Determining Sensitivity of a Receptor

Category	Description
High	Receptor (human, physical or biological) with little or no capacity to absorb proposed changes and/or minimal opportunities for mitigation.
Medium	Receptor with little capacity to absorb proposed changes and/or limited opportunities for mitigation.
Low	Receptor with some capacity to absorb proposed changes and/or reasonable opportunities for mitigation.
Negligible	Receptor with good capacity to absorb proposed changes or/and good opportunities for mitigation.

Source: Mott MacDonald, 2017

9.1.1.3 Impact Evaluation

Likely impacts are evaluated taking into account the interaction between the magnitude and sensitivity criteria as presented in the impact evaluation matrix in Table 12.

Table 12: Impact Evaluation Matrix

		Magnitude						
		Adverse				Beneficial		
		Major	Moderate	Minor	Negligible	Minor	Moderate	Major
Sensitivity	High	Major	Major	Moderate	Negligible	Moderate	Major	Major
	Medium	Major	Moderate	Minor	Negligible	Minor	Moderate	Major
	Low	Moderate	Minor	Negligible	Negligible	Negligible	Minor	Moderate
	Negligible	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Minor

Source: Mott MacDonald, 2017

9.1.1.4 Determining Significance

The objective of this SR PVP environmental assessment is to identify the likely significant effects on the environment and people from the projects development. Impacts that have been evaluated as being ‘moderate’ or ‘major’ are significant effects and identified as such in the specialist chapters. Consequently, impacts that are ‘minor’ or ‘negligible’ are not significant.

9.1.2 Cumulative Impacts

The assessment of cumulative impacts considers the combination of multiple impacts that may result when the Project is considered alongside other existing or proposed projects in the same geographic area or similar development timetable. The assessment of cumulative impacts will identify where particular resources or receptors would experience significant adverse or beneficial impacts as a result of a combination of projects (inter-project cumulative impacts).

It will also identify combined impacts where impacts identified in different environmental and social aspects of this environmental assessment combine to affect a specific receptor.

9.1.3 Mitigation and Enhancement Measures

Where feasible the following hierarchy of mitigation measures will be applied:

- Avoidance and reduce impacts through design (embedded mitigation)
- Abate impacts at source or at receptor
- Repair, restore or reinstate to address temporary construction effects
- Compensation for loss or damage

In addition to the above, community engagement and disclosure activities have played a key role in managing the extent of impacts and consideration has also been given to the identification of enhancement measures. Enhancement measures are actions and processes that:

- Create new positive impacts or benefits
- Increase the reach or amount of positive impacts or benefits
- Distribute positive impacts or benefits more equitably

Each specialist chapter identifies relevant mitigation and enhancement measures. All the mitigation, management, and monitoring measures to address likely Project impacts are reported in the projects EMP.

9.1.4 Residual Impacts

Residual impacts are those significant impacts that remain after the application of mitigation and enhancement measures. Impacts considered 'major' or 'moderate' after application of mitigation and enhancement measures, are presented as significant residual impacts.

9.1.5 Uncertainties

Any uncertainties associated with impact prediction or the sensitivity of receptors due to the absence of data or other limitations are explicitly stated. Where applicable, the environmental assessment makes recommendations concerning measures that should be put in place with monitoring or environmental or social management plans to deal with the uncertainty so that they may be addressed.

9.2 Methodology for Assessing the Social Impacts

9.2.1 Social Impact Assessment (SIA) Approach

Primary data used to inform the assessment of the project social impacts has been collected mainly through consultation and stakeholder engagement activities conducted as part of the BA process.

The significance of the social impacts has been determined through consideration of the level of vulnerability (sensitivity) of project affected individuals, households, communities, and other social groups (social receptors), and the magnitude of the impact experienced by them. The criteria for determining the sensitivity of social receptors and the magnitude of social impacts are described below.

The sensitivity of social receptors has been determined through consideration of their vulnerability to social impacts. This is measured by their capacity to cope with impacts that affect their access to or control over additional or alternative social resources of a similar nature, ultimately affecting their wellbeing. Sensitive or vulnerable people are generally considered to have less means to absorb adverse changes or shocks than less-sensitive or less-vulnerable receptors. Similarly, they may be less able to maximise and build on beneficial changes to their resource bases.

When considering sensitivity to social effects, the response to resource change takes into account the type of receptor. For example, a community’s vulnerability is generally measured in terms of its resilience to loss of community facilities, whereas an individual’s or household’s vulnerability considers their resilience to deprivation and loss of livelihood assets or opportunities (such as jobs, productive land, or natural resources). Impacts that increase impoverishment risks contribute to vulnerability. Impoverishment risks include landlessness, joblessness, homelessness, marginalisation, increased morbidity and mortality, food insecurity, loss of access to common property resources and social disarticulation. Table 13 below presents the guideline criteria that have been used to categorise sensitivity of receptors.

Table 13: Social receptor sensitivity criteria

Sensitivity of receptors	Definition
High	An already vulnerable social receptor with very little capacity and means to absorb proposed changes or with very little access to alternative similar sites or services.
Medium	An already vulnerable social receptor with limited capacity and means to absorb proposed changes or with little access to alternative similar sites or services.
Low	A non-vulnerable social receptor with some capacity and means to absorb proposed changes and with some access to alternative similar sites or services.
Negligible	A non- vulnerable social receptor with plentiful capacity and means to absorb proposed changes and with good access to alternative similar sites or services.

Source: Mott MacDonald, 2017

The magnitude of the social impacts has been determined by consideration of the extent to which social receptors gain or lose access to or control over socio-economic resources, resulting in a beneficial or adverse effect on their individual and collective wellbeing. Wellbeing is considered as the financial, physical, and emotional conditions and quality of life of people and communities.

For beneficial impacts, the extent to which local wellbeing is likely to be enhanced has been considered. This is in accordance with the international movement in SIA practice towards an increased focus on enhancing long-term development benefits for local communities’ sustainability, as opposed to only considering mitigation of adverse impacts. As such, the magnitude criteria include consideration of the extent to which benefits are shared with and or realised by local people and communities.

The assessment of magnitude has been undertaken in three steps. Firstly, the impacts have been identified. Then the nature of the impact has been considered as to whether it is beneficial or adverse, direct, or indirect, transboundary, or cumulative, or a combination of any of the

above. Finally, the magnitude of impacts has been categorised as major, moderate, minor, or negligible, based on consideration of parameters including likelihood, duration, number of people or groups affected, and spatial extent along with professional judgement. Table 14 summarises the categories of magnitude.

Table 14: Magnitude criteria

Categorisation	Definition
Major	A highly likely impact that would have implications beyond the Project life affecting the wellbeing of many people across a broad cross-section of the population and affecting various elements of the local communities', or workers' resilience.
Moderate	A likely impact that continues over a number of years throughout the Project life and affects the wellbeing of specific groups of people and affecting specific elements of the local communities', or workers' resilience.
Minor	A potential impact that occurs periodically or over the short term throughout the life of the Project affecting the wellbeing of a small number of people and with little effect on the local communities', or workers' resilience.
Negligible	A potential impact that is very short lived so that the socio-economic baseline remains largely consistent and there is no detectable effect on the wellbeing of people or the local communities', or workers' resilience.

Source: Mott MacDonald, 2017

Unlike other topics within SIA, the potential health and safety impacts will not be assigned formal magnitude and sensitivity ratings and significance will not be assigned. Individuals respond to impacts on their health in different ways, influenced by a range of health determinants which includes their genetics, lifestyle, environment, and many others. Therefore, it is common to consider changes associated with the project as changes to health risks. These health risks can be ranked in terms of their importance, considering the likely scale of change and the population groups which experience the change. Mitigation and enhancement measures are identified to minimise risks and optimise beneficial opportunities created by the project.

9.2.2 Area of Influence (Aoi)

The SIA considers the area of influence (Aoi) and project affected area (PAA). The Aoi encompasses all areas directly and indirectly affected by project components such as the SR PVP footprint, transmission lines and transmission line corridors, related infrastructure, adjacent residential areas, and adjacent industrial areas.

9.2.3 Impact Evaluation

Likely impacts are evaluated taking into account the interaction between the magnitude and sensitivity criteria as presented in the impact evaluation matrix in Table 15.

Table 15: Impact evaluation matrix

ASSESSMENT FRAMEWORK Significance Matrix		Magnitude of Impact								
		Adverse				Neutral	Beneficial			
		Major	Moderate	Minor	Negligible		Negligible	Minor	Moderate	Major
Sensitivity of Receptor	High	Substantial	Substantial	Major	Moderate		Moderate	Major	Substantial	Substantial
	Medium	Substantial	Major	Moderate	Minor		Minor	Moderate	Major	Substantial
	Low	Major	Moderate	Minor	Negligible		Negligible	Minor	Moderate	Major
	Negligible	Moderate	Minor	Negligible	Negligible		Negligible	Negligible	Minor	Moderate

Source: Mott MacDonald, 2017

9.3 Project Phases

The proposed SR PVP project will consist of four key project phases:

- Pre-construction phase
- Construction phase
- Operational phase
- Decommissioning and rehabilitation phase

9.3.1 Pre-construction Phase

The pre-construction phase will entail the finalisation of the SR PVP and transmission line as to be built designs and layout taking into consideration the conditions of the EA. An Engineering, Procurement, and Construction (EPC) Contractor will be appointed.

9.3.2 Construction Phase

Post the pre-construction phase, the EPC Contractor will construct the SR PVP and transmission lines as per design specifications. Figure 12 provides a summary overview of the envisaged construction activities and schedule for the proposed SR PVP development. It will be the EPC Contractor’s responsibility, in conjunction with the project company, to ensure compliance with the conditions of the EA and all other authorisations or permits and the requirements of the EMPr by all sub-contractors, during the entire construction phase.

9.3.3 Operational Phase

The operational phase will commence with the commissioning of the PV plant and automated electrical systems, as well as the day-to-day management and maintenance of associated support services and infrastructure. The envisaged lifespan of the proposed SR PVP is approximately 20-25 years however this could be extended via future equipment and system upgrades and or replacement.

9.3.4 Project phase summary and impact assessment

Of the four key project phases, assessment of the environmental impacts is undertaken for the Construction and Operational phases only. Assessment of the Pre-construction and Decommissioning and Rehabilitation phase are excluded for the following reasons:

- The Pre-construction phase has no physical environmental impacts as the phase is purely desktop without physical implementation. Identified potential environmental impacts will be considered within the final project design as per the conditions of the environmental authorisation
- The decommissioning, closure and rehabilitation phase impacts were not assessed as it was assumed that these would be managed under a decommissioning EIA in the future as required under the NEMA EIA regulations.

9.4 Detailed Description of Potential Impacts Associated with the Construction of the Proposed SR PVP

9.4.1 Topographic Impacts

Negligible impacts on the topography are anticipated as only basic levelling will be undertaken on site where needed as the site has an existing shallow gradient. The existing natural vegetation will be retained where possible.

Increased weight on the ground from the 60MWh battery infrastructure could lead to local subsidence of the undermined areas on site. Where possible and if possible, battery infrastructure will be placed on areas where undermining is not present. The residual impacts post implementation of the mitigation measures is anticipated to be **minor**.

9.4.2 Noise Impacts

Movement of heavy machinery and vehicle traffic, will impact temporarily on existing baseline noise levels in the area. The level of impact at the sensitive receptors is anticipated to be **moderate**.

To mitigate these impacts, the noisiest construction activities will be limited to daytime hours from Monday to Friday (i.e. 08:00 to 18:00) unless otherwise permitted. All equipment used on site will be equipped with mufflers on engine exhausts and compressor components. Limiting vehicle speeds on site to 30km/h to reduce road based noise generation. Vehicle or plant engines will be shut off if not in use and not left running unnecessarily. The residual impacts post implementation of the mitigation measures is anticipated to be **minor**.

9.4.3 Geological Impacts

Negligible are anticipated on the geology as the proposed SR PVP development does not include any significant groundworks. Shallow excavations to a maximum depth of approximately 1.5 meters are anticipated for the infrastructure foundations.

9.4.4 Geohydrological Impacts

Fuel and/or oil spillages from heavy machinery and vehicles could potentially impact on the groundwater reserve, should they be left unattended and seep into the deeper layers of soil or in to a shallow aquifer. However, a protocol for addressing any spillages is included in the EMP. Hydrocarbon related spillages will be cleaned up and remediated immediately. Furthermore, drip trays will be used under vehicles when parked to prevent oil spillages. The impacts from potential fuel and/or oil spillages is thus anticipated to be **negligible**.

The infiltration of contaminated surface water, resulting from the mismanagement of waste materials and dirty water, may have a **minor** impact groundwater resources. Waste and storm water management plans will be implemented on site to address surface water contamination aspects and thus the impact after mitigation is anticipated to be **negligible**.

Leakage from the battery infrastructure could seep into the ground and contaminate the groundwater resource, may have a **moderate** impact. The battery infrastructure is built within containers with integrated safety containment to prevent leakage and spillages. In addition, all battery infrastructure will be housed on an impermeable concrete base which will prevent contamination. The residual impacts are thus anticipated to be **negligible**.

9.4.5 Surface Hydrology Impacts

Any surface water runoff from the site is anticipated to flow in alignment with the surface topography and/or infiltrate on site. The following three risks are identified which could potentially lead to surface water pollution during rainfall events on site:

- Fuel and/or oil spillages from heavy machinery and vehicles
- Poor handling and storage of waste on site
- Poor management of cement and cement based waste streams

Management of the contamination risks will be mitigated via the implementation waste management and stormwater management plans. The impact after mitigation is thus anticipated to be **negligible**.

9.4.6 Climate Impacts

The proposed SR PVP is anticipated to have **no** impact on the regional and/or local climate.

9.4.7 Air Quality Impacts

Particulate emissions from site preparation, earthworks, clearing, and dust entrainment from construction vehicles is anticipated to have a **major** impact. Appropriate dust control measures will be implemented on site (i.e. water / dust suppressant sprayed onto gravel roads) or other suitable best practice techniques to mitigate the impacts. The residual impacts of fugitive particulate emissions are thus anticipated to be **moderate**.

Combustion emissions from heavy machinery and vehicles could potentially impact on the baseline ambient air quality in the area however all vehicles and/or machinery will be serviced regularly to ensure optimum operating performance with reduced emissions generation levels. It is also noted that these emissions will be transient in nature as the equipment and/or vehicles move around site. The residual impacts of the combustion emissions are thus anticipated to be **negligible**.

9.4.8 Traffic Impacts

A temporary gravel access road will be build off Hebbard road to provide temporary access to the site during the construction phase. Based on site observations, the traffic volumes along Hebbard road are relatively high as the road serves as a linkage road for Main Reef Road (R41) to Albertina Sisulu (R24), both of which are regional roads. Additionally, it was observed that the frequency of light delivery vehicles and heavy vehicles are common along Hebbard road due to the Robbertville industrial area being directly adjacent to the proposed SR PVP site.

Considering that Hebbard Road is already relatively heavily trafficked, the additional contribution of vehicles from the SR PVP project is anticipated to have a **negligible** impact regarding traffic congestion as the frequency of deliveries is anticipated to be below 20 deliveries per day. Similarly, the additional density of heavy vehicles along Hebbard Road is likely to have a **negligible** impact regarding damage to the local road infrastructure.

9.4.9 Cultural and Heritage Resource Impacts

The proposed SR PVP project footprint is located on a vacant parcel of defunct “brownfields” land with a history of undermining mining. The land is thus highly transformed and disturbed. No visible graves were observed on site nor other areas of potential cultural significance. A 40m buffer around the shaft has been proposed and will be maintained for safety reasons. The proposed SR PVP project is anticipated to have a **minor** impact regarding cultural and heritage resources in the local area. A “Chance Finds” procedure regarding cultural and heritage resources will be implemented on site to further reduce the risk and thus the residual impacts are anticipated to be **negligible** with the implementation of this procedure.

The undertaking of a Phase I heritage impact assessment as stipulated in Section 38 of the NHRA is therefore viewed as not being required due to the likely low risk regarding the presence of significant heritage and/or cultural resources on site. These opinions could be further investigated and/or verified should the South African Heritage Resources Agency hold the opinion that such assessments should be undertaken prior to the finalisation of the BAR and final application to GDARD.

9.4.10 Agricultural Potential, Soil, and Land Use Capability

The proposed SR PVP site is historic brownfields undermined land and is considered as having a low agricultural potential. The loss of agricultural land is thus considered **negligible**.

Heavy machinery and vehicles could potentially have fuel or oil spillages during construction and soil could become contaminated. Any spillages will be cleaned up and remediated immediately. Drip trays will be used under vehicles when parked to prevent oil spillages. The residual impacts post such mitigation measures is thus **negligible**.

Vehicles could compact soil on the site during construction leading to hard pack surfaces and increased erosion via surface water runoff. The sites stormwater management plan will address surface water aspects including erosion and sedimentation. Berms will be used on site to manage surface water runoff and reduce erosion. The residual impacts post such mitigation measures is thus **negligible**.

Change of land from "vacant defunct brownfield" land to a land use with an economic value is a **major positive** benefit to the COJ and surrounding communities if the project is granted EA.

9.4.11 Flora & Fauna Impacts

Flora and fauna will be physically displaced from the proposed SR PVP footprint. Where possible, flora will be left in situ rather than removal. Rehabilitation with local species will also be used to maintain diversity on site where possible. The impact is thus anticipated to be **moderate** even with the implementation of rehabilitation.

Fauna external to the site boundary may be disturbed by the noise and dust generated by the construction activities. Noise generation will be closely monitored on site and mitigation measures implemented where required. Wet suppression will be deployed to reduce fugitive dust generation. Residual impacts post mitigation is thus anticipated to be **negligible**.

Impact on off-site fauna and flora as a result of potential contamination of off-site surface water is anticipated to be **negligible** as the sites Storm Water Management Plan will address surface water and contamination risks.

Avifauna could be injured by flying into the solar panels, which is anticipated to be a **moderate** impact. The residual impact after mitigation is thus anticipated to be **minor**.

9.4.12 Socio-economic Character Impacts

Should the proposed SR PVP be authorised and developed, **major** and **substantial positive** socio-economic benefits will be experienced resulting from the conversion of the defunct brownfields vacant land including the following:

- Provide significant benefit to the local economy surrounding the site via stimulating the local economy and providing employment opportunities.
- Conversion of defunct vacant land to that holding an economic value.
- Conversion of current unmanaged defunct brownfields vacant land to a secure access controlled site will have a positive benefit regarding vagrancy and crime in the near vicinity of the site.

The only anticipated **negative** socio-economic impacts of the project are anticipated to include:

- The restriction of access to the site as the foot path access routes to the Robertville industrial area from the Florida residential areas will be constrained. The level of impact is anticipated to be **moderate**

9.4.13 Visual impacts

Construction activities, fugitive dust emission, and construction vehicles traversing the proposed site, as well as the presence of new infrastructure will transform the landscape permanently hence a **major** impact on sensitive receptors. To mitigate the impacts, appropriate dust control measures will be implemented on site (i.e. water / dust suppressant sprayed onto gravel roads) or other suitable best practice techniques such as tree screening, implementation of visual screening berms etc will be used to mitigate the impacts. The residual impacts post mitigation will be **minor**.

Glare from solar panels could impact on local sensitive receptors and/or flight paths resulting in a **moderate** impact.

9.4.14 Waste Impacts

General and hazardous waste streams will be generated during construction activities and will require appropriate management to prevent pollution and contamination of the environment. All wastes on site will be managed under the site waste management plan and site emergency plans regarding pollution control and spillages. The residual impacts post mitigation via the implementation of the waste management plan and site emergency plan will be **negligible**.

9.5 Detailed Description of Potential Impacts Associated with the Construction of the Proposed Transmission Line Option A 33kV Line to Florida Substation

9.5.1 Topographic Impacts

Negligible impacts on the topography are anticipated as a narrow trench will be opened to a maximum depth of 1.5m for transmission line laying. The trench will then be backfilled and rehabilitation in alignment with the sites rehabilitation plan will be implemented which will mitigate the impacts within the transmission line corridor.

9.5.2 Noise Impacts

Movement of heavy machinery and vehicle traffic, will impact temporarily on existing baseline noise levels along the transmission line corridor. The level of impact at the sensitive receptors is

anticipated to be **moderate**. To mitigate these impacts, the noisiest construction activities will be limited to daytime hours from Monday to Friday (i.e. 08:00 to 18:00) unless otherwise permitted. All equipment used on site will be equipped with mufflers on engine exhausts and compressor components. Limiting vehicle speeds on site to <30km/h. Vehicle or plant engines will be shut off if not in use and not left running unnecessarily. The residual impacts post implementation of the mitigation measures is anticipated to be **minor**.

9.5.3 Geological Impacts

Negligible impacts are anticipated on the geology as the excavations for the transmission line will be shallow (maximum depth of 1.5m) and the transmission line corridor will be rehabilitated.

9.5.4 Geohydrological Impacts

Fuel and/or oil spillages from heavy machinery and vehicles could potentially impact on the groundwater reserve, should they be left unattended and seep into the deeper layers of soil or in to a shallow aquifer. However, a protocol for addressing any spillages is included in the EMP. Hydrocarbon related spillages will be cleaned up and remediated immediately. Furthermore, drip trays will be used under vehicles when parked to prevent oil spillages. The impacts from potential fuel and/or oil spillages is thus anticipated to be **negligible**.

The infiltration of contaminated surface water, resulting from the mismanagement of waste materials and dirty water, may have a **minor** impact groundwater resources. Waste and storm water management plans will be implemented on site to address surface water contamination aspects and thus the impact after mitigation is anticipated to be **negligible**.

9.5.5 Surface Hydrology Impacts

The following three risks are identified with the transmission line which could potentially lead to surface water pollution during rainfall events on site:

- Heavy machinery and vehicles could potentially have fuel or oil spillages
- Poor handling and storage of waste
- Poor management of cement and cement based waste streams

Management of the contamination risks will be mitigated via the implementation waste management and storm water management plans. The impact after mitigation is thus anticipated to be **negligible**.

9.5.6 Climate Impacts

The proposed transmission line is anticipated to have **no** impact on the regional and/or local climate. The project will aid in the reduction of power sector CO₂ emissions by being a green energy project in comparison to coal based energy generation projects.

9.5.7 Air Quality Impacts

Particulate emissions from the transmission line trenching, clearing, and dust entrainment from construction vehicles is anticipated to have a **minor** impact. Appropriate dust control measures will be implemented on site (i.e. water / dust suppressant sprayed onto gravel roads) or other suitable best practice techniques to mitigate the impacts. The residual impacts of fugitive particulate emissions are thus anticipated to be **negligible**.

Combustion emissions from heavy machinery and vehicles could potentially impact on the baseline ambient air quality in the area however all vehicles and/or machinery will be serviced regularly to ensure optimum operating performance with reduced emissions generation levels. It

is also noted that these emissions will be transient in nature as the equipment and/or vehicles move along the transmission line corridor. The residual impacts of the combustion emissions are thus anticipated to be **negligible**.

9.5.8 Traffic impacts

Installation of the transmission line is expected to have a **negligible** impact on traffic in the area as the very little heavy machinery will be required to open the trench and bury the transmission line

9.5.9 Cultural and Heritage Resource Impacts

The proposed transmission line corridor is located on a vacant parcel of defunct “brownfields” land with a history of undermining mining. The land is thus highly transformed and disturbed. No visible graves were observed on site nor other areas of potential cultural significance. The proposed transmission line is anticipated to have a **minor** impact regarding cultural and heritage resources in the local area. A “Chance Finds” procedure regarding cultural and heritage resources will be implemented on site to further reduce the risk and thus the residual impacts are anticipated to be **negligible** with the implementation of this procedure.

The undertaking of a Phase I heritage impact assessment as stipulated in Section 38 of the NHRA is therefore viewed as not being required due to the likely low risk regarding the presence of significant heritage and/or cultural resources on site. These opinions could be further investigated and/or verified should the South African Heritage Resources Agency hold the opinion that such assessments should be undertaken prior to the finalisation of the BAR and final application to GDARD.

9.5.10 Agricultural Potential, Soil, and Land Use Capability

The proposed transmission line corridor is located on historic brownfields undermined land and is considered as having a low agricultural potential. The loss of agricultural land is thus considered **negligible**.

Heavy machinery and vehicles could potentially have fuel or oil spillages during construction and soil could become contaminated. Any spillages will be cleaned up and remediated immediately. Drip trays will be used under vehicles when parked to prevent oil spillages. The residual impacts post such mitigation measures is thus **negligible**.

The installation of the transmission line will sterilise surface land uses within the servitude corridor (i.e. no permanent structures will be allowed to be built over the buried cables). This impact is considered **moderate**. No mitigation measures are applicable however the servitude will be placed as close as possible to existing servitude or within existing servitudes where possible to limit land sterilization. The physical servitude will be a maximum of 3m. The residual impacts post such mitigation measures is thus **minor**.

9.5.11 Flora & Fauna Impacts

Based on the flora and fauna assessment undertaken by The Biodiversity Company, flora and fauna may be physically displaced from the proposed transmission line corridor. Where possible, flora will be left in situ rather than removal. Rehabilitation with local species will also be used to maintain diversity. As the area to be disturbed (i.e. the physical trench) is narrow the impact is anticipated to be **negligible** with the implementation of rehabilitation.

Fauna external to the site boundary may be disturbed by the noise and dust generated by the construction activities. Noise generation will be closely monitored and mitigation measures

implemented where required. Wet suppression will be deployed to reduce fugitive dust generation. Residual impacts post mitigation is thus anticipated to be **negligible**.

9.5.12 Socio-economic Character Impacts

Should the proposed transmission line be authorised and developed, **major positive** socio-economic benefits will be experienced in association with the establishment of the SR PVP as the project will provide significant benefit to the local economy surrounding the site via stimulating the local economy and providing employment opportunities

9.5.13 Visual Impacts

According to the visual impact assessment undertaken by Visual Resource Management Africa, construction activities, fugitive dust emission, and construction vehicles traversing the transmission line corridor may transform the landscape. Appropriate dust control measures on site (i.e. water / dust suppressant sprayed onto gravel roads) or other suitable best practice techniques will be implemented to mitigate the risks. The residual risk with the implementation of the mitigation measures will be **negligible**.

9.5.14 Waste Impacts

General and hazardous waste streams will be generated during construction activities and will require appropriate management to prevent pollution and contamination of the environment. All wastes generated from the transmission line construction will be managed under the site waste management plan and site emergency plans regarding pollution control and spillages. The residual impacts post mitigation via the implementation of the waste management plan and site emergency plan will be **negligible**.

9.6 Detailed Description of Potential Impacts Associated with the Construction of the Proposed Transmission Line Option B 33kV Line to Sentraal Substation

9.6.1 Topographic Impacts

Negligible impacts on the topography are anticipated as a narrow trench will be opened to a maximum depth of 1.5m for transmission line laying. The trench will then be backfilled and rehabilitation in alignment with the sites rehabilitation plan will be implemented which will mitigate the impacts within the transmission line corridor

9.6.2 Noise Impacts

Movement of heavy machinery, vehicle traffic and directional drilling under the Florida Lake canal, will impact temporarily on existing baseline noise levels along the transmission line corridor. The level of impact at the sensitive receptors is anticipated to be **moderate**. To mitigate these impacts, the noisiest construction activities will be limited to daytime hours from Monday to Friday (i.e. 08:00 to 18:00) unless otherwise permitted. All equipment used on site will be equipped with mufflers on engine exhausts and compressor components. Limiting vehicle speeds on site to <30km/h. Vehicle or plant engines will be shut off if not in use and not left running unnecessarily. The residual impacts post implementation of the mitigation measures is anticipated to be **minor**.

9.6.3 Geological Impacts

Negligible impacts are anticipated on the geology as the excavations for the transmission line will be shallow (maximum depth of 1.5m) and the transmission line corridor will be rehabilitated.

9.6.4 Geohydrological Impacts

Fuel and/or oil spillages from heavy machinery and vehicles could potentially impact on the groundwater reserve. However, any spillages will be cleaned up and remediated immediately. Furthermore, drip trays will be used under vehicles when parked to prevent oil spillages. The impacts from potential fuel and/or oil spillages is thus anticipated to be **negligible**.

The infiltration of contaminated surface water, resulting from the mismanagement of waste materials and dirty water, may have a **minor** impact groundwater resources. Waste and storm water management plans will be implemented on site to address surface water contamination aspects and thus the impact after mitigation is anticipated to be **negligible**.

9.6.5 Surface Hydrology Impacts

The proposed power distribution transmission line Option 2 to the Sentraal substation will be pipe jacked via directional drilling under the canal to avoid impacting on the surface hydrology of the canal. The following four risks are identified with the transmission line which could potentially lead to surface water pollution during rainfall events on site:

- Heavy machinery and vehicles could potentially have fuel or oil spillages
- Poor handling and storage of waste
- Poor management of cement and cement based waste streams
- Directional drilling fluids and other waste materials from the pipe jacking of the transmission line under the Florida Lake canal

Management of the contamination risks will be mitigated via the implementation waste management and storm water management plans. All drilling fluids will be maintained and managed within a bunded structure to prevent seepage into both the surface and groundwater resources. The impact after mitigation is thus anticipated to be **negligible**.

9.6.6 Climate Impacts

The proposed transmission line is anticipated to have **no** impact on the regional and/or local climate.

9.6.7 Air Quality Impacts

Particulate emissions from the transmission line trenching, clearing, and dust entrainment from construction vehicles is anticipated to have a **minor** impact. Appropriate dust control measures will be implemented on site (i.e. water / dust suppressant sprayed onto gravel roads) or other suitable best practice techniques to mitigate the impacts. The residual impacts of fugitive particulate emissions are thus anticipated to be **negligible**.

Combustion emissions from heavy machinery and vehicles could potentially impact on the baseline ambient air quality in the area however all vehicles and/or machinery will be serviced regularly to ensure optimum operating performance with reduced emissions generation levels. It is also noted that these emissions will be. The residual impacts of the combustion emissions are thus anticipated to be **negligible**.

9.6.8 Traffic Impacts

Installation of the transmission line is expected to have a **negligible** impact on traffic in the area as the very little heavy machinery will be required to open the trench and bury the transmission line

9.6.9 Cultural and Heritage Resource Impacts

The proposed transmission line corridor is located on a vacant parcel of defunct “brownfields” land with a history of undermining mining. The land is thus highly transformed and disturbed. No visible graves were observed on site nor other areas of potential cultural significance. The proposed transmission line is anticipated to have a **minor** impact regarding cultural and heritage resources in the local area. A “Chance Finds” procedure regarding cultural and heritage resources will be implemented on site to further reduce the risk and thus the residual impacts are anticipated to be **negligible** with the implementation of this procedure.

The undertaking of a Phase I heritage impact assessment as stipulated in Section 38 of the NHRA is therefore viewed as not being required due to the likely low risk regarding the presence of significant heritage and/or cultural resources on site. These opinions could be further investigated and/or verified should the South African Heritage Resources Agency hold the opinion that such assessments should be undertaken prior to the finalisation of the BAR and final application to GDARD.

9.6.10 Agricultural Potential, Soil, and Land Use Capability

The proposed transmission line corridor is located on historic brownfields undermined land and is considered as having a low agricultural potential. The loss of agricultural land is thus considered **negligible**.

Heavy machinery and vehicles could potentially have fuel or oil spillages during construction and soil could become contaminated. Any spillages will be cleaned up and remediated immediately. Drip trays will be used under vehicles when parked to prevent oil spillages. The residual impacts post such mitigation measures is thus **negligible**.

The installation of the transmission line will sterilise surface land uses within the servitude corridor (i.e. no permanent structures will be allowed to be built over the buried cables). This impact is considered **moderate**. No mitigation measures are applicable however the servitude will be placed as close as possible to existing servitude or within existing servitudes where possible to limit land sterilization. The physical servitude will be a maximum of 3m. The residual impacts post such mitigation measures is thus **minor**.

9.6.11 Flora & Fauna Impacts

Based on the flora and fauna assessment undertaken by The Biodiversity Company, flora and fauna may be physically displaced from the proposed transmission line corridor. Where possible, flora will be left in situ rather than removal. Rehabilitation with local species will also be used to maintain diversity. As the area to be disturbed (i.e. the physical trench) is narrow the impact is anticipated to be **negligible** with the implementation of rehabilitation.

Fauna external to the site boundary may be disturbed by the noise and dust generated by the construction activities and directional drilling operations. Noise generation will be closely monitored and mitigation measures implemented where required. Wet suppression will be deployed to reduce fugitive dust generation. Residual impacts post mitigation is thus anticipated to be **negligible**.

9.6.12 Socio-economic Character Impacts

Should the proposed transmission line be authorised and developed, **major positive** socio-economic benefits will be experienced in association with the establishment of the SR PVP as the project will provide significant benefit to the local economy surrounding the site via stimulating the local economy and providing employment opportunities

9.6.13 Visual Impacts

According to the visual impact assessment undertaken by Visual Resource Management Africa, construction activities, fugitive dust emission, and construction vehicles traversing the transmission line corridor may transform the landscape. Appropriate dust control measures on site (i.e. water / dust suppressant sprayed onto gravel roads) or other suitable best practice techniques will be implemented to mitigate the risks. The residual risk with the implementation of the mitigation measures will be **negligible**.

9.6.14 Waste Impacts

General and hazardous waste streams will be generated during construction activities and will require appropriate management to prevent pollution and contamination of the environment. All wastes generated from the transmission line construction will be managed under the site waste management plan and site emergency plans regarding pollution control and spillages. The residual impacts post mitigation via the implementation of the waste management plan and site emergency plan will be **negligible**.

9.7 Detailed Description of Potential Impacts Associated with the Operation of the Proposed SR PVP

9.7.1 Topographic Impacts

Increased weight on the ground from the 60MWh battery infrastructure could lead to local subsidence of the undermined areas on site in time. No mitigation is available in the operational phase however the residual impacts are anticipated to be **moderate**.

9.7.2 Noise Impacts

Movement of maintenance machinery and vehicle traffic on site may impact on existing baseline noise levels in the area. It is anticipated that these impacts will be very temporal in nature. The level of impact at the sensitive receptors is thus anticipated to be **negligible**.

9.7.3 Geological Impacts

No impacts on the geology are anticipated.

9.7.4 Geohydrological Impacts

Fuel and/or oil spillages from maintenance machinery and vehicles could potentially impact on the groundwater reserve. However, any spillages will be cleaned up and remediated immediately. The impacts from potential fuel and/or oil spillages is thus anticipated to be **negligible**.

The infiltration of contaminated surface water, resulting from the servicing and maintenance of the infrastructure, mismanagement of waste materials and dirty water from the SR PVP, may have a **minor** impact groundwater resources. Waste and stormwater management plans

maintained on site to address surface water contamination aspects and thus the impact after mitigation is anticipated to be **negligible**.

Leakage from the battery infrastructure could seep into the ground and contaminate the groundwater resource, may have a **moderate** impact. The battery infrastructure is built within containers with integrated safety containment to prevent leakage and spillages. In addition, all battery infrastructure will be housed on an impermeable concrete base which will prevent contamination. The residual impacts are thus anticipated to be **negligible**.

9.7.5 Surface Hydrology Impacts

Any surface water runoff from the site is anticipated to flow in alignment with the surface topography and/or infiltrate on site. The following two risks are identified which could potentially lead to surface water pollution during rainfall events on site:

- Fuel and/or oil spillages (hydrocarbon contamination) from maintenance machinery and vehicles
- Waste water from the bowser truck washing the PV panels
- Poor handling and storage of waste on site

Management of the contamination risks will be mitigated via the implementation waste management and storm water management plans. The impact after mitigation is thus anticipated to be **negligible**.

Compaction of the grounds surface at the proposed SR PVP site could lead to increased run off, soil erosion and sedimentation in surface water resources off-site. These impacts are anticipated to have a **minor** impact on the surface water resource. The maintenance of a storm water management plan will address surface water and possible erosion risks. Berms will be used on site to manage surface water runoff and reduce erosion. The impact after mitigation is thus anticipated to be **negligible**.

9.7.6 Climate Impacts

The proposed SR PVP is anticipated to have **no** impact on the regional and/or local climate. The project will aid in the reduction of power sector CO₂ emissions by being a green energy project in comparison to coal based energy generation projects.

9.7.7 Air Quality Impacts

Particulate emissions from maintenance operations, and dust entrainment from vehicles on site is anticipated to have a **minor** impact. Appropriate dust control measures will be implemented on site (i.e. water / dust suppressant sprayed onto gravel roads) or other suitable best practice techniques to mitigate the impacts. The residual impacts of fugitive particulate emissions are thus anticipated to be **negligible**.

Combustion emissions from the maintenance machinery and vehicles could potentially impact on the baseline ambient air quality in the area however all vehicles and/or machinery will be serviced regularly to ensure optimum operating performance with reduced emissions generation levels. It is also noted that these emissions will be temporal in nature as the equipment and/or vehicles move around site. The residual impacts of the combustion emissions are thus anticipated to be **negligible**.

The release of hydrogen and chlorine gas from the battery infrastructure could be harmful to human health at the sensitive receptors. The battery infrastructure includes an automated HCL/chlorine sensor which will

monitor the gas levels and shut down the battery infrastructure if a gas build up is detected. In addition, any chlorine generated is re-absorbed by the electrolyte solution. The residual impacts of the battery emissions are thus anticipated to be **negligible**.

9.7.8 Traffic Impacts

During the operational phase, access to site will be via Klopper street north of the site. A minor increase in traffic will be experienced on Klopper street with employees and maintenance contractors accessing the site on a daily basis. The impacts are anticipated to be very limited as the proposed SR PVP is an automated facility with limited maintenance requirements. The impacts are thus expected to be **negligible**.

9.7.9 Cultural and Heritage Resource Impacts

There will be **no** impacts on cultural and heritage resources during the operational phase of the SR PVP. A 40m buffer around the shaft will be maintained for safety reasons and to ensure that this potential heritage site remains undisturbed by the project.

9.7.10 Agricultural Potential, Soil, and Land Use Capability

There will be **no** impacts on the agricultural potential and land use capability during the operational phase of the proposed SR PVP.

Hard pack surfaces and increased erosion via surface water runoff. The sites stormwater management plan will address surface water aspects including erosion and sedimentation. Berms will be used on site to manage surface water runoff and reduce erosion. The residual impacts post such mitigation measures is thus **negligible**.

9.7.11 Flora & Fauna Impacts

Avifauna could be injured by flying into the solar panels, which is anticipated to be a **moderate** impact. The residual impact after mitigation is thus anticipated to be **minor**.

Avifauna nests on the infrastructure during the operational phase will require removal to reduce the risk of on-site fires. Removal of nests should be undertaken in alignment with an avifauna specialists' recommendations. The residual impact after mitigation (i.e. nest removal under the advice of the avifauna specialist) is thus anticipated to be **minor**.

Fauna external to the site boundary may be disturbed by the noise generated by the operation of the facility, however noise will be minimal. Noise generation will be closely monitored on site and mitigation measures implemented where required. The residual impact is thus anticipated to be **negligible**.

Off-site fauna and flora may be impacted as a result of potential contamination of off-site surface water. The site's stormwater management plans will address surface water and contamination risks both on and off site. The residual impact is thus anticipated to be **negligible**.

9.7.12 Socio-economic Character Impacts

Should the proposed SR PVP be authorised and developed, **moderate positive** socio-economic benefits will be experienced as the project will provide significant benefit to the local economy surrounding the site via stimulating the local economy and providing employment opportunities. Stabilisation of the electrical power grid as more power will be available in the area will also be a **substantial positive** benefit of the project.

9.7.13 Visual Impacts

Due to the built nature and the large trees located to the west of the site, the potential for glare is unlikely to take place. The angle of the PV panels will be very low, so very little glint is anticipated. Any glint occurring would also be experienced for short periods of time this limiting the sensitive receptors exposure. The residual impact is thus anticipated to be **negligible**.

Infrastructure on site will transform the landscape permanently and will be visible to several sensitive receptors without the implementation of mitigation measures. The impact is that anticipated to be **moderate**.

9.7.14 Waste Impacts

General and hazardous waste streams will be generated during operational activities and will require appropriate management to prevent pollution and contamination of the environment. All wastes on site will be managed under the site waste management plan and site emergency plans regarding pollution control and spillages. The residual impacts post mitigation via the implementation of the waste management plan and site emergency plan is anticipated to be **negligible**.

9.8 Detailed Description of Potential Impacts Associated with the Operation of the Proposed Transmission Line Option A 33kV Line to Florida Substation

9.8.1 Topographic Impacts

No impacts on the topography are anticipated from the transmission line during the operational phase of the SR PVP.

9.8.2 Noise Impacts

Movement of maintenance machinery and vehicle traffic at the substation regarding the transmission line termination points may impact temporarily on existing baseline noise levels. It is anticipated that these impacts will be very temporal in nature. The level of impact at the sensitive receptors is thus anticipated to be **negligible**.

9.8.3 Geological Impacts

No impacts on the geology are anticipated from the transmission line.

9.8.4 Geohydrological Impacts

Maintenance within the substation regarding the transmission line termination points could lead to groundwater contamination and a **minor** impact groundwater resources. Any spillages will be cleaned up and remediated immediately in alignment with the sites site emergency plans regarding pollution control and spillages. The residual impacts post mitigation is anticipated to be **negligible**.

The infiltration of contaminated surface water, resulting from the servicing and maintenance of the substation and transmission line termination points and/or mismanagement of waste materials, may have a **minor** impact groundwater resources. Waste and storm water management plans will be implemented on site to address surface water contamination aspects and thus the impact after mitigation is anticipated to be **negligible**.

9.8.5 Surface Hydrology Impacts

Maintenance within the substation regarding the transmission line termination points and/or the poor handling and storage of waste at the substations could lead to surface water

contamination. These impacts are anticipated to have a **minor** impact on the surface water resource. Management of the contamination risks will be mitigated via the implementation waste management and storm water management plans. The impact after mitigation is thus anticipated to be **negligible**.

9.8.6 Climate Impacts

The proposed transmission line is anticipated to have **no** impact on the regional and/or local climate during the operational phase.

9.8.7 Air Quality Impacts

The proposed transmission line is anticipated to have **no** impact on the local ambient air quality during the operational phase.

9.8.8 Traffic Impacts

The proposed transmission line is anticipated to have **no** impact on the local traffic during the operational phase.

9.8.9 Cultural and Heritage Resource Impacts

The proposed transmission line is anticipated to have **no** impact on the cultural and heritage resources during the operational phase.

9.8.10 Agricultural Potential, Soil, and Land Use Capability

The transmission line will sterilise a maximum width of 3m within the transmission line corridor. The residual impact is anticipated to be **minor** as the loss of land is minimal.

9.8.11 Flora & Fauna impacts

The proposed transmission line is anticipated to have **no** impact on the flora and fauna during the operational phase as it is buried underground.

9.8.12 Socio-economic Character Impacts

Should the proposed SR PVP be authorised and developed, **moderate positive** socio-economic benefits will be experienced as the project will provide significant benefit to the local economy surrounding the site via stimulating the local economy and providing employment opportunities

9.8.13 Visual Impacts

The proposed transmission line is anticipated to have **no** visual impact during the operational phase as it is buried underground.

9.8.14 Waste Impacts

General and hazardous waste streams will be generated during operational activities and will require appropriate management to prevent pollution and contamination of the environment. All wastes on site will be managed under the site waste management plan and site emergency plans regarding pollution control and spillages. The residual impacts post mitigation via the implementation of the waste management plan and site emergency plan will be **negligible**.

9.9 Detailed Description of Potential Impacts Associated with the Operation of the Proposed Transmission Line Option B 33kV Line to Sentraal Substation

9.9.1 Topographic Impacts

No impacts on the topography are anticipated from the transmission line during the operational phase of the SR PVP.

9.9.2 Noise Impacts

Movement of maintenance machinery and vehicle traffic at the substation regarding the transmission line termination points may impact temporarily on existing baseline noise levels. It is anticipated that these impacts will be very temporal in nature. The level of impact at the sensitive receptors is thus anticipated to be **negligible**.

9.9.3 Geological Impacts

No impacts on the geology are anticipated from the transmission line operational phase.

9.9.4 Geohydrological Impacts

Maintenance within the substation regarding the transmission line termination points could lead to groundwater contamination and a **minor** impact groundwater resources. Any spillages will be cleaned up and remediated immediately in alignment with the sites site emergency plans regarding pollution control and spillages. The residual impacts post mitigation is anticipated to be **negligible**.

The infiltration of contaminated surface water, resulting from the servicing and maintenance of the substation and transmission line termination points and/or mismanagement of waste materials, may have a **minor** impact groundwater resources. Waste and storm water management plans will be implemented on site to address surface water contamination aspects and thus the impact after mitigation is anticipated to be **negligible**.

9.9.5 Surface Hydrology Impacts

Maintenance within the substation regarding the transmission line termination points and/or the poor handling and storage of waste at the substations could lead to surface water contamination. These impacts are anticipated to have a **minor** impact on the surface water resource. Management of the contamination risks will be mitigated via the implementation waste management and storm water management plans. The impact after mitigation is thus anticipated to be **negligible**.

9.9.6 Climate Impacts

The proposed transmission line is anticipated to have **no** impact on the regional and/or local climate during the operational phase.

9.9.7 Air Quality Impacts

The proposed transmission line is anticipated to have **no** impact on the local ambient air quality during the operational phase.

9.9.8 Traffic Impacts

The proposed transmission line is anticipated to have **no** impact on the local traffic during the operational phase.

9.9.9 Cultural and Heritage Resource Impacts

The proposed transmission line is anticipated to have **no** impact on the cultural and heritage resources during the operational phase.

9.9.10 Agricultural Potential, Soil, and Land Use Capability

The transmission line will sterilise a maximum width of 3m within the transmission line corridor. The residual impact is anticipated to be **minor** as the loss of land is minimal.

9.9.11 Flora & Fauna Impacts

The proposed transmission line is anticipated to have **no** impact on the flora and fauna during the operational phase as it is buried underground.

9.9.12 Socio-economic Character Impacts

Should the proposed SR PVP be authorised and developed, **moderate positive** socio-economic benefits will be experienced as the project will provide significant benefit to the local economy surrounding the site via stimulating the local economy and providing employment opportunities

9.9.13 Visual Impacts

The proposed transmission line is anticipated to have **no** visual impact during the operational phase as it is buried underground.

9.9.14 Waste Impacts

General and hazardous waste streams will be generated during operational activities and will require appropriate management to prevent pollution and contamination of the environment. All wastes on site will be managed under the site waste management plan and site emergency plans regarding pollution control and spillages. The residual impacts post mitigation via the implementation of the waste management plan and site emergency plan will be **negligible**.

9.10 Cumulative Impacts of the Proposed SR PVP and Associated Transmission Line (Option A or Option B)

The following key cumulative impacts are anticipated:

- **Air quality impacts:** Fugitive particulate emissions from the proposed SR PVP and associated transmission line during the construction and operational phases may negatively influence the local ambient air quality. Appropriate dust control measures (i.e. water / dust suppressant sprayed onto gravel roads) or other suitable best practice techniques will be required to mitigate the impacts. The residual impacts post mitigation is anticipated to be **moderate**.
- **Reduction in agricultural potential, soil, and land use capability:**
 - The SR PVP project footprint and transmission line corridor will sterilise surface land uses within throughout the life of the project. No mitigation measures are applicable however the servitude will be placed as close as possible to existing servitude or within existing servitudes where possible to limit land sterilization. The physical servitude will be a maximum of 3m wide within a 50m wide corridor. The residual impact is anticipated to be **minor**.

- The change of land use from "vacant defunct brownfield" land to a land use with an economic value (I.e. SR PVP) is a **major positive** benefit to the COJ and surrounding communities.
- **Socio-economic character impacts:**
 - Should the proposed SR PVP and associated transmission line be authorised and developed, **moderate** to **substantial positive** socio-economic benefits will be experienced as the project will provide significant benefit to the local economy surrounding the site via stimulating the local economy and providing employment opportunities
 - Conversion of current unmanaged vacant "defunct brownfield" land (I.e. the SR PVP project footprint) to a secure access controlled site will have a **substantial positive** benefit regarding vagrancy and crime in the near vicinity of the site
- **Visual impacts:** Construction activities, fugitive dust emission, and construction vehicles traversing the proposed SR PVP site and transmission line corridor, as well as the presence of new infrastructure will transform the landscape and have a **moderate** impact. With the implementation of appropriate dust control measures (i.e. water / dust suppressant sprayed onto gravel roads) or other suitable best practice the residual impacts post mitigation is anticipated to be **minor**.

9.11 Impact Assessment Summary

All the predicted environmental impacts resulting from the proposed project activities are described in Table 16 to

Table 21 along with their significance ratings before and after mitigation.

Table 16: SR PVP Impact Assessment Matrix for Construction

Description of impact	Magnitude		Sensitivity level	Impact Significance	Mitigation measures	Residual impacts after mitigation	
	+	-					Level
SR PVP project footprint							
Topography							
During construction, site preparations might affect surface topography		-	Minor	Low	Negligible	Only basic levelling will be undertaken on site where needed as the site has an existing shallow gradient. Natural vegetation will be retained where possible	Negligible
Increased weight on the ground from the 60MWh battery infrastructure could lead to local subsidence of the undermined areas on site		-	Moderate	Moderate	Moderate	Where possible and if possible, battery infrastructure will be placed on areas where undermining is not present	Moderate
Noise impact							
Movement of heavy machinery and vehicle traffic, will impact temporarily on existing baseline noise levels in the area		-	Moderate	Medium	Moderate	Limit the noisiest construction activities to daytime hours from Monday to Friday (i.e. 08:00 to 18:00) unless otherwise permitted. All equipment used on site will be equipped with mufflers on engine exhausts and compressor components. Limiting vehicle speeds on site to < 30 km/h. Vehicle or plant engines will be shut off if not in use and not left running unnecessarily.	Minor
Groundwater resource impacts							
Heavy machinery and vehicles could potentially have fuel or oil spillages during construction		-	Minor	Low	Negligible	Any spillages will be cleaned up and remediated immediately. Drip trays will be used under vehicles when parked to prevent oil spillages	Negligible
The infiltration of contaminated surface water, resulting from the mismanagement of waste materials and dirty water, may impact groundwater resources		-	Moderate	Low	Minor	Waste management and storm water management plans will address surface water contamination aspects	Negligible
Leakage from the battery infrastructure could seep into the ground and contaminate the groundwater resource		-	Moderate	Moderate	Moderate	The battery infrastructure is built within containers with integrated safety containment to prevent leakage and spillages. In addition, all battery infrastructure will be housed on an impermeable concrete base which will prevent contamination to the ground and groundwater resource	Negligible
Air quality impacts							
Particulate emissions from site preparation, earthworks, clearing, and dust entrainment from construction vehicles		-	Major	Medium	Major	Implement appropriate dust control measures on site (i.e. water / dust suppressant sprayed onto gravel roads) or other suitable best practice techniques	Moderate
Combustion emissions from heavy machinery and vehicles could potentially impact on the baseline ambient air quality in the area		-	Negligible	Negligible	Negligible	All vehicles and/or machinery are to be serviced regularly to ensure optimum operating performance with reduced emissions generation.	Negligible
Reduction in agricultural potential, soil, and land use capability							
Loss of arable land		-	Negligible	Negligible	Negligible	Historic brownfields undermined land and is considered as having a low agricultural potential	Negligible
Heavy machinery and vehicles could potentially have fuel or oil spillages during construction and soil could become contaminated		-	Minor	Low	Negligible	Any spillages will be cleaned up and remediated immediately. Drip trays will be used under vehicles when parked to prevent oil spillages	Negligible
Vehicles could compact soil on the site during construction leading to hard pack surfaces and increased erosion		-	Moderate	Low	Minor	Storm water management plans will address surface water aspects including erosion and sedimentation	Negligible
Change of land use and land capability due to use of the "vacant defunct brownfield" land	+		Major	Medium	Major	Project benefit: Converting defunct land to economically viable land	Major
Surface water resource impacts							
Heavy machinery and vehicles could potentially have fuel or oil spillages during construction which could lead to surface water pollution during rainfall events		-	Moderate	Low	Minor	Waste management and storm water management plans will address surface water contamination aspects	Negligible
Contamination of surface water due to poor handling and storage of waste		-	Moderate	Low	Minor	Waste management and storm water management plans will address surface water contamination aspects	Negligible
Contamination of surface water due to poor management of cement and cement based waste streams		-	Moderate	Low	Minor	Waste management and storm water management plans will address surface water contamination aspects	Negligible
Compaction of the grounds surface could lead to increased run off, soil erosion and sedimentation in surface water resources off-site		-	Moderate	Low	Minor	Storm water management plans will address surface water and possible erosion risks. Berms will be used on site to manage surface water runoff and reduce erosion	Negligible
Traffic impact							
Increased traffic congestion on local roads		-	Minor	Low	Negligible	Managed via the traffic management plan	Negligible

Description of impact	Magnitude		Sensitivity level	Impact Significance	Mitigation measures	Residual impacts after mitigation	
	+	-					Level
Damage to local road infrastructure due to the increased frequency of heavy vehicles		-	Minor	Low	Negligible	Managed via the traffic management plan	Negligible
Cultural and heritage resource impacts							
Cultural heritage resources may be disturbed due to land clearing		-	Moderate	Low	Minor	Managed via a chance finds procedure regarding cultural and heritage resources	Minor
Unmarked underground graves or archaeological artefacts could be unearthed during construction phase should excavation be required for the infrastructure foundations		-	Moderate	Low	Minor	Managed via a chance finds procedure regarding cultural and heritage resources	Minor
Impacts on Flora & Fauna							
Physical displacement of Flora & Fauna on the SR PVP footprint		-	Major	Low	Moderate	Where possible Flora will be left in situ rather than removal. Rehabilitation with local species will also be used to maintain diversity on site where possible	Moderate
Fauna external to the site boundary may be disturbed by the noise and dust generated by the construction activities		-	Minor	Low	Negligible	Noise generation will be closely monitored on site and mitigation measures implemented where required. Wet suppression will be deployed to reduce fugitive dust generation.	Negligible
Impact on off-site fauna & flora as a result of potential contamination of off-site surface water		-	Minor	Low	Negligible	Storm water management system to contain dirty water on site and divert clean runoff away from the site. Site specific measures contained in SWMP	Negligible
Socio-economic character impacts							
Restriction of access to the site. Foot path access routes to the Robertville industrial area from the Florida residential areas will be constrained		-	Moderate	Low	Moderate		Moderate
Employment creation	+		Moderate	Medium	Major	Project benefit: Creation of ± 200 jobs for 6 to 8 months during the construction phase	Major
Conversion of defunct vacant land to that holding an economic value	+		Major	Medium	Substantial	Project benefit: Conversion of defunct brownfields vacant land to an economically viable PVP project will provide significant benefit and stimulus to the local economy surrounding the site	Substantial
Improved local security due to the conversion of vacant land to a managed site	+		Major	Medium	Substantial	Project benefit: Conversion of current unmanaged defunct brownfields vacant land to a secure access controlled site will have a positive benefit regarding vagrancy and crime in the near vicinity of the site	Substantial
Visual impacts							
Construction activities, fugitive dust emission, and construction vehicles traversing the proposed site, as well as the presence of new infrastructure will transform the landscape.		-	Major	Medium	Major	Implement appropriate dust control measures on site (i.e. water / dust suppressant sprayed onto gravel roads) or other suitable best practice techniques	Minor
Waste management							
General and hazardous waste streams will be generated during construction activities and will require appropriate management to prevent pollution and contamination of the environment		-	Minor	Low	Negligible	Will be managed under the site waste management plan and site emergency plans regarding pollution control and spillages	Negligible

Source: Mott MacDonald, 2017

Table 17: Transmission line Option A 33kV Line to Florida Substation Impact Assessment Matrix for Construction

Description of impact	Magnitude		Sensitivity level	Impact Significance	Mitigation measures	Residual impacts after mitigation	
	+	-					Level
Topography							
During construction, trenching of the transmission line might affect surface topography		-	Minor	Low	Negligible	Rehabilitation in alignment with the sites rehabilitation plan will be implemented which will mitigate the impacts within the transmission line corridor	Negligible
Noise impact							
Movement of heavy machinery and vehicle traffic, will impact temporarily on existing baseline noise levels along the transmission line corridor and at the substations		-	Moderate	Medium	Moderate	Limit the noisiest construction activities to daytime hours from Monday to Friday (i.e. 08:00 to 18:00) unless otherwise permitted. All equipment used on site will be equipped with mufflers on engine exhausts and compressor components. Limiting vehicle speeds on site to < 30 km/h. Vehicle or plant engines will be shut off if not in use and not left running unnecessarily.	Minor
Groundwater resource impacts							

Description of impact	Magnitude		Sensitivity level	Impact Significance	Mitigation measures	Residual impacts after mitigation	
	+	-					Level
Heavy machinery and vehicles could potentially have fuel or oil spillages during construction		-	Minor	Low	Negligible	Any spillages will be cleaned up and remediated immediately. Drip trays will be used under vehicles when parked to prevent oil spillages	Negligible
The infiltration of contaminated surface water, resulting from the mismanagement of waste materials and dirty water, may impact groundwater resources		-	Moderate	Low	Minor	Waste management and storm water management plans will address surface water contamination aspects	Negligible
Air quality impacts							
Particulate emissions from transmission line trenching, clearing, and dust entrainment from construction vehicles		-	Moderate	Low	Minor	Implement appropriate dust control measures on site (i.e. water / dust suppressant sprayed onto gravel roads) or other suitable best practice techniques	Negligible
Combustion emissions from heavy machinery and vehicles could potentially impact on the baseline ambient air quality in the area		-	Negligible	Negligible	Negligible	All vehicles and/or machinery are to be serviced regularly to ensure optimum operating performance with reduced emissions generation.	Negligible
Reduction in agricultural potential, soil, and land use capability							
Loss of arable land		-	Negligible	Negligible	Negligible	Land on the SR PVP footprint is highly disturbed brownfield land with a history of undermining. The agricultural potential is thus viewed as low to negligible	Negligible
Heavy machinery and vehicles could potentially have fuel or oil spillages during construction and soil could become contaminated		-	Moderate	Low	Minor	Will be managed under the site waste management plan and site emergency plans regarding pollution control and spillages	Negligible
The installation of the transmission line will sterilise surface land uses within the servitude corridor		-	Moderate	Moderate	Moderate	No mitigation measures are applicable however the servitude will be placed as close as possible to existing servitude or within existing servitudes where possible to limit land sterilization. The physical servitude will be a maximum of 3m wide within a 50m wide corridor	Minor
Surface water resource impacts							
Heavy machinery and vehicles could potentially have fuel or oil spillages during construction which could lead to surface water pollution during rainfall events		-	Moderate	Low	Minor	Waste management and storm water management plans will address surface water contamination aspects	Negligible
Contamination of surface water due to poor handling and storage of waste		-	Moderate	Low	Minor	Waste management and storm water management plans will address surface water contamination aspects	Negligible
Contamination of surface water due to poor management of cement and cement based waste streams		-	Moderate	Low	Minor	Waste management and storm water management plans will address surface water contamination aspects	Negligible
Traffic impact							
Increased traffic congestion on local roads		-	Minor	Low	Negligible	Managed via the traffic management plan	Negligible
Damage to local road infrastructure due to the increased frequency of heavy vehicles		-	Minor	Low	Negligible	Managed via the traffic management plan	Negligible
Cultural and heritage resource impacts							
Cultural heritage resources may be disturbed due to land clearing		-	Moderate	Low	Minor	Managed via a chance finds procedure regarding cultural and heritage resources	Negligible
Unmarked underground graves or archaeological artefacts could be unearthed during the transmission line excavations		-	Moderate	Low	Minor	Managed via a chance finds procedure regarding cultural and heritage resources	Negligible
Impacts on Flora & Fauna							
Displacement of Flora & Fauna due to the transmission line corridor		-	Minor	Low	Negligible	Where possible Flora will be left in situ rather than removal. Rehabilitation with local species will also be used to maintain diversity where possible	Negligible
Fauna in close proximity to the transmission line corridor may be disturbed by the noise and dust generated by the construction activities		-	Minor	Low	Negligible	Noise generation will be closely monitored on site and mitigation measures implemented where required. Wet suppression will be deployed to reduce fugitive dust generation.	Negligible
Socio-economic character impacts							
Employment creation	+		Moderate	Medium	Major	Project benefit: Creation of ± 200 jobs for 6 to 8 months during the construction phase	Major
Visual impacts							
Construction activities, fugitive dust emission, and construction vehicles traversing the transmission line corridor may transform the landscape.		-	Minor	Medium	Minor	Implement appropriate dust control measures on site (i.e. water / dust suppressant sprayed onto gravel roads) or other suitable best practice techniques	Negligible
Waste management							
General and hazardous waste streams will be generated during construction activities and will require appropriate management to prevent pollution and contamination of the environment		-	Minor	Low	Negligible	Will be managed under the site waste management plan and site emergency plans regarding pollution control and spillages	Negligible

Source: Mott MacDonald, 2017

Table 18: Transmission line Option B 33kV Line to Sentraal Substation Impact Assessment Matrix for Construction

Description of impact	Magnitude		Sensitivity level	Impact Significance	Mitigation measures	Residual impacts after mitigation
	+	-				
Topography						
During construction, trenching of the transmission line might affect surface topography		-	Minor	Low	Negligible	Rehabilitation in alignment with the sites rehabilitation plan will be implemented which will mitigate the impacts within the transmission line corridor
Noise impact						
Movement of heavy machinery and vehicle traffic, will impact temporarily on existing baseline noise levels along the transmission line corridor and at the substations		-	Moderate	Medium	Moderate	Limit the noisiest construction activities to daytime hours from Monday to Friday (i.e. 08:00 to 18:00) unless otherwise permitted. All equipment used on site will be equipped with mufflers on engine exhausts and compressor components. Limiting vehicle speeds on site to < 30 km/h. Vehicle or plant engines will be shut off if not in use and not left running unnecessarily.
Noise from directional drilling for the transmission line to pass under the canal may impact on nearby sensitive receptors		-	Moderate	Medium	Moderate	Limit the noisiest construction activities to daytime hours from Monday to Friday (i.e. 08:00 to 18:00). All equipment used on site will be equipped with mufflers on engine exhausts and compressor components. Limiting vehicle speeds on site to < 30 km/h. Vehicle or plant engines will be shut off if not in use and not left running unnecessarily.
Groundwater resource impacts						
Heavy machinery and vehicles could potentially have fuel or oil spillages during construction		-	Minor	Low	Negligible	Any spillages will be cleaned up and remediated immediately. Drip trays will be used under vehicles when parked to prevent oil spillages
The infiltration of contaminated surface water, resulting from the mismanagement of waste materials and dirty water, may impact groundwater resources		-	Moderate	Low	Minor	Waste management and storm water management plans will address surface water contamination aspects
Air quality impacts						
Particulate emissions from transmission line trenching, clearing, and dust entrainment from construction vehicles		-	Moderate	Low	Minor	Implement appropriate dust control measures on site (i.e. water / dust suppressant sprayed onto gravel roads) or other suitable best practice techniques
Combustion emissions from heavy machinery and vehicles could potentially impact on the baseline ambient air quality in the area		-	Negligible	Negligible	Negligible	All vehicles and/or machinery are to be serviced regularly to ensure optimum operating performance with reduced emissions generation.
Reduction in agricultural potential, soil, and land use capability						
Loss of arable land		-	Negligible	Negligible	Negligible	Land on the SR PVP footprint is highly disturbed brownfield land with a history of undermining. The agricultural potential is thus viewed as low to negligible
Heavy machinery and vehicles could potentially have fuel or oil spillages during construction and soil could become contaminated		-	Moderate	Low	Minor	Will be managed under the site waste management plan and site emergency plans regarding pollution control and spillages
The transmission line will sterilise surface land uses within the servitude corridor		-	Moderate	Moderate	Moderate	No mitigation measures are applicable however the servitude will be placed as close as possible to existing servitude or within existing servitudes where possible to limit land sterilization. The physical servitude will be a maximum of 3m wide within a 50m wide corridor
Surface water resource impacts						
Heavy machinery and vehicles could potentially have fuel or oil spillages during construction which could lead to surface water pollution during rainfall events		-	Moderate	Low	Minor	Waste management and storm water management plans will address surface water contamination aspects
Contamination of surface water due to poor handling and storage of waste		-	Moderate	Low	Minor	Waste management and storm water management plans will address surface water contamination aspects
Contamination of surface water due to poor management of cement and cement based waste streams		-	Moderate	Low	Minor	Waste management and storm water management plans will address surface water contamination aspects
Contamination of surface water due to poor management of directional drilling fluids and other waste materials when installing the transmission line under the canal		-	Moderate	Low	Minor	Waste management and storm water management plans will address surface water contamination aspects. All drilling fluids will be maintained and managed within a bunded structure to prevent seepage into both the surface and groundwater resources
Traffic impact						
Increased traffic congestion on local roads		-	Minor	Low	Negligible	Managed via the traffic management plan
Damage to local road infrastructure due to the increased frequency of heavy vehicles		-	Minor	Low	Negligible	Managed via the traffic management plan
Disruptions in local traffic flows if transmission lines are trenched across roads and not via directional drilling and pipe jacking		-	Moderate	Medium	Moderate	Managed via the traffic management plan
Cultural and heritage resource impacts						

Description of impact	Magnitude			Sensitivity level	Impact Significance	Mitigation measures	Residual impacts after mitigation
	+	-	Level				
Cultural heritage resources may be disturbed due to land clearing		-	Moderate	Low	Minor	Managed via a chance finds procedure regarding cultural and heritage resources	Negligible
Unmarked underground graves or archaeological artefacts could be unearthed during the transmission line excavations		-	Moderate	Low	Minor	Managed via a chance finds procedure regarding cultural and heritage resources	Negligible
Impacts on Flora & Fauna							
Displacement of Flora & Fauna due to the transmission line corridor		-	Minor	Low	Negligible	Where possible Flora will be left in situ rather than removal. Rehabilitation with local species will also be used to maintain diversity where possible	Negligible
Fauna in close proximity to the transmission line corridor may be disturbed by the noise and dust generated by the construction activities		-	Minor	Low	Negligible	Noise generation will be closely monitored on site and mitigation measures implemented where required. Wet suppression will be deployed to reduce fugitive dust generation.	Negligible
Noise from directional drilling for the transmission line to pass under the canal may impact on the nearby flora		-	Moderate	Low	Minor	Noise generation will be closely monitored on site and mitigation measures implemented where required.	Negligible
Socio-economic character impacts							
Employment creation	+		Moderate	Medium	Major	Project benefit: Creation of ± 200 jobs for 6 to 8 months during the construction phase	Major
Visual impacts							
Construction activities, fugitive dust emission, and construction vehicles traversing the transmission line corridor may transform the landscape.		-	Minor	Medium	Minor	Implement appropriate dust control measures on site (i.e. water / dust suppressant sprayed onto gravel roads) or other suitable best practice techniques	Negligible
Waste management							
General and hazardous waste streams will be generated during construction activities and will require appropriate management to prevent pollution and contamination of the environment		-	Minor	Low	Negligible	Will be managed under the site waste management plan and site emergency plans regarding pollution control and spillages	Negligible

Source: Mott MacDonald, 2017

Table 19: SR PVP Impact Assessment Matrix For Operation

Description of impact	Magnitude			Sensitivity level	Impact Significance	Mitigation measures	Residual impacts after mitigation
	+	-	Level				
Topography							
Increased weight on the ground from the 60MWh battery infrastructure could lead to local subsidence of the undermined areas on site in time		-	Moderate	Moderate	Moderate		Moderate
Noise impact							
Operation of the SR PVP may impact on existing baseline noise levels in the area		-	Negligible	Negligible	Negligible	N/A, noise impacts will be limited to maintenance operations on site and will be limited in duration	Negligible
Groundwater resource impacts							
Machinery and vehicles used on site could potentially have fuel or oil spillages during maintenance operations		-	Minor	Low	Negligible	Any spillages will be cleaned up and remediated immediately. Drip trays will be used under vehicles when parked to prevent oil spillages	Negligible
Servicing of infrastructure on site and the infiltration of contaminated surface water, may impact groundwater resources		-	Moderate	Low	Minor	Waste management and storm water management plans will address surface water contamination aspects	Negligible
The infiltration of contaminated surface water, resulting from the mismanagement of waste materials may impact groundwater resources		-	Minor	Low	Negligible	Will be managed under the site waste management plan and site emergency plans regarding pollution control and spillages	Negligible
Leakage from the battery infrastructure could seep into the ground and contaminate the groundwater resource		-	Moderate	Moderate	Moderate	The battery infrastructure is built within containers with integrated safety containment to prevent leakage and spillages. In addition, all battery infrastructure will be housed on an impermeable concrete base which will prevent contamination to the ground and groundwater resource	Negligible
Air quality impacts							
Particulate emissions from site maintenance operations, and dust entrainment from vehicles on site		-	Moderate	Low	Minor	Implement appropriate dust control measures on site (i.e. water / dust suppressant sprayed onto gravel roads) or other suitable best practice techniques	Negligible
Combustion emissions from heavy machinery and vehicles could potentially impact on the baseline ambient air quality in the area		-	Negligible	Negligible	Negligible	All vehicles and/or machinery are to be serviced regularly to ensure optimum operating performance with reduced emissions generation.	Negligible

Description of impact	Magnitude		Sensitivity level	Impact Significance	Mitigation measures	Residual impacts after mitigation	
	+	-					Level
The release of hydrogen and chlorine gas from the battery infrastructure could be harmful to human health at the sensitive receptors		-	Negligible	Negligible	Negligible	The battery infrastructure includes an automated HCL/chlorine sensor which will monitor the gas levels and shut down the battery infrastructure if a gas build-up is detected. In addition, any chlorine generated is re-absorbed by the electrolyte solution	Negligible
Surface water resource impacts							
Maintenance machinery and vehicles could potentially have fuel or oil spillages during construction which could lead to surface water pollution during rainfall events		-	Moderate	Low	Minor	Waste management and storm water management plans will address surface water contamination aspects	Negligible
Contamination of surface water due to poor handling and storage of waste		-	Moderate	Low	Minor	Waste management and storm water management plans will address surface water contamination aspects	Negligible
Compacted ground on site could lead to increased run off, soil erosion and sedimentation in surface water resources off-site		-	Moderate	Low	Minor	Storm water management plans will address surface water aspects including erosion and sedimentation	Negligible
Traffic impact							
Increased traffic congestion on local roads		-	Minor	Low	Negligible	Managed via the traffic management plan	Negligible
Impacts on Flora & Fauna							
Avifauna could be injured by flying into the solar panels		-	Moderate	Medium	Moderate		Moderate
Removal of avifauna nests from the infrastructure to reduce the risk of on-site fires		-	Minor	Low	Negligible	Removal of avifauna nests should be undertaken in alignment with an avifauna specialist recommendations regarding nest removal	Negligible
Fauna external to the site boundary may be disturbed by the noise generated by the operation of the facility		-	Minor	Low	Negligible	Noise generation will be closely monitored on site and mitigation measures implemented where required.	Negligible
Impact on off-site fauna & flora as a result of potential contamination of off-site surface water		-	Minor	Low	Negligible	Storm water management plans will address surface water and contamination risks	Negligible
Socio-economic character impacts							
Employment creation for the operational phase	+		Minor	Low	Minor	Project benefit: Ten (10) permanent jobs will be created via the project	Minor
Additional generation capacity will assist in grid stabilisation and thereby reduce potential negative impacts to businesses and GDP, stimulating economic growth in areas where there were previous power shortages	+		Major	Medium	Substantial	Project benefit: Additional generation capacity will assist in grid stabilisation	Substantial
Agricultural Potential, Soil, and Land Use Capability							
Hard pack surfaces and increased erosion via surface water runoff.		-	Moderate	Medium	Moderate	The sites stormwater management plan will address surface water aspects including erosion and sedimentation. Berms will be used on site to manage surface water runoff and reduce erosion.	Negligible
Visual impacts							
Glare from solar panels could impact on local sensitive receptors and/or flight paths		-	Moderate	Low	Minor	Due to the built nature and the large trees located to the west of the site, the potential for glare is unlikely to take place. SolarReserve will also be using no glare black panels and the angle of the PV panels will be very low, so very little glint is anticipated.	Negligible
Infrastructure on site will transform the landscape permanently		-	Major	Medium	Moderate		Moderate
Waste management							
General and hazardous waste streams will be generated during operational activities and will require appropriate management to prevent pollution and contamination of the environment		-	Minor	Low	Negligible	Will be managed under the site waste management plan and site emergency plans regarding pollution control and spillages	Negligible

Source: Mott MacDonald, 2017

Table 20: Transmission Line Option A 33kV Line to Florida Substation Impact Assessment Matrix for Operation

Description of impact	Magnitude		Sensitivity level	Impact Significance	Mitigation measures	Residual impacts after mitigation	
	+	-					Level
Noise impact							

Description of impact	Magnitude		Sensitivity level	Impact Significance	Mitigation measures	Residual impacts after mitigation	
	+	-					Level
Maintenance within the substation regarding the transmission line termination points may impact temporarily on existing baseline noise levels		-	Negligible	Negligible	N/A, noise impacts will be limited to maintenance operations on site and will be limited in duration	Negligible	
Groundwater resource impacts							
Maintenance within the substation regarding the transmission line termination points could lead to groundwater contamination		-	Moderate	Low	Minor	Will be managed under the site waste management plan, storm water management plans and site emergency plans regarding pollution control and spillages	Negligible
The infiltration of contaminated surface water, resulting from the mismanagement of waste materials at the substations, may impact groundwater resources		-	Moderate	Low	Minor	Will be managed under the site waste management plan and storm water management plans	Negligible
Surface water resource impacts							
Maintenance within the substation regarding the transmission line termination points could lead to surface water contamination		-	Moderate	Low	Minor	Will be managed under the site waste management plan and storm water management plans	Negligible
Contamination of surface water due to poor handling and storage of waste at the substations		-	Moderate	Low	Minor	Will be managed under the site waste management plan and storm water management plans	Negligible
Reduction in agricultural potential, soil, and land use capability							
The installation of the transmission line will sterilise surface land uses within the servitude corridor		-	Moderate	Moderate	Moderate	No mitigation measures are applicable. A maximum of 3m wide along the transmission line will be sterilised	Minor
Socio-economic character impacts							
Employment creation for the operational phase	+		Minor	Low	Minor	Project benefit: Ten (10) permanent jobs will be created via the project	Minor
Waste management							
General and hazardous waste streams will be generated during maintenance activities and will require appropriate management to prevent pollution		-	Minor	Low	Negligible	Will be managed under the site waste management plan and site emergency plans regarding pollution control and spillages	Negligible

Source: Mott MacDonald, 2017

Table 21: Transmission Line Option B 33kV Line to Sentraal Substation Impact Assessment Matrix for Operation

Description of impact	Magnitude		Sensitivity level	Impact Significance	Mitigation measures	Residual impacts after mitigation	
	+	-					Level
Noise impact							
Maintenance within the substation regarding the transmission line termination points may impact temporarily on existing baseline noise levels		-	Negligible	Negligible	N/A, noise impacts will be limited to maintenance operations on site and will be limited in duration	Negligible	
Groundwater resource impacts							
Maintenance within the substation regarding the transmission line termination points could lead to groundwater contamination		-	Moderate	Low	Minor	Will be managed under the site waste management plan, storm water management plans and site emergency plans regarding pollution control and spillages	Negligible
The infiltration of contaminated surface water, resulting from the mismanagement of waste materials at the substations, may impact groundwater resources		-	Moderate	Low	Minor	Will be managed under the site waste management plan and storm water management plans	Negligible
Surface water resource impacts							
Maintenance within the substation regarding the transmission line termination points could lead to surface water contamination		-	Moderate	Low	Minor	Will be managed under the site waste management plan and storm water management plans	Negligible
Contamination of surface water due to poor handling and storage of waste at the substations		-	Moderate	Low	Minor	Will be managed under the site waste management plan and storm water management plans	Negligible
Reduction in agricultural potential, soil, and land use capability							
The installation of the transmission line will sterilise surface land uses within the servitude corridor		-	Moderate	Moderate	Moderate	No mitigation measures are applicable. A maximum of 3m wide along the transmission line will be sterilised	Minor

Description of impact	Magnitude		Sensitivity level	Impact Significance	Mitigation measures	Residual impacts after mitigation
	+	-				
Socio-economic character impacts						
Employment creation for the operational phase	+		Minor	Low	Minor	Project benefit: Ten (10) permanent jobs will be created via the project
Waste management						
General and hazardous waste streams will be generated during maintenance activities and will require appropriate management to prevent pollution		-	Minor	Low	Negligible	Will be managed under the site waste management plan and site emergency plans regarding pollution control and spillages

Source: Mott MacDonald, 2017

10 Environmental Management Programme Report (EMPr)

An Environmental Management Program Report (EMPr) for the proposed SR PVP is required under the Regulations in terms of Chapter 5 of NEMA (as amended). The EMPr becomes a legally binding document on the applicant as a condition of approval of the Project by GDARD in addition to other conditions that may be stipulated in the Record of Decision / Environmental Authorisation.

The primary objective of an EMPr is to safeguard the environment, site staff and the local population from site activities which may cause harm or nuisance. This EMPr is intended to provide a framework to ensure prevention, minimisation, mitigation, and off-setting measures to address the environmental and social impacts associated with the Project including transparent and effective monitoring.

The implementation of the EMPr ensures that environmental, health and safety and social performance is in accordance with national standards and regulations.

The EMPr should be updated and/or revised for both construction and operation phases, as necessary to address the prevailing conditions as monitored during both construction and operations periods. Responsibilities for implementation are outlined in the succeeding sections and fall to either the Project Company (SolarReserve) or the EPC Contractors. Compliance with the requirements of the EMPr will need to be confirmed via regular compliance audits. For example, the Project Company will actively seek to monitor, audit, and assess the compliance of the EPC Contractor(s) and ensure that corrective actions are taken when necessary to maintain environmental and social performance in line with the EMPr.

Please refer to the detailed SR PVP EMPr in Appendix D, compiled as a standalone document for the ease of future compliance auditing purposes.

11 Environmental Assessment Practitioner Independent Opinion

Based on the assessed impacts, it is recommended that the environmental authorisation be granted subject to the following conditions:

- On condition that SolarReserve SA Management and the SR PVP must implement and adhere to all the stipulations in the EMPr and the Environmental Authorisation.
- A vegetation survey needs to be conducted during the wet season (i.e. flowering and growing season between the months of November to March) to confirm whether plant species of conservation concern are present on the site. The survey needs to be undertaken before the project site is cleared (i.e. prior to construction).

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August 2017

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Zero point energy, 2016 Schematic of the Solar Photovoltaic infrastructure and linkages

Zero point energy, 2017 Proposed site infrastructure layout

12 Appendix A: Signed Consent of Use form

ADDENDUM 1

7. CONSENT USE

Consent in terms of Regulation 39 of the 2014 NEMA EIA Regulations by the landowner or person in control of the land that the proposed activity/ies may be undertaken on the land in question

When to use this form

Note: This form must be completed when an application for amendment in terms of the 2014 NEMA EIA Regulations is submitted where the proposed amendment will impact on the activity undertaken/to be undertaken on the land or if the amendment relates to the transfer of rights and obligations.

Notes for completing and submitting this form

- (1) This form is current as of December 2014. It is the responsibility of the applicant to ascertain whether subsequent versions of the form have been released by the Department.
- (2) This form must be attached to the application form for amendment.
- (3) Unless protected by law, all information contained in the form will become public information.

CONTACT INFORMATION

Name of land owner/ person in control of the land	Industrial Zone (Pty) Limited		
Trading name (if any):			
Contact person:	Jeanie Pelsler		
Physical address:	iProp House Modulus road extension Ormonde Johannesburg		
Postal address:	PO Box 27 Crown Mines		
Postal code:	2025	Cell:	0828703042
Telephone:	0114981777	Fax:	0114981222
E-mail:	jeanie@iprop.co.za		

CONSENT


1. We the undersigned **Industrial Zone (Pty) Limited** of registration number **197100814607** are the registered owners of the property **Vogelstruisfontein 2311Q Portion 4 (Remaining extent)** located at **The end Granville Avenue, Robbertville, Johannesburg (GPS location: 26°11'7.73" S 27°54'57.82"E)**.
2. We hereby give consent to the applicant /person to whom the rights are to be transferred **SolarReserve South Africa Management (Pty) Limited** of registration number **2013/211712/07** to undertake the following activity(ies) on the property:

The SolarReserve Vogelstruisfontein Photovoltaic Project (SR PVP) will comprise a fixed array of mounted solar photovoltaic panels and other associated infrastructure commonly associated with photovoltaic power plant utilizing integrated onsite battery storage facilities. Total generation capacity of the SR PVP is anticipated to be 8.83MWp photovoltaic and 10MW/80MWh battery storage developed on a footprint of 18ha. The following infrastructure is anticipated:

- Instrumentation and control units consisting of hardware and software for the remote monitoring and

- control of the power plant
- Fixed array solar panel mountings (8.83MWp generation capacity) and cabling between structures
- DC power storage banks in containers for off peak storage (10MW/60MWh storage capacity)
- Inverter transformers that will convert the DC generated by the photovoltaic panels and stored by the integrated battery banks to AC to be exported to users
- Transformer substations for altering the generated voltages for compatibility with the electrical grid and/or user requirements
- A new power transmission line connected to the existing Sentraal substation. Currently, environmental authorization is being sought for two transmission line corridor routes however only one route will be constructed based on approvals from the City Power. The options under consideration including:
 - o 33kV from Vogelstruisfontein substation to Florida substation (± 47 meters) (*preferred option*)
 - o 33kV turning into a new 88/33kV Florida Reserve Switching Station then to the Sentraal substation (± 1.7 km)
- Power plant gravel access roads (both internal and external)
- Security fencing and a CCTV network around the site for access control
- A prefabricated office building
- Temporary buildings during the construction phase including construction offices, a workshop area, materials storage etc.

Please refer to the detailed the Option Agreement signed between SolarReserve and Industrial Zone (Pty) Ltd for the use of Vogelstruisfontein 2311Q Portion 4 (Remaining extent) attached below (i.e. signed consent of use contract)



Signature of land owner/person in control of the land or authorised representative

Name of authorised person if the landowner is a legal entity

JEAN MARIE PELSER

Date

18/07/2017

|

13 Appendix B: VBDG Town Planners Letter

VBDG Town Planners

Town Planners and Development Consultants

JOHANNESBURG: Tel : 27 011 706 2761 or 079 1586699 Fax : 27 011 463 0137 or 086 642 7892
Email : druce@mvweb.co.za Website: www.vbgd.co.za

POSTAL ADDRESS : P.O.Box 1914 Rivonia 2128

PHYSICAL ADDRESS: York House :Epsom Downs Office Park: 13 Sloane Street Bryanston Sandton



Celebrating 30 Years service to our clients (1986 to 2016)

Date: 23/2/17

Our Ref:

Ignatius De Wet
Solarserve
Sinosteel Plaza
Rivonia Rd
Sandton

Dear Ignatius,

SOLAR PANEL FARM: VOGELSTRUISFONTEIN 231 IQ

I refer to the above and to my letter dated 14 February 2017 which outlined the discussions I had with City Council Senior Legal advisor.

I confirmed that senior legal advisor, Alwyn Nortje, was of the opinion that no town planning process is necessary. His suggestion is that a lease diagram be created and registered, and that a lease agreement be drawn up with a private servitude over the property in favour of the user, ie Solarserve. He also undertook to confirm with his colleagues at City Planning that this approach would be in order, and he would revert to me in the next few days.

He has today confirmed his discussion with Ms Gina Zanti at City Planning and advised as follows:

"She is fine with my proposal that a servitude be registered at the interim. I state in the interim, because as and when the new Land Use Scheme for the COJ comes into operation, these old parcels of mining land will automatically get a zoning, which in terms of (which) you could do a consent use application and then cancel the servitude."

I therefore confirm that the approach as discussed with City of Johannesburg can be followed and that a town planning process is not required.

I trust you find this in order.

Yours Sincerely,

Lloyd Druce
VBDG Town Planners

Director: L.D.Druce B Sc TRP PPrin Prog Law (UNISA)

Assisted by: J. Erasmus BA (Hons)PPrin



CITY OF JOHANNESBURG METROPOLITAN MUNICIPALITY



A WORLD CLASS AFRICAN CITY

GROUP LEGAL & CONTRACTS
(LEGAL ADVISORY SERVICES)
(SUSTAINABLE SERVICES)

TEL: 011 407 7224
FAX: 011 339 4204
DIRECT FAX: 086 652 2507
E-MAIL: alwynN@joburg.org.za

2017-08-07

Our reference: 15/4/1
Your reference:

VBGD TOWN PLANNERS

BY E-MAIL: druce@mweb.co.za

Dear Sir

RE: SOLAR FARM: FARM VOGELSTRUISFONTEIN 231 IQ: REGISTRATION OF SERVITUDE

The above refers.

This is to confirm that the City of Johannesburg has no objection in the registration of a servitude over the above property for purposes of a solar solar plant/farm. The property used to be mining land and does not fall within the jurisdiction of a town planning scheme.

Once the City of Johannesburg Land Use Scheme has been promulgated for purposes of SPLUMA, it will enable the owner to bring a land development application in terms of such scheme to regularize the land use.

Trust you find the above in order.

Yours faithfully

A handwritten signature in black ink, appearing to read "Adv Alwyn Nortjé".

ADV ALWYN NORTJÉ
SNR LEGAL ADVISER
OFFICE OF THE EXECUTIVE MAYOR
GROUP LEGAL & CONTRACTS
(SUSTAINABLE SERVICES)

14 Appendix C: PPP Report

Report pending post PPP process currently underway - 7 September until 8 October 2017

15 Appendix D: Environmental Management Programme Report (EMPr)

M
M
MOTT
MACDONALD

SOLARRESERVE[®]



SolarReserve Vogelstruisfontein Photovoltaic Project

Environmental Management Programme Report
(EMPr)

7 September 2017

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SolarReserve Vogelstruisfontein Photovoltaic Project

Environmental Management Programme Report (EMPr)

7 September 2017

Issue and Revision Record

Revision	Date	Originator	Checker	Approver	Description
A	23-08-2017	C Hunter	A Bennet	E Wildy	Draft report

Document reference: 371154 | 2 | 2

Information class: Standard

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Appendix B: Expected flora and fauna species

45

Abbreviations

BA	Basic Assessment
CLO	Community Liaison Officer
ECO	Environmental Control Officer
EMPr	Environmental Management Programme Report
EMS	Environmental, Health and Safety
EPC	Engineering, Procurement and Construction
EPRP	Emergency Preparedness and Response Plan
ESMS	Environmental and Social Management System
GDARD	Gauteng Department of Agriculture and Rural Development
HR	Human Resources
KPIs	Key Performance Indicators
MSDS	Material Safety Data Sheet
NCR	Non-Compliance Report
NEMA	The National Environmental Management Act
OHS	Occupational Health and Safety
PPE	Personal Protective Equipment
SEP	Stakeholder Engagement Plan
SR PVP	SolarReserve Photovoltaic Project
TMP	Traffic Management Plan
WMP	Waste Management Plan

1 Introduction

1.1 Introduction

An Environmental Management Programme Report (EMPr) for the proposed SolarReserve Photovoltaic Project (SR PVP) (the Project) is required under the regulations in terms of Chapter 5 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) (as amended). The EMPr becomes a legally binding document on the applicant as a condition of approval of the project by the Gauteng Department of Agriculture and Rural Development (GDARD) in addition to other conditions that may be stipulated in the Environmental Authorisation.

The primary objective of an EMPr is to safeguard the environment, site staff and the local population from site activities which may cause harm or nuisance. This EMPr is intended to provide a framework to ensure prevention, minimisation, mitigation, and off-setting measures to address the environmental and social impacts associated with the Project, including transparent and effective monitoring.

The implementation of the EMPr ensures that environmental, health and safety (EHS) and social performance is in accordance with national standards and regulations.

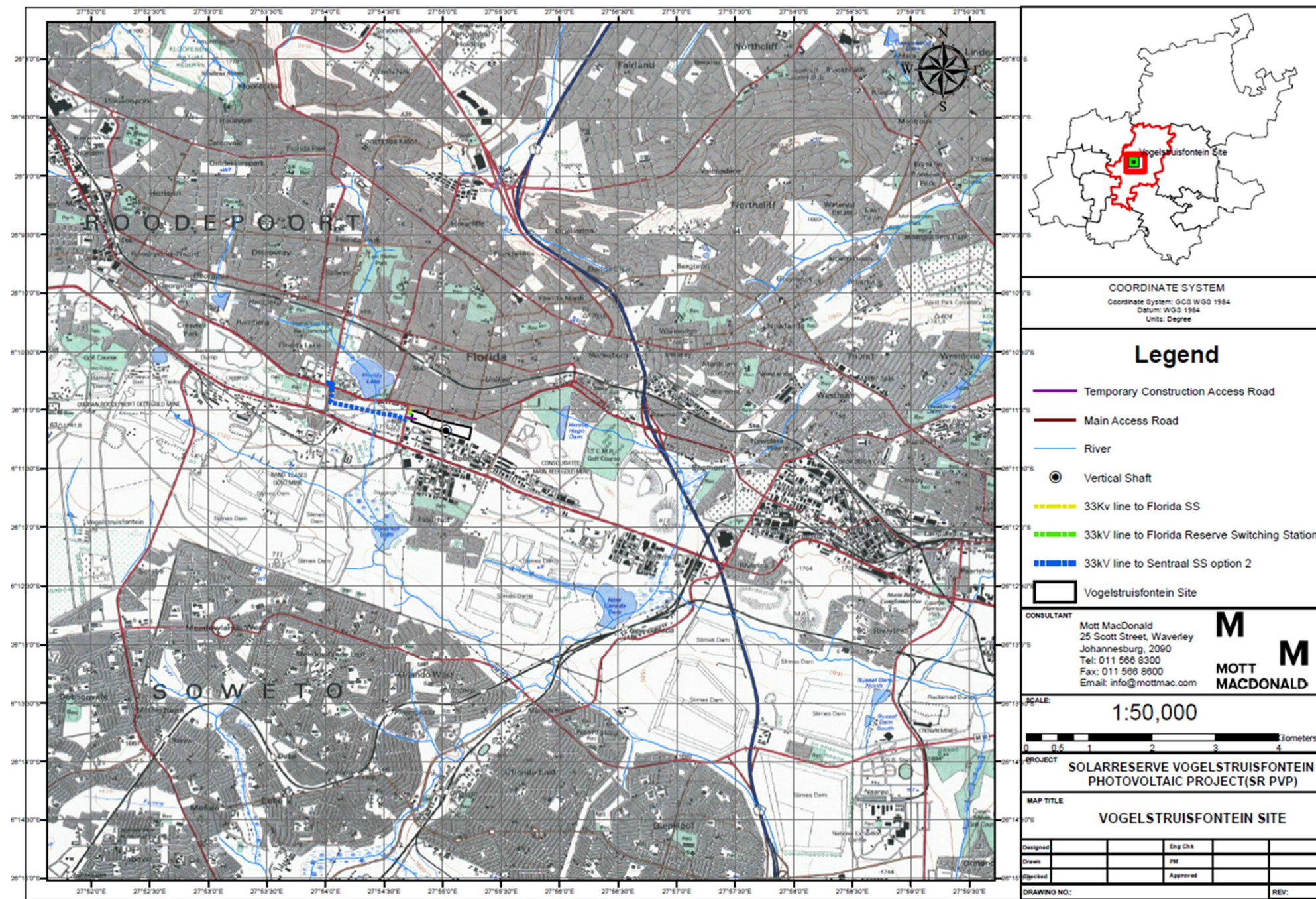
The EMPr should be updated and/or revised for both construction and operation phases, as necessary to address the prevailing conditions as monitored during both construction and operations periods. Responsibilities for implementation are outlined in the succeeding sections and fall to either the Project Company (SolarReserve), the EPC Contractors or the Operation and Maintenance (O&M) contractors. Compliance with the requirements of the EMPr will need to be confirmed via regular compliance audits. For example, the Project Company will actively seek to monitor, audit, and assess the compliance of the EPC Contractor(s) and ensure that corrective actions are taken when necessary to maintain environmental and social performance in line with the EMPr.

1.2 SR PVP background

1.2.1 Activity location

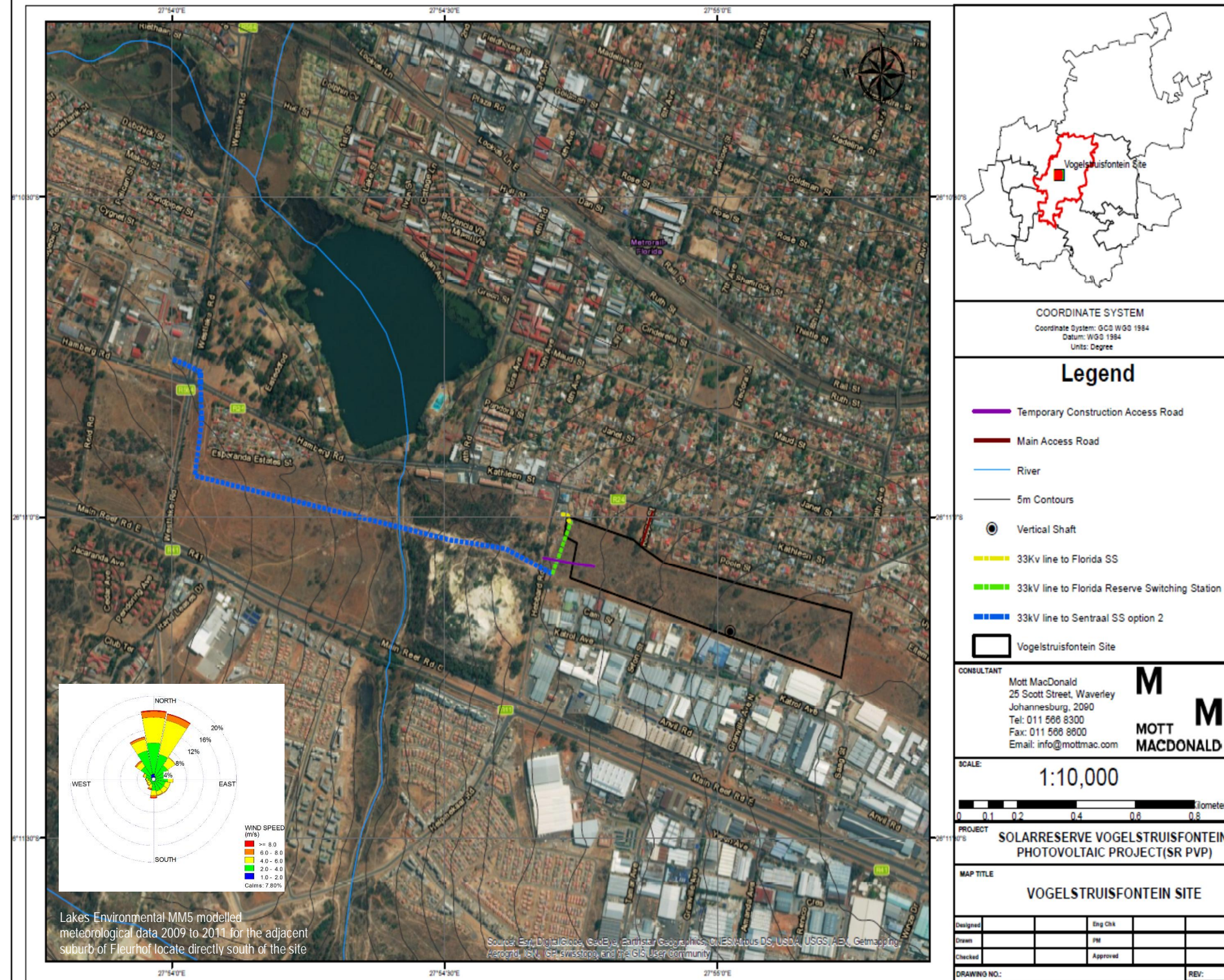
The SR PVP and associated infrastructure will be located on the remaining extent of portion 4 of the Farm Vogelstruisfontein 231IQ with a total size of 65.78ha. The project will be constructed on a smaller, 16.616ha portion "leased area" cut out of the remaining extent of portion 4 as indicated on the surveyor diagram (Figure 1 to Figure 3).

Figure 1: Regional Location of the of the proposed SolarReserve Vogelstruisfontein Photovoltaic Project (SR PVP) Project and Associated Transmission Line Corridors



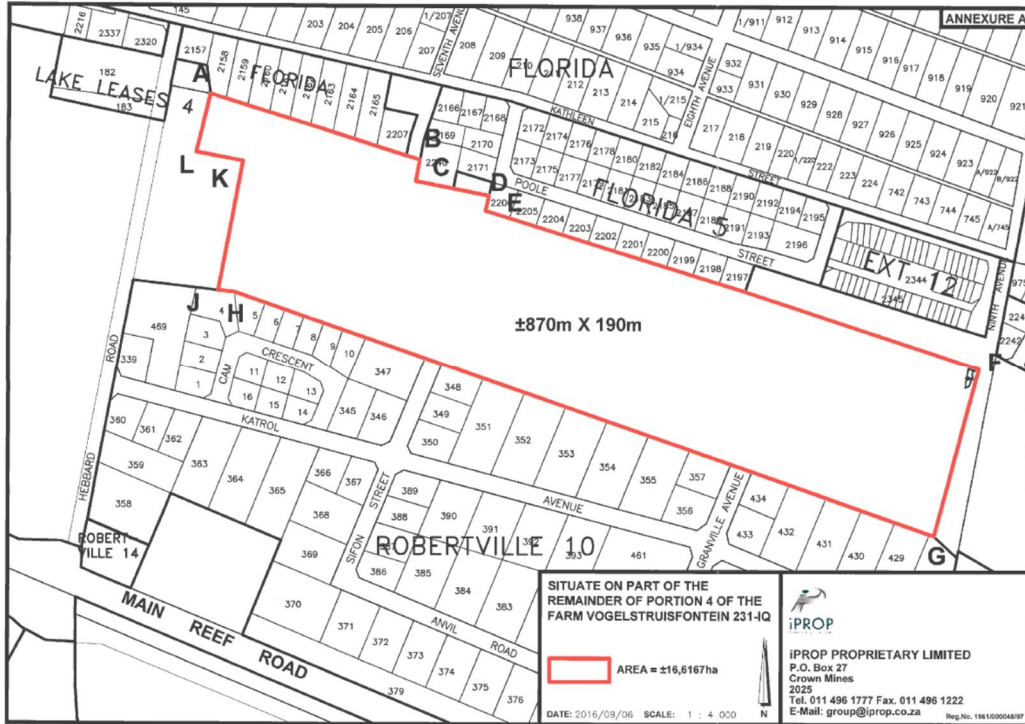
Source: Mott MacDonald, 2017

Figure 2: Location of the proposed SR PVP Project and Associated Transmission Line Corridors



Source: Mott MacDonald, 2017

Figure 3: Surveyor Diagram



Source: Iprop, 2016

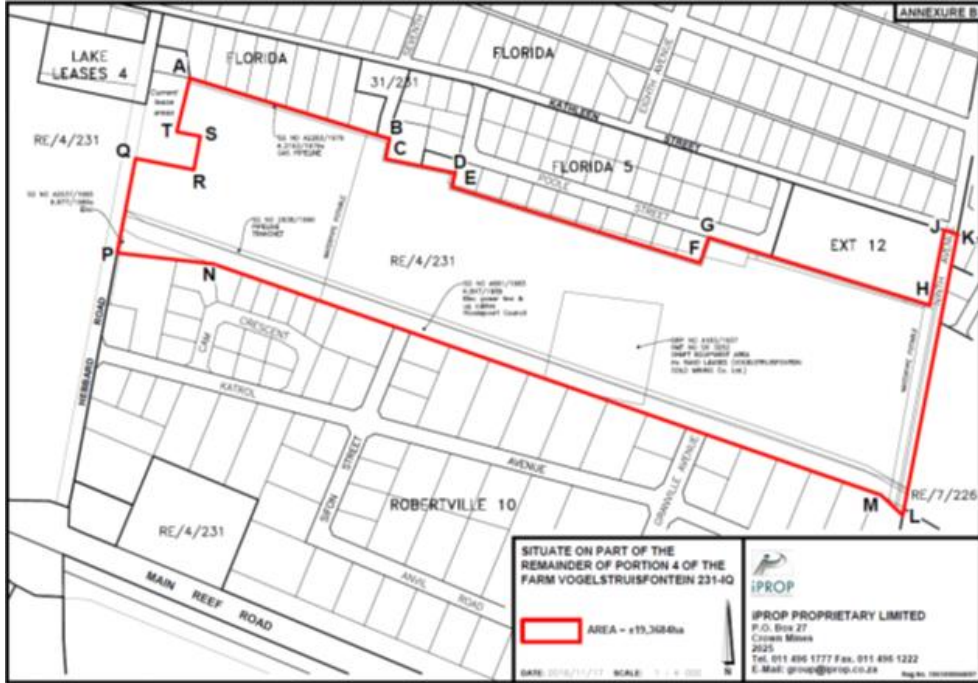
1.2.2 Activity description

The “SR PVP” is proposed to include several arrays of photovoltaic (PV) panels as well as utility scale integrated storage system (60MWh of flow battery storage) with a combined export capacity limit of 9.9 MW (Figure 2).

The “leased area” includes a number of servitudes which run along the north, south and eastern boundaries of the property include the following (Figure 4 & Figure 5):

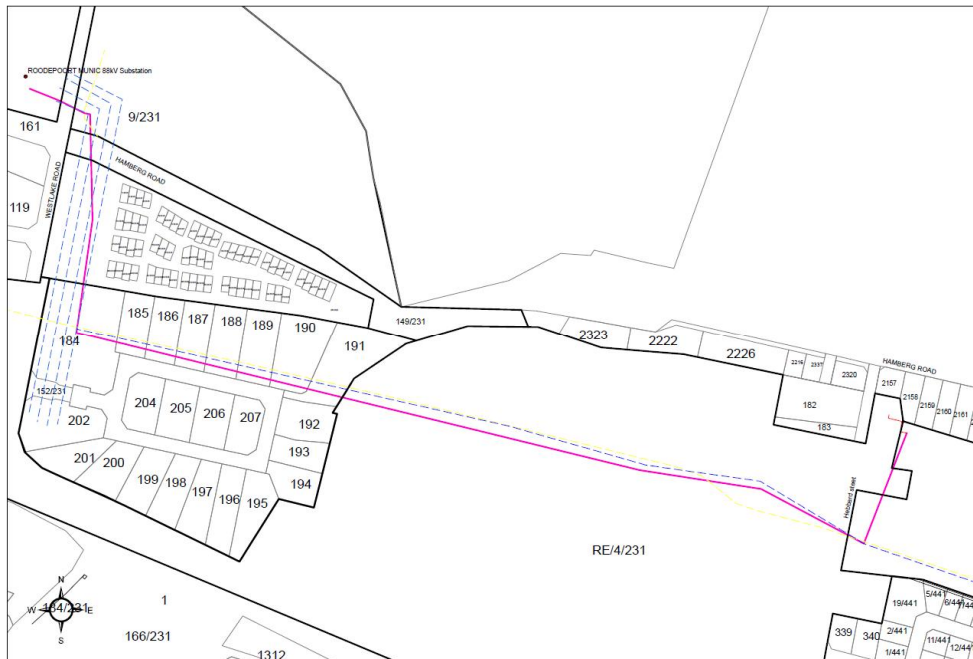
- Transnet pipeline
- 88kV City Power OHL servitude
- Mining ventilation shaft, Gold Mining Co.
- Gas pipeline
- Water pipeline

Figure 4: Servitude Locations within the SR PVP Project Footprint



Source: Iprop, 2016

Figure 5: Surveyor diagram of the Option B Sentraal substation connection with associated properties



Source: SolarReserve, 2017

The site identified (Figure 4) for the PV Solar with integrated storage project will consist of both the solar PV panels, utility scale vanadium flow batteries as well as the associated infrastructure required for such a facility (Figure 6 & Figure 8) including, but not limited to:

- PV array (9.9MW) comprising of the photovoltaic modules/panels, mounting structures and associated balance of system (tracking/fix hardware, protection systems i.e. masts and electronics)
- 7000m² hard standing battery storage facility platform. Vanadium flow batteries (60MWh) housed in 40ft. containers consisting of cell stacks and vanadium electrolyte contained in tanks with all associated balance of plant (piping, pumps, and control equipment)
- Inverters, transformers and switchgear with integrated battery storage
- An on-site substation consisting of a 40ft container split with Project and City Power equipment in each respective section of the substation. 33kV transmission line buried from City Power substation to option a) Florida substation (±47m – yellow line) or option b) Sentraal substation connecting into City Power's 33kV (±1.7 km – blue & green line) (Figure 2)
- Cabling between the project components
- Pre-fabricated housing for administration offices, security and guard houses, maintenance and storage
- Temporary construction laydown area of approximately 1ha
- Internal gravel service roads constructed by removing 300mm topsoil and backfilling with type 1 crushed stone, compacted to 97% Mod Ashto. Roads shall ± 4m in width cantilevered either side for storm water run-off
- Raw water storage tank
- Project primary and/or secondary access road/s, associated access point/s, internal distribution roads and crossings
- Fencing and perimeter security system around the project development footprint, and all other necessary related infrastructure.

The interconnection solution will evacuate the power generated by the SR PVP via a 33kV power line from the on-site Project Substation and City Power substation to the existing City Power Florida (Option A) or Sentraal substation (Option B). Approval in principle to connect to both substations have been provided by City Power, subject to Generation License.

The Vogelstruisfontein Project's interconnection infrastructure will comprise of the following (Figure 8 & Figure 9):

- Vogelstruisfontein Project substation and City Power substation both housed in a single 40ft container measuring 12.5m x 3m x 3m
- 33kV MV XLPE 300mm copper cable buried and secured (concrete) minimum depth 1m from City Power Substation to either substation Florida (circa 100m length) or Sentraal substation (circa 1.2km west) of the proposed site.
- The grid connection solution
- 48 Core optical ground wire (OPGW)
- One additional breaker in the existing Florida and Sentraal substations;
- Cable trenches and cabling
- One 25m lighting/lightning masts
- Short access roads to the substations
- Standard control room located within the combined 40ft container substation
- Control Plant, AC/DC, Metering, SCADA and Telecoms

The proposed transmission line will be a City Power owned asset, and only constructed by the Applicant under a self-build agreement with City Power.

Figure 6: A typical example of installed Solar Photovoltaic Panels and Container Substations which will be used at the SR PVP project



Source: (Left) Jasper Power Company, 2014 & (Right) SolarReserve, 2013

Figure 7: An Aerial Conceptual Model Displaying the proposed SR PVP Solar Farm on the Project Footprint



Source: SolarReserve, 2017

1.2.3 Associated Project Services

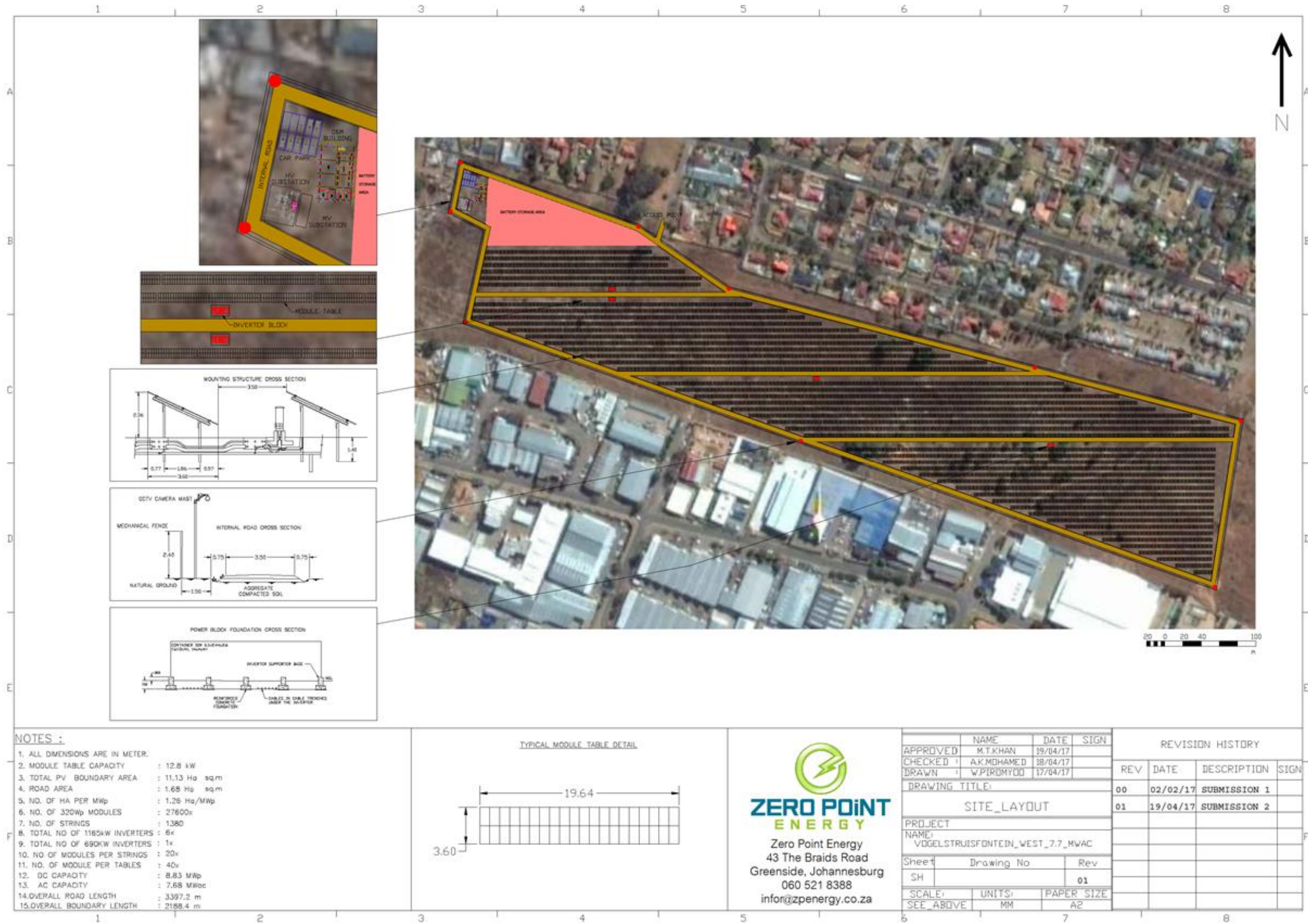
Services required for the SR PVP will include:

- Waste Management - all refuse material generated from the proposed development will be collected by a contractor and disposed of at a licensed waste disposal site. It is most likely that the waste will be

disposed of at the Marie Louise landfill site. This service will be arranged with the municipality/and/or management services provider when required.

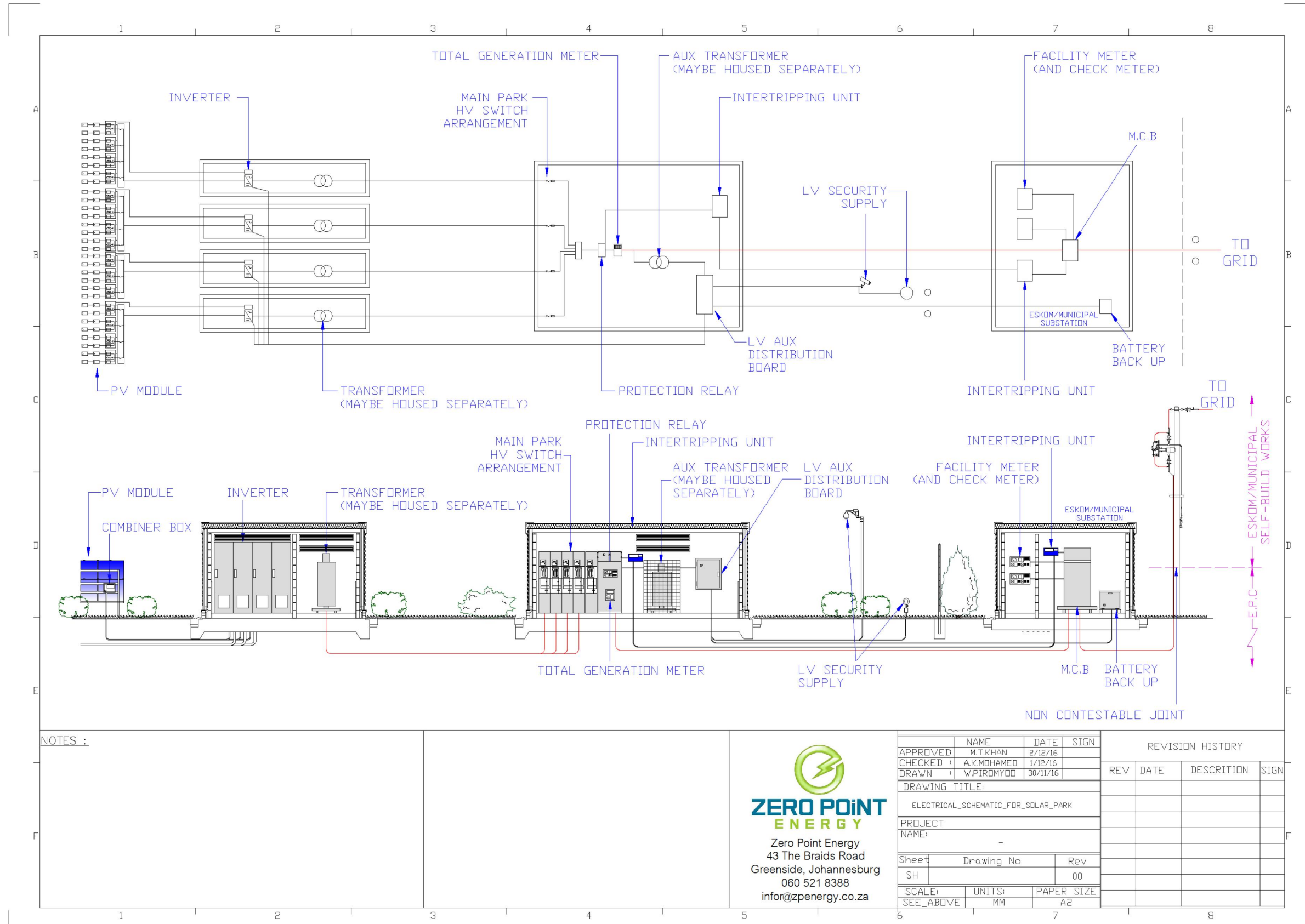
- Sanitation – The project will construct and utilise its own sanitation services as the City of Johannesburg Municipality does not service the project site. All sewage/effluent water originating from these facilities will be managed utilising temporary portable chemical toilets during construction and portable modular sewage treatment facilities (package plants) during operation. The volume of sewage generation during the operational phase will be very low – with only security personnel occupying the site full time. Operational and Maintenance Contractors will periodically visit the site for facility maintenance if and when required.
- Water for the construction phase will be transported to the site, using water tankers. During the operational phase the need is minimal and will be trucked to site.
- Construction electricity – the use of generators will be required during the construction phase of the plant
- Operational power – power for all auxiliary power services shall be drawn from the 33kV connection to the City Power network. On site step-down, auxiliary transformers will step down the 33kV MV supply to 400V
- Storm Water Management – Based on the planned construction activities, no significant scaled ground works will act to change the flow of surface water across the site other than the gravel access roads to the infrastructure. The existing grass vegetation will be retained as far as possible and managed as stipulated in the Environmental Management Programme report (EMPr). No asphalt or layer works will cover any section of the site requiring storm water channelling and associated drainage. Surface water on site is thus anticipated to naturally infiltrate and drain in alignment with the existing topography of the site.

Figure 8: Proposed Site Infrastructure Layout



Source: Zero Point Energy, 2017

Figure 9: Schematic of the Solar Photovoltaic Infrastructure and Linkages



NOTES :



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Source: Zero Point Energy, 2016

1.2.4 Proposed Construction Activities and Facilities

The construction phase will involve the construction and assembly of the PV panels, electrical systems, buildings, and other infrastructure required for the operation of the plant. In this regard, the activities and/or facilities relevant to the construction phase are listed below, with further details provided thereafter.

- Site establishment and the construction of access roads and services
- Site clearing and earthworks
- Bulk material laydown and assembly plant
- Consumable stores
- Temporary workshop
- Power supply and use
- Water supply, storage and use
- Construction site camp office
- Staff facilities
- Management and administration
- Waste management

1.2.4.1 Site Establishment

Prior to construction of the project infrastructure, the necessary security and access controls will be implemented and temporary access route established off Hebbard road. Access control and security will be required for health, safety and security reasons. The project site will be enclosed by means of the relevant security measures. This will keep both the surrounding residents and land user's safe from possible incidents and keep the project proponents' investment safe. A security office with security personnel and associated communication network will be maintained throughout the project phases. The most intensive road use is expected to take place during the constructions phase.

On-site gravel access roads will be developed to facilitate access to the infrastructure including storm water management adjacent to the roads. In summary, the gravel access roads will be developed in alignment with the following basic specifications:

- Maximum of 4m wide with 1m ditches for the support of the drainage system (if necessary)
- Built with gravel aggregate (i.e. crushed stone, gravel/quarry-run) sourced from local aggregate suppliers, where possible
- Base layer up to 15cm thick compacted to the 95% Proctor (AASHTO)
- 40cm minimum of subgrade preparation

1.2.4.2 Clearing and Earthworks

Earthworks may be required prior to the establishment of infrastructure and for the preparation of foundations of the PV panel mounting structures, inverter and transformer units, the electrical control structures and buildings and other structures. In this regard, vegetation and topsoil will be stripped at the location of surface infrastructure. Topsoil will be stockpiled for use in decommissioning and rehabilitation of construction facilities.

1.2.4.3 Laydown

The final activity layout within this area will be finalised in conjunction with the appointed construction contractor to ensure that the options are practical as well as environmentally sound. This area may be of a temporary nature and would be decommissioned and rehabilitated (as required) once construction is finished.

1.2.4.4 Stores

Consumables will be stored according to use and pollution potential in appropriately designed and operated storage facilities. Bulk chemicals will be stored in storage tanks, and most other chemicals will be stored in returnable delivery containers. This area may also be used for assembly and construction of the PV panels prior to installation on mounting structures. Following the construction phase, it is envisaged that this area continue to operate as the operational materials and consumables storage facility or be used for the installation of additional PV panels.

1.2.4.5 Fuelling

Various construction equipment and vehicles will require refuelling during the construction phase. All refuelling will be undertaken at offsite refueling stations.

1.2.4.6 Maintenance

On-site maintenance and repairs of construction equipment and vehicles will be undertaken in a temporary workshop maintenance facility. Drip trays will be used to prevent contamination of the ground when the vehicles are parked.

1.2.4.7 Power Supply

Power will be required during the construction phase of the project. It is proposed that this power be sourced from the existing transmission lines / point of connection. The necessary applications for the connection to the grid will be submitted to the City Power for approval. In the event the project cannot draw its construction supply from the City Power network, diesel generators will be brought to site as auxiliary/construction power supply.

1.2.4.8 Water Supply

Water will be required during the construction phase for general building activities, washing of equipment, dust suppression as well as for staff use (potable water). The water consumption requirements for the proposed project during construction is estimated at approximately 1 000m³ per month for the duration of the construction period (± 6-8 months).

Due to the location of the site it is proposed that the project will utilise and develop its own water provision services based on the fact that these services do not reach the project site.

Accordingly, construction water may need to be sourced through the following options until such time as the operational water supply system is in place.

- Municipal potable water from a nearby municipal connection point or
- Trucked to site with a water bowser (i.e. Water sourced from a suitable municipal source)

1.2.4.9 Construction Site Camp

During the construction phase, management and administration facilities with associated kitchen and ablutions will be required to facilitate construction activities, manage procurement, maintenance and waste

management activities as well as for the daily running of the construction camp and associated staff facilities. No construction camp will be erected on site as workers will enter and exit the site on a daily basis.

1.2.4.10 Waste Management

During the construction phase, general and inert building waste, as well as hazardous construction waste will be generated. Sewage/effluent waste will also be generated at the construction camp and ablution and sanitation facilities. The duly authorised service provider will provide all waste management services. All wastes will be disposed at appropriate full permitted facilities and/or licenced landfills. Records of the volumes of waste removed and safe waste disposal certificates will be kept on site for inspection purposes. This will be the responsibility of the appointed contractor and a copy of such records are to be provided to SolarReserve for record and audit purposes. The service agreement with the appointed contractor will be put in place once the contract has been awarded.

3.1.2.8.1 General and Inert Building Waste

General and inert building waste will be collected in bins and skips and temporarily stored in the designated general and building waste storage area in covered, tip proof waste skips for collection and disposal by an appropriate waste contractor. The burying and/or burning of refuse/waste will not be permitted at any time. The mixing of general and building waste with hazardous materials will not be permitted on-site. Waste separation will occur before waste is placed in the waste skips, where possible.

3.1.2.8.2 Hazardous Waste

Hazardous waste material generated during the construction phase (such as used lubricants and chemicals and empty containers/packaging from potentially contaminating consumables) will be temporarily stored on site prior to collection and disposal at a license hazardous waste disposal facility. This storage area will be bunded, under cover and located on an impermeable surface. The storage facility will be designed to ensure compliance with the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEMWA).

3.1.2.8.3 Sewage/effluent

Ablution and sanitation facilities will be located within the contractors' site offices/camp and readily accessible to all employees. All sewage/effluent water originating from the construction camp will be managed utilising temporary portable chemical toilets and portable modular sewage treatment facilities. These facilities will be maintained and serviced regularly by an appropriate services provider who will dispose of the sewage/effluent at municipal sewage treatment works.

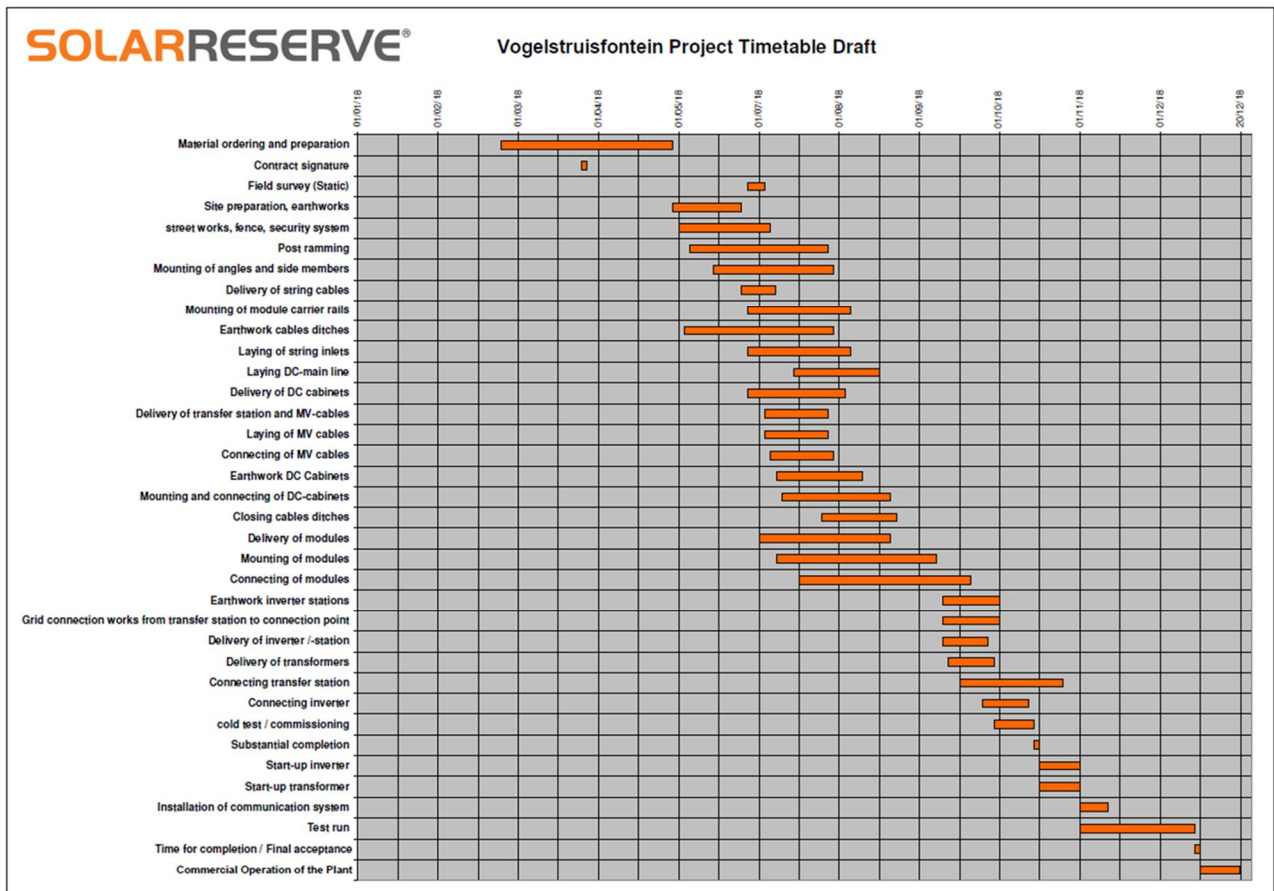
1.2.4.11 Fire Protection

A fire protection and prevention plan will be prepared for the construction phase of the project. The primary aim of this system will be to preserve and protect human life as well as tangible goods and equipment in the event of a fire. The fire protection system will employ measures to reduce the occurrence of fire in the event of an explosion as well as to contain and prevent fires from happening or entering the site/plant. A construction phase fire protection and prevention plan will be instituted accordingly. During construction, the SR PVP will be serviced with an intermediate fire protection system which may entail an auxiliary pressure pump, fire extinguishers and other portable fire-fighting equipment. In addition, a fire break along the site perimeter will be maintained.

1.2.4.12 Envisaged Construction Schedule and Operational Hours

The construction phase is anticipated to last approximately 6 to 8 months, depending on the City Power connection works time schedule. Construction hours will be according to standard industry practice and/or as any deviation that is approved by the relevant authorities. Figure 10 provides an overview of the envisaged construction activities and schedule for the proposed SR PVP development.

Figure 10: Envisaged SP PVP Construction Activities and Schedule



Source: SolarReserve, 2017

1.2.4.13 Decommissioning of Construction Activities

Upon completion of the construction phase, all temporary construction facilities may be decommissioned and removed from site. Cement/concrete slabs allowed for foundation structures would then be removed and compacted and disturbed soils will be ripped and rehabilitated with appropriate natural vegetation in alignment with the sites rehabilitation plan.

Some facilities such as stores and maintenance areas, may be utilised during the operation phase of the project and will remain on site and be managed as operational facilities accordingly.

1.2.5 Proposed operational activities and facilities

The operational phase will commence with the commissioning of the PV plant and automated electrical systems, as well as the day-to-day management and maintenance of associated support services and

infrastructure. The envisaged lifespan of the proposed SR PVP is approximately 20-25 years however this could be extended via future equipment and system upgrades and/or replacement.

The activities and/or facilities relevant to the operational phase are listed below, with further details provided thereafter.

- Access and security services
- Generation of electricity using PV technology
- Operational power supply and use
- Maintenance and repair to operational equipment
- Storm-water management infrastructure
- Fire protection for plant services and infrastructure.

1.2.5.1 Access and Security

During the construction phase, access to the property will be via a constructed temporary gravel access road from Hebbard Road, off Main Reef Road. The permanent access road to the site for the operational phase of the site will be via Kloppers street, off Albertina Sisulu road. During operations, Klopper street road usage will mostly be limited to staff, for cleaning of PV panels and deliveries of consumables.

Access control and security will be required for health, safety and security reasons. The project site will be enclosed by means of the relevant security measures. This will keep both the surrounding residents and land user's safe from possible incidents and keep the project proponents' investment safe. A security office with security personnel and associated communication network will be maintained throughout the project phases.

1.2.5.2 Operational Power Supply

Electricity produced via the proposed SR PVP will be exported to the City Power network. The exact operational profile of the plant would be dependent on generation controlled by the power purchaser's economic dispatch decisions and portfolio resource scheduling, transmission constraints and other factors, as well as on weather conditions. It is anticipated that the plant itself will supply in its own operational power requirements during the day, whilst power will be drawn from the grid at night.

1.2.5.3 Water Supply and Use

The proposed PV plant will require approximately 1000m³ of water per annum during the operational phase of the project. Water during this phase will be required for the uses listed below:

- PV panel cleaning
- Service water for maintenance
- Potable use and ablutions
- Dust suppression
- Irrigation during rehabilitation
- Fire protection water

1.2.5.4 Procurement, Storage and Use of Consumables

It is envisaged that all general consumables will be stored on-site, however maintenance related consumables, such as panels or speciality items will be stored at an off-site and dispatched to site as and when required.

1.2.5.5 Maintenance and Repair Facilities

It is envisaged that maintenance teams will be based off-site and dispatched to the plant as and when required to undertake routine operational management and maintenance. PV panel cleaning will be done via tanker trucks specially fitted with high-pressure washers. These trucks are filled with demineralized water and then driven slowly through the PV array, spraying high pressure water onto the panels effectively removing any accumulated dust or foreign matter. Biodegradable detergents may be used in this regard.

Any bird nests on the infrastructure will be removed to reduce fire risks. Removal of the nets will be undertaken in alignment with an avifauna specialist's recommendations.

1.2.5.6 Waste Management

The operation phase of the SR PVP may generate both liquid and solid waste streams, comprising general/domestic, hazardous waste and sewage. The liquid waste shall mainly include sewage effluent. In addition to the above, limited emissions from equipment and machinery are also expected. It is noted that no waste will be disposed of on-site. The service agreement with the appointed contractor will be put in place once the contract has been awarded.

Primary Wastewater Collection System

The SR PVP is expected to create a minimal amount of wastewater. The source of waste water would be the water used for washing the PV panels at set intervals and dirty area surface runoff. To the extent practicable, wastewater will be recycled and reused to reduce the amount of effluent generated and removed for disposal.

Plant Drains and Oil/Water Separator

General plant drains may be used to collect containment area wash down and drainage from facility equipment and maintenance area drains. Water from these areas may be collected in a system of floor drains, hub drains, sumps, and piping and routed to a primary wastewater collection system. Drains that potentially could contain oil or grease would first be routed through an oil/water separator.

Operational Sewage/Effluent

Sewage/effluent waste streams may be generated from the ablution facility. As and when required, the septic tank (solids holding tank) will be cleaned out by a vacuum truck and the wastes trucked and disposed at a licensed facility. This activity will adhere to the plant safety program as administered by plant personnel.

Solid Waste

The plant will produce solid wastes typical of PV power generation operations. All waste generated on site will be subject to the principal of "Reduce, Reuse and Recycle" as far as possible before disposal is regarded as an option. Plant wastes include broken and rusted metal and machine parts, defective or broken electrical materials, empty containers, broken PV panel components and other solid wastes including the typical domestic refuse generated by staff. Solid wastes will be temporarily stored on site and trucked offsite for recycling or disposal at a suitable recycling facility or licensed landfill site in the vicinity once sufficient volume is available warranting disposal and/or recycling. The responsibility regarding the management of the wastes generated on site will be that of the O&M contractor.

Management of Hazardous Waste

Hazardous wastes generated by the proposed SR PVP such as used oil from electrical systems, empty chemical containers and lubricants from maintenance of equipment will be properly managed and disposed of. These waste materials will be temporarily stored on site in appropriate containers (depending on whether in liquid or solid state) in an impermeable bunded and covered area prior to collection by a

licensed waste contractor for recycling or disposal at an appropriately licensed facility. The storage facility will be designed as per the typical Good Industry International Practice (GIIP) regarding the storage and management of hazardous wastes. Plant personnel and maintenance workers will be trained to handle hazardous wastes generated at the site in accordance with all applicable regulations and protocols.

Emissions

Powered equipment such as operational and maintenance vehicles and equipment and stand-by generators will be well maintained in order to ensure exhaust emissions are within manufacturer specifications. Powered fire pumps and emergency generators will only be operated during bona fide emergencies and periodically for brief periods, as required by relevant codes and standards, for reliability testing or maintenance within strict limitations on acceptable fuels and maximum allowable run hours.

1.2.5.7 Storm Water Management

The proposed SR PVP will be maintained in a relatively natural state, with regard to natural vegetation and soil type. Most of the rainfall falling in this area will infiltrate into the ground whilst surface runoff that does occur will drain towards a preferential flow paths exiting the project site. A clean water channel will have to be constructed so as to limit the width of flow in this preferential flow path, such that surface runoff is collected and safely removed from the project site.

The clean water runoff will be diverted around the project area and discharged to the nearest low point. A silt trap is proposed at the outlet of one of the clean water channels and was sized based on daily anticipated flows which are taken conservatively as the 1:2 year storm event, whilst the spillway sizing for the silt trap is designed to cater for the 1:50 year storm event. The conceptual design will feed into the detailed storm water management plan which will be finalised prior to construction.

1.3 Structure of EMPr

Section 1 of this EMPr presents the purpose of this EMPr and a general overview of the project activities.

Section 2 of this EMPr outlines the various institutional arrangements to be put in place by the Project to enable the implementation of the EMPr.

Section 3 presents the various mitigation measures as identified through the Basic Assessment (BA) process. For each of the objectives, relevant mitigation measures are identified together with monitoring measures and Key Performance Indicators (KPIs). For each mitigation activity, a proposed action and associated timeframe is provided.

Section 4 provides further outlines on the various management plans, policies, or procedures to be implemented by the Project Company (or any Contractors under the Project Company's direction). The implementation recommendations are intended to ensure that the various mitigation measures identified through the BA process are incorporated by the Project in a structured way with clear lines of responsibility.

Section 5 of the EMPr provides an overview of monitoring and reporting requirements associated with the activities.

Section 6 of this EMPr provides the details of the Environmental Assessment Practitioner (EAP) and their statement of independence

2 Institutional Arrangements and Implementation

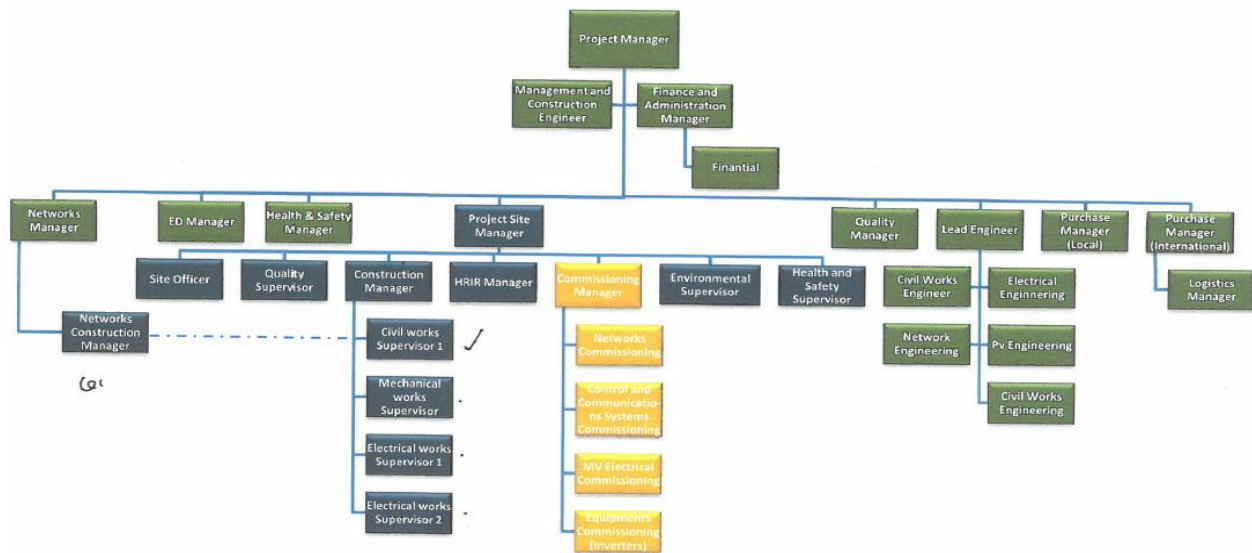
2.1 Overview

This section provides a summary of the institutional requirements needed to ensure effective implementation of the environmental and social management and monitoring measures to avoid and minimise impacts resulting from the SR PVP.

2.1.1 The Project Company’s role

The overall responsibility for the implementation of the EMPr and identified mitigation and/or management actions falls to the Project Manager of the Project Company (SolarReserve) (Figure 11). The Project Manager can allocate some of the responsibilities to the EPC contractor and/or the Operations and Maintenance contractor via contractual agreements between the Project Company and the respective service providers. Additionally, the Project Manager will also hold responsibility for reporting to regulatory authorities as per the permits and regulatory requirements.

Figure 11: SR PVP proposed project team structure



Source: SolarReserve, 2017

2.1.2 EPC contractor

Based on contractual agreements with the Project Company, the EPC Contractor will (in all likelihood) be required to meet the specific requirements outlined within this EMPr for the construction phase. Clauses to be inserted in the EPC Contractor’s agreements should ensure compliance with this EMPr and appropriate legislative requirements. Such clauses will also be included by the EPC Contractor into any sub-contractor contracts.

The Project Company will be required to monitor all contractors (i.e. EPC Contractor and any other sub-contractors) performance on a regular basis and will undertake the following throughout the duration of the construction period:

- Review contractor documentation against the requirements of this EMPr to ensure alignment
- Undertake regular compliance audits
- Continuously check records
- Set up a contractor reporting structure
- Conduct regular meetings with the contractors covering environmental and social aspects
- Closely monitor and review all reports received regarding compliance and/or non-compliance.

2.1.3 Environmental Control Officer (ECO)

The Project Company must appoint a dedicated environmental control officer (ECO) prior to commencement of the construction phase to ensure effective implementation of the environmental measures and commitments. The ECO will be responsible for monitoring, reviewing, and verifying compliance of the contractors with the specifications of the EMPr and conditions of the environmental authorisation. The ECO will also be mandated to act as the site Community Liaison Officer (CLO) regarding social aspects of the project.

The following environmental, health and safety functions should be carried out by the appointed ECO:

- Take prime responsibility for the environmental management of the Project and ensure the Project is compliant with the requirements of the national regulations.
- Monitor all activities on site and ensuring that all contractors comply with the requirements of the conditions stipulated in the environmental authorisation and the requirements outlined in the EMPr.
- Liaising with the Project Company, EPC Contractor, sub-contractors and competent authority throughout the construction phase of the Project.
- Ensuring all the necessary environmental authorisations and permits have been obtained and are in place.
- Inspecting the construction site and surrounding areas regularly.
- Keeping photographic record of progress on the site from an environmental perspective.
- Review reporting and compliance audits undertaken by EPC Contractor.
- Report daily on any EMPr non-compliances to the EPC Contractor.
- Ensure that requisite remedial action is implemented appropriately in the event of non-compliance.
- Liaisons with the Gauteng Department of Agriculture and Rural Development (GDARD) regarding the project activities and compliance levels as per the environmental authorisation conditions of approval and the EMPr.

The following community liaison functions should be carried out by the appointed ECO:

- Develop and manage implementation of the Stakeholder Engagement Plan (SEP).
- Manage day to day interactions with all stakeholders, communities, and interest groups with respect to public health and safety, security, and other social concerns.
- Implement the community grievance mechanism
- Coordinate the logging, investigation, resolution, and escalation to site management (when appropriate) of any community grievances, concerns or other issues that involve local communities or external stakeholders

- Hold regular consultation meetings with stakeholders to provide participants with the opportunity to raise their concerns, and be informed of anticipated and unanticipated impacts throughout the construction period
- Maintain and update records of meetings with stakeholders
- Carry out regular community visits
- Collect up to date information and data about local communities and other stakeholders.
- Ensure that community liaison contact details are distributed to all stakeholders before start of construction and are placed on the site entrance sign
- Periodically monitor and report on SEP implementation and grievances to the Project Company management team

2.1.4 Human Resources (HR) Manager

The responsibilities of the HR Manager will include, *inter alia*, the following:

- Manage implementation of the site HR policy and procedures
- Provide advice to management and personnel in relation to HR requirements
- Manage staff recruitment and training processes
- Manage employee payroll, benefits, and compensation
- Manage employee relations and day to day interactions with workers with respect to labour issues
- Ensure worker contracts are in place prior to mobilisation of the workforce and are compliant with national requirements
- Ensure that the workers' grievance mechanism is disclosed to workers prior to commencement of construction and throughout the construction phase, and that regular monitoring of grievances occurs
- Co-ordinate the logging, investigation, resolution and escalation to site management (when appropriate) of workers' grievances, concerns or other issues
- Assist the EHS Manager in the delivery of workplace training and awareness sessions as relevant, for all employees and new hires
- Assist the EHS team in the timely resolution of any observed EHS issues affecting employees
- Periodically monitor and report on implementation of HR policy and procedures and worker grievances to Sponsor management

3 Summary of Mitigation Measures

3.1 Overview

The mitigation measures as identified through the BA process are summarised in the tables below, split into construction phase and operation phase. For each mitigation measure or activity, relevant standards are identified together with responsibilities and timescales for implementation. Furthermore, relevant monitoring or key performance indicators are identified for each aspect of mitigation and an implementation route is identified.

3.2 Construction and Operation Mitigation Measures Summary

The following tables address project construction and operational activities identifying specific mitigation and monitoring measures associated with environmental and social aspects where relevant and as required.

Table 1: Mitigation and monitoring measures – Construction phase

Aspect	Potential impact	Objectives	Mitigation measure (s)	Responsible person / party	Timescales	Monitoring frequency	Implementation Plan
Air quality management	Dust fall, and fine particulates (PM10)	To minimise the dust fallout generated by vehicles and machinery. Remain within national standards (Dust fall, and fine particulates) at site perimeter and at sensitive receptor locations. Reduce visual intrusion of construction activities and areas.	<ul style="list-style-type: none"> Ensure all construction vehicles adhere to designated access tracks and other works areas as marked on site plans. Enforce low vehicle speeds on unpaved roads (< 30 km/h). Implement appropriate dust control measures as and when they become necessary (water / chemical stabilisation (dust suppressant) sprayed onto gravel roads) or other suitable best practice technique. Dust fallout monitoring in alignment with the South African Dust Fallout Regulations is to be undertaken at the facilities boundaries throughout the construction period. A minimum of five monitoring points should be installed on site: <ul style="list-style-type: none"> One point along northern boundary of the site, One point along southern boundary of the site One point along western boundary of the site One point along northern boundary of the site One point along the site access road As much as possible, phase the removal of vegetation. Monitor natural re-vegetation of disturbed areas with locally indigenous grass species. 	Contractors / ECO / EO	Throughout the Construction phase	Weekly	EMP to be implemented by EPC Contractors.
	Exhaust fume pollution from combustion engines	To minimise the fumes from vehicles and machinery.	<ul style="list-style-type: none"> All vehicles and/or machinery to be used on site should to be kept in good working order and inspected for excessive smoke (particulate) and combustion emissions at regular intervals. All vehicles and/or machinery to be serviced regularly. Machinery should not be allowed to idle for longer than ~5 minutes to reduce fugitive exhaust emissions from site. Equipment and/or machinery not being used should be switched off. 				
Topography management	Landscape scarring from erosion	To provide for runoff capture and prevention of erosion	<ul style="list-style-type: none"> Implementation of a Storm Water Management Plan (SWMP). 	Project Company EPC Contractor	Prior to construction phase and throughout construction	Weekly	Storm Water Management Plan EMP to be implemented by EPC Contractors.
			<ul style="list-style-type: none"> Regular monitoring of the site for erosion problems during construction (ongoing) and operation (at least twice annually) is recommended, particularly after large summer thunderstorms have been experienced. The ECO will determine the frequency of monitoring based on the severity of the impacts in the erosion prone areas. Implement erosion control measures such as mounded humps to allow diversion of road surface flow at regular intervals. 	Contractors / ECO / EO	Throughout the Construction phase	Weekly	EMP to be implemented by EPC Contractors.

Aspect	Potential impact	Objectives	Mitigation measure (s)	Responsible person / party	Timescales	Monitoring frequency	Implementation Plan
			<ul style="list-style-type: none"> • Compacted areas should have adequate drainage systems to avoid pooling and surface flow. Heavy machinery should not compact those areas which are not intended to be compacted as this will result in compacted hydrophobic, water repellent soils which increase the erosion potential of the area. Where compaction does occur, the areas should be ripped. • If soil erosion is detected and leading to sedimentation off site, an erosion management plan is to be developed and implemented. • A 40m radius exclusion zone is to be maintained around the vertical mine shaft on site and/or as stipulated by the Department of Mineral Resources and/or GDARD (Note: The size of the exclusion zone is still under discussion with the relevant authorities). 				
Geology management	<p>Degradation of quality due to mixing with subsoil.</p> <p>Loss of topsoil due to water and wind erosion.</p> <p>Colonisation of topsoil stockpile by weeds.</p>	To maintain quality of topsoil until it is needed for rehabilitation	<ul style="list-style-type: none"> • The maximum depth of topsoil stripping should be 30cm. • Careful stripping and stockpiling to avoid mixing of topsoil and subsoil. • If there is less than 30cm of unconsolidated soil material above a limiting layer of rock or hardpan, then the entire depth must be stripped and stockpiled as topsoil (even if it contains a high proportion of coarse fragments). • Topsoil and natural vegetation should be retained in the areas below the PV panels, where possible. • Topsoil stockpile parameters: <ul style="list-style-type: none"> - Limit the stockpile height to 3 metres, slope to 1 in 5, and rounding the top edges to reduce erosion. - Berm down-gradient of stockpile. • Keep stockpiled topsoil moist to facilitate natural vegetation growth and reduce wind erosion • Undertaken regular weeding and remove any alien vegetation which may propagate on the soil stockpiles. • Construct berms approximately 1m high (slope to 1 in 5, with rounding of the top edges to reduce erosion) 200m apart across slope of site to reduce erosion. 	Contractors / ECO / EO	Throughout the Construction phase	Weekly	EMP to be implemented by EPC Contractor
Water resources, water quality and soil management	Potential pollution from spillage of hydrocarbons and chemicals.	Protection of surface and ground water quality for the environment. Protect soil from contamination. No pollution or harm to the	<ul style="list-style-type: none"> • Implement SWMP before undertaking any activities. • Storing hazardous materials in enclosed structure securely locked and located away from water courses and on an impermeable surface with suitable bunding and a drain with shut off valve. The enclosed building must have clear safety signage and must also be equipped with spill kits. • Keep a record of all hazardous substances stored on site and clearly label the containers. Material Safety Data Sheets (MSDS) are to be available at all hazardous storage areas on site. 	Contractors / ECO / EO	Throughout the Construction phase	Weekly	EMP to be implemented by EPC Contractor

Aspect	Potential impact	Objectives	Mitigation measure (s)	Responsible person / party	Timescales	Monitoring frequency	Implementation Plan
		environment, persons, and animals.	<ul style="list-style-type: none"> ● If spillages of hazardous materials occur, spills clean up and remediation to take place according to protocol immediately. ● A Standard Operating Procedure (SOP) for the handling, storage and disposal of hazardous materials needs to be implemented and enforced by the EO and or ECO. ● Place drip trays under vehicles when parked on a permeable surface. ● All generators on site should be located in a bunded areas or on a mobile drip tray. Bunded areas and drip trays are to be maintained on a regular basis. ● Routine on-site maintenance of construction machinery and vehicles shall be carried out in a designated workshop/maintenance area with an impermeable hard standing surface and drainage to an oil interceptor/sump. ● Maintaining appropriate trained personnel (such as through emergency spill training and other relevant health and safety induction course or workshop etc.) on site to handle hazardous materials and in case leaks occur. ● Environmental awareness training will be provided to workers on site. 				
Waste Management	Pollution from general waste and material	Appropriate waste and materials management	<ul style="list-style-type: none"> ● Development and implementation of a Waste Management Plan for the site. ● The project site to be kept neat and tidy at all times – no littering will be allowed. ● Suitable fines can be implemented to address littering by the EO/ECO. ● No burning of waste is allowed on site ● It is the responsibility of the Contractor to ensure that there is adequate waste management collection facilities across the site for the management of general and hazardous waste streams. ● It is the responsibility of the EPC Contractor to implement a waste control system which applies to all waste generated on site. This system is to include the following as a minimum: <ul style="list-style-type: none"> - Monitor the types of waste generated on site - Monitor the volumes of each waste type generated on site - Detailed records of disposal including safe disposal certificates are to be available for inspection - Monitor the duration of waste storage on site and ensure that storage of waste on site is not to exceed 30 days 	Project Company EPC Contractor	Prior to construction phase and throughout construction	Weekly	Waste Management Plan EMP to be implemented by EPC Contractor

Aspect	Potential impact	Objectives	Mitigation measure (s)	Responsible person / party	Timescales	Monitoring frequency	Implementation Plan
			<ul style="list-style-type: none"> Segregation and monitoring of waste streams in view of minimising, reusing, and recycling waste. Re-use of materials on site wherever possible. Regular disposal of general waste to a licensed third-party landfill 	Contractors / ECO / EO	Throughout the Construction phase	Weekly	Waste Management Plan EMP to be implemented by EPC Contractor
	Pollution from hazardous waste handling and storage	Appropriate waste and materials management	<ul style="list-style-type: none"> Potentially contaminating wastes will be stored in impermeable bunded, fenced area (bunded area to provide 110% volume of the storage containers) until removed by a reputable contractor for disposal at an appropriately licensed landfill. The Contractor must keep records of all disposal certificates. 	Contractors / ECO / EO	Throughout the Construction phase	Weekly	Waste Management Plan EMP to be implemented by EPC Contractor
Biodiversity and ecology management	<p>Stripping of vegetation will destroy habitat and disturb fauna on the site.</p> <p>Loss destruction and/or eradication of plant species of conservation concern/ importance</p>	Management of biodiversity issues. Habitat conservation and management	<ul style="list-style-type: none"> Areas that are denuded during construction need to be revegetated with indigenous vegetation to prevent encroachment by alien invasive plant species, where practical. Implementation of an alien vegetation management plan for the Project Site. If any faunal species of conservation importance are recorded during construction, activities should temporarily cease and an appropriate specialist should be consulted to identify the correct course of action. If plant species of conservation concern are suspected of being present and/or are recorded on site then the following mitigation measures must be implemented: <ul style="list-style-type: none"> An ecologist should be contracted to map the area where the populations of Red List and Orange List plant species occur Buffer zones must be provided by the ecologist to mitigate deleterious edge effects on the population (Note: The 2014 GDARD Requirements for Biodiversity Assessments stipulates a buffer zones of 200m). Where legally allowable, certain plant species of conservation concern are to be relocated locally on site without applying for a permit from GDARD If relocated off site, a permit will be required from GDARD prior to relocation. Fauna likely to remain in the area and utilise such brownfield parcels of land as corridor for movement will be mostly small e.g. mongooses, hedgehogs, rodents etc. Placing small tunnels under fences to allow movement of animals through the site can mitigate the impact to some degree without compromising security. For small mammals, pipe culverts from 0.3m – 1m in diameter are preferable. Educate staff about the sensitivity of faunal species. Induction of workers to include topics on the importance of preserving habitats of animals and prevention of poaching. 	Contractors / ECO / EO	Throughout the Construction phase	Weekly	Alien vegetation management plan EMP to be implemented by EPC Contractor

Aspect	Potential impact	Objectives	Mitigation measure (s)	Responsible person / party	Timescales	Monitoring frequency	Implementation Plan
			<ul style="list-style-type: none"> The intentional killing of any animals including snakes, lizards, birds, or other animals should be strictly prohibited. Trench side walls are to be sloped with a 1:3 gradient to allow fauna the opportunity to climb out of the trenches. Daily inspection of trenches for animals is to be undertaken Work areas to be kept to the minimum to reduce habitat loss. 				
Noise management	Noise nuisance generated by construction activities	To avoid intrusive noise levels	<ul style="list-style-type: none"> Limiting vehicle speeds on site to < 30 km/h Vehicle or engines and machinery to be shut off if not in use and not left running unnecessarily. Use of properly maintained vehicle / construction fleet where possible Noise monitoring should be undertaken if complaints are received from the surrounding residential areas during the construction phase. Noise limits for the project should be set at 60dB during the day. Appropriate mitigating measures based on the monitoring result or following the receipt of any complaints must be implemented. Installing suitable mufflers on engine exhausts and compressor components Providing the public with advance notice of planned noise-generating activities. Limit the noisiest construction activities to normal working hours, unless otherwise permitted Construction activities must meet the noise standard requirements of the Occupational Health and Safety Act, 1993 (Act No 85, of 1993) Construction staff working in areas where the 8-hour ambient noise levels exceed 85dBA must wear hearing protection equipment. 	Contractors / ECO / EO	Throughout the Construction phase	Weekly	EMP to be implemented by EPC Contractor
Transport and traffic management	Increase in traffic may affect road safety adversely, increase congestion and wear and tear of the road surface and add to frustration of other road users.	To maximise road safety, and minimise congestion and frustration	<ul style="list-style-type: none"> Implementation of Traffic Management Plan (TMP) 	Project Company EPC Contractor	Prior to construction phase and throughout construction	Weekly	Traffic Management Plan EMP to be implemented by EPC Contractor
			<ul style="list-style-type: none"> Construction-related road use will be limited to daylight hours and movement of heavy vehicles during peak traffic hours will be avoided as far as practicable Provision of safety and traffic signage along internal roads and public roads to alert road users on road safety. Enforcement of low vehicle speeds on unpaved roads (< 30 km/h) on site for the safety of personnel and to reduce dust emissions All drivers must be in possession of a legally valid licence 	Contractors / ECO / EO	Throughout the Construction phase	Weekly	Traffic Management Plan EMP to be implemented by EPC Contractor

Aspect	Potential impact	Objectives	Mitigation measure (s)	Responsible person / party	Timescales	Monitoring frequency	Implementation Plan
			<ul style="list-style-type: none"> Monitor adherence to traffic regulations and speed limits Monitor drivers for use of alcohol and other substances that could impair judgment and driving ability 				
Landscape and visual amenity	Glare and lights at night	Ensure glare and lights at night are not visually intrusive.	<ul style="list-style-type: none"> Downward lighting to be used as much as possible No up lighting of structures or signage is allowed – unless permitted or a requirement from the Civil Aviation Authority 	Contractors / ECO / EO / Landscape consultant	Throughout construction phase	Weekly	EMP to be implemented by EPC Contractors.
	Changes to landscape character of north-eastern areas	Reduced visual footprint.	<ul style="list-style-type: none"> The removal and clearance of veld grass is to be restrained to the direct footprint of the infrastructure. Where possible the indigenous vegetation should be left in situ. All alien invasive vegetation should be removed from site 				
	Site and structure aesthetics	Structures to blend into the landscape and signage is restrained as seen from adjacent receptors.	<ul style="list-style-type: none"> Wherever possible, consideration regarding colour of the infrastructure must be considered. Colours should be used which blend into the background landscape wherever possible The PV project signage is clearly visible for location purposes but is restrained 				
Socio-economic Management	Opportunities associated with local employment benefits.	Enhancing local employment	<ul style="list-style-type: none"> Development, implementation, and disclosure of Recruitment Policy Project information will be communicated to all Interested and Affected Parties in alignment with a Stakeholder Engagement Plan (SEP) and grievance programme. Community involvement and/or notifications will foster community buyin to the project. 	Project Company EPC Contractor	Prior to construction phase and throughout construction	Monthly	Stakeholder Engagement Plan (SEP) and grievance programme Recruitment policy EMP to be implemented by EPC Contractor
	Local economic development opportunities	Enhancing local procurement	<ul style="list-style-type: none"> Support local enterprises through contracting more local firms to provide goods and services where possible 	Project Company EPC Contractor	Prior to construction phase and throughout construction	Monthly	EMP to be implemented by EPC Contractor
	Labour risks and unrest	Working conditions are compliant with national standards	<ul style="list-style-type: none"> A Human Resources (HR) Policy is to be in place. As part of the HR policy, an induction to new staff is undertaken to explain the relevant information on labour rights and employment laws. Issue each member of staff with an individual contract of employment. Insert clauses in contractors' agreements to ensure compliance with all policies, plans, procedures and identified mitigation measures. 	Project Company EPC Contractor	Prior to construction phase and throughout construction	Weekly	HR Policy Workers grievance mechanism EMP to be implemented by EPC Contractor

Aspect	Potential impact	Objectives	Mitigation measure (s)	Responsible person / party	Timescales	Monitoring frequency	Implementation Plan
			<ul style="list-style-type: none"> Develop and implement a worker's grievance mechanism for all employees, contractors, subcontractors, and site personnel. All complaints will be recorded, followed up and resolved expeditiously. 				
	Occupation health and safety (OHS) risks	Labour management and workforce protection and safety	<ul style="list-style-type: none"> Issue Personal Protective Equipment (PPE) to all workers. Induction and training programme for workers particularly covering health and safety procedures and handling equipment. Worker Health and Safety Plan including road safety element with penalties for violation of rules and speed limits and Permit to Work system for hazardous tasks. Daily toolbox talks/staff briefing sessions. Provision of a medical facility at site and personnel trained in first aid. Establishment of Emergency Preparedness and Response Plan (EPRP). Incidents and accidents logs to be maintained. Adequate sanitation facilities will be provided and suitable distributed on site. Minimum of 1 chemical toilet for every 15 workers on site will be available. The chemical toilets are to be serviced daily and have a constant supply of toilet paper, soap, and water. All workers/employees/contractors will have access to safe and potable water. Provision of shaded lunch areas for workers, with seating and waste bins. 	Project Company EPC Contractor	Prior to construction phase and throughout construction	Weekly	OHS Plan EPRP EMP to be implemented by EPC Contractor OHS plan
	Community safety risks	Safeguarding community health, safety, and security. Restrict access to sites, especially hazardous areas.	<ul style="list-style-type: none"> Implementation of Site Security Plan Establish a designated access control point to the site for safe entry and exit Construction area will be securely fenced off before construction activities commence. Clearly demarcate and secure working areas, excavations and lay down areas in an appropriate manner Access to neighbouring properties will be prohibited An Environmental Control Officer (ECO) will be appointed and their mandate will include both the management of environmental issues and liaison with Interested and Affected parties as per the SEP. Implementation a grievance mechanism to receive, record and respond to community complaints. This mechanism should be detailed in the SEP. 	Project Company EPC Contractor	Prior to construction phase and throughout construction	Weekly	Site Security Plan SEP EMP to be implemented by EPC Contractor
Cultural heritage and archaeology	Highly unlikely for heritage resources to be found, but	Avoid damage to unrecorded archaeological heritage features.	<ul style="list-style-type: none"> Chance find procedure is to be developed prior to construction Workers induction is to include sensitisation training regarding heritage and the chance finds procedure 	Project Company	Prior to construction phase and	Weekly	Chance finds procedure

Aspect	Potential impact	Objectives	Mitigation measure (s)	Responsible person / party	Timescales	Monitoring frequency	Implementation Plan
	possible during site preparations and excavation works		<ul style="list-style-type: none"> If a possible heritage resource is identified on site, the immediate area is to be cordoned off and a heritage impact assessment practitioner/ECO called to inspect the site for confirmation purposes. 	EPC Contractor	throughout construction		EMP to be implemented by EPC Contractor
Transmission Line Management	Disturbance to water courses and land from directional drilling activities and the burying of the transmission line	Avoid significant environmental damage to land and water courses	<ul style="list-style-type: none"> Minimise the extent of clearing vegetation. Topsoil and subsoil will be stockpiled separately. Subsoil will be used for backfilling and topsoil for rehabilitation purposes. Stripped vegetation will be stockpiled away from soil stockpiles. All stockpiles will be stored separately in areas where it will not be damaged. All directional drilling operations are to be undertaken in alignment with a standard operating procedure (SOP) for drilling operations. Should any drilling fluids be required these should be contained within a temporary bunded structure including a high-density plastic liner to prevent groundwater pollution. Drilling is to take place from outside the riparian zone, unless otherwise permitted Establish sediment control measures to prevent surface water runoff from the drilling site entering the canal. Where possible try to align construction schedule for drilling to take place during the dry season. Should concrete be required for the installation of the subsurface of the transmission line, concrete must be imported to construction areas and not mixed along the transmission line corridor. Trench side walls are to be sloped with a 1:3 gradient to allow fauna the opportunity to climb out of the trenches. Daily inspection of trenches for animals is to be undertaken 	Project Company EPC Contractor	Construction phase	Weekly	SOP for drilling operations. EMP to be implemented by EPC Contractor
		Rehabilitation of affected land	<ul style="list-style-type: none"> Rehabilitation of disturbed areas will be undertaken progressively as works progress. Disturbed areas will be restored as near as practical to its original profile. Topsoil will be re-spread over the area where it was removed and compacted. Regular monitoring will be undertaken during the construction period to monitor for weeds and ensure growth of revegetation and stability (if necessary, appropriate reapplication of seeds will be carried out). 				

Table 2: Mitigation and monitoring measures – Operation phase

Aspect	Potential impact	Objectives	Mitigation measure (s)	Responsible person / party	Timescales	Monitoring frequency	Implementation Plan
Air quality management	Dust fall and fine particles (PM10)	To minimise the dust from vehicles travelling on gravel surfaces	<ul style="list-style-type: none"> Enforce low vehicle speeds on unpaved roads (< 30 km/h) Ensure all maintenance vehicles adhere to travelling on designated site access roads and other work areas as marked on site plans. Implement appropriate dust control measures as and when they become necessary (water / dust suppressant sprayed onto gravel roads) or other suitable best practice technique. Chemical binders are to be considered for unpaved roads, if dust fallout levels exceed the South African Dust Fallout Regulations at the facilities boundaries. 	O&M Company	Throughout the Operation phase	Monthly	EMP to be implemented by O&M Company.
	Exhaust fume pollution from combustion engines	To minimise the fumes from vehicles and machinery.	<ul style="list-style-type: none"> All vehicles and/or maintenance machinery to be used on site should be inspected monthly for excessive smoke (particulate) and combustion emissions. All vehicles and/or maintenance machinery are to be serviced regularly to ensure optimum operating performance with reduced emissions generation. Machinery should not be allowed to idle for longer than 5 minutes to reduce fugitive exhaust emissions from site. Equipment and/or machinery not being used should be switched off. 	O&M Company	Throughout the Operation phase	Monthly	EMP to be implemented by O&M Company.
Topography management	Damage to the vertical mine shaft	Preserve the mine shaft on site	<ul style="list-style-type: none"> A 40m radius exclusion zone is to be maintained around the vertical mine shaft on site and/or as stipulated by the Department of Mineral Resources and/or Gauteng Department of Agriculture and Rural Development (GDARD). 	O&M Company	Throughout the Operation phase	Monthly	EMP to be implemented by O&M Company.
Erosion and geology management	Potential erosion from wind and water. Colonisation of topsoil stockpile by weeds.	Erosion prevention. To maintain quality of topsoil until it is needed for rehabilitation.	<ul style="list-style-type: none"> Regular inspection of SWMP berms Areas that are denude need to be revegetated with local indigenous vegetation to prevent erosion potential and to bind the soil. Conduct regular inspections to identify areas of erosion Undertake regular weeding and remove any alien vegetation which may propagate on site and lead to erosion as indigenous plants may be outcompeted. Undertake regular inspections and maintenance of storm water drains and culverts for blockages 	O&M Company	Throughout the Operation phase	Monthly	EMP to be implemented by O&M Company.
Water resources, water quality	Potential pollution from spillage of	Protection of surface and ground water	<ul style="list-style-type: none"> Place drip trays under heavy maintenance vehicles when parked for longer than 3 hours Storing hazardous materials on site is to be within enclosed structure securely locked and located away and on an 	O&M Company	Throughout the Operation phase	Monthly	EMP to be implemented by O&M Company.

Aspect	Potential impact	Objectives	Mitigation measure (s)	Responsible person / party	Timescales	Monitoring frequency	Implementation Plan
and soil management	hydrocarbons and chemicals.	quality for the environment. Protect soil from contamination. No pollution or harm to the environment, persons, and animals.	impermeable surface with suitable bunding and a drain with shut off valve. The enclosed building must have clear safety signage and must also be equipped with spill kits. <ul style="list-style-type: none"> Keep a record of all hazardous substances stored on site and clearly label the containers. MSDS's are to be available at all hazardous storage areas on site. If spillages occur, spillages will be cleaned up and remediated immediately. Contaminated soil will either be remediated <i>in situ</i> or disposed of at an appropriately licensed landfill site. Maintaining appropriate trained personnel on site to handle hazardous materials and in case leaks occur. 				
Waste management	Pollution from general waste and material	Appropriate waste and materials management	<ul style="list-style-type: none"> Continued implementation of the sites Waste Management Plan which will include the principles of waste segregation and monitoring of waste streams in view of minimising, reusing, and recycling waste wherever possible The project site to be kept neat and tidy at all times – no littering will be allowed. Suitable fines can be implemented to address littering by the EO/ECO. No burning of waste is allowed on site It is the responsibility of the Contractor to ensure that there is adequate waste management collection facilities across the site for the management of general and hazardous waste streams. It is the responsibility of the O&M Contractor to maintain a waste control system which applies to all waste generated on site. This system is to include the following as a minimum: <ul style="list-style-type: none"> Monitor the types of waste generated on site Monitor the volumes of each waste type generated on site Detailed records of disposal including safe disposal certificates are to be available for inspection Monitor the duration of waste storage on site and ensure that storage of waste on site is not to exceed 30 days 	O&M Contractors / ECO / EO	Throughout the Operation phase	Monthly	WMP & EMP to be implemented by O&M Company.
	Pollution from hazardous waste handling and storage	Appropriate waste and materials management	<ul style="list-style-type: none"> Segregation and monitoring of waste streams in view of minimising, reusing, and recycling waste. Re-use of materials on site wherever possible. Regular disposal of general waste to a licensed third-party landfill Potentially contaminating wastes will be stored in impermeable banded, fenced area (banded area to provide 110% volume of 	O&M Company	Throughout the Operation phase	Monthly	EMP to be implemented by O&M Company.

Aspect	Potential impact	Objectives	Mitigation measure (s)	Responsible person / party	Timescales	Monitoring frequency	Implementation Plan
			<p>the storage containers) until removed by a reputable contractor for disposal at an appropriately licensed landfill.</p> <ul style="list-style-type: none"> The Contractor must keep records of all disposal certificates. 				
Biodiversity and ecology management	<p>Project site will be inaccessible to fauna, except for birds, insects, snakes, and rodents.</p> <p>Potential loss and/or eradication of plant species and fauna of conservation concern / importance.</p>	<p>Management of biodiversity issues.</p> <p>Habitat conservation and management</p>	<ul style="list-style-type: none"> Areas that are denude need to be revegetated with indigenous vegetation to prevent encroachment by alien invasive plant species. Continue implementing the alien invasive vegetation management plan for the project site. The intentional killing of any animals including snakes, lizards, birds, or other animals should be strictly prohibited. Fauna likely to remain in the area and utilise the project footprint as corridor for movement will be mostly small e.g. mongooses, hedgehogs, rodents etc. Placing small tunnels under fences to allow movement of animals through the site can mitigate the impact to some degree without compromising security. For small mammals, pipe culverts from 0.3m – 1m in diameter are preferable. Structures should be monitored for, and cleared of, obstructions such as detritus or silt blockages that impede movement. Small mammals, carnivores, and reptiles avoid crossing structures with significant detritus blockages Maintain indigenous vegetation community within the project footprint. 	O&M Company	Throughout the Operation phase	Monthly	Alien invasive vegetation management plan EMP to be implemented by O&M Company.
Noise management	Noise nuisance generated	Prevent complaints from the community	<ul style="list-style-type: none"> Limiting vehicle speeds on site to 30 km/h. Vehicle and/or plant engines to be shut off if not in use and not left running unnecessarily. Implement and maintain Grievance Plan in operations phase. Noise monitoring should be undertaken if complaints are received from the surrounding residential areas. Noise limits for the project should be set at 60dB during the day. 	O&M Company	Throughout the Operation phase	Monthly	EMP to be implemented by O&M Company.
Transport and traffic management	Increase in traffic to solar plant increasing road congestion, safety, and deterioration of road surfaces	To maximise road safety, and minimise congestion and deterioration	<ul style="list-style-type: none"> Access road to site will be paved and inspected and maintained regularly. Enforcement of low vehicle speeds on unpaved roads (< 30 km/h) on site for the safety of personnel and to reduce dust emissions. Monitor adherence to traffic regulations and speed limits. 	O&M Company	Throughout the Operation phase	Monthly	EMP to be implemented by O&M Company.

Aspect	Potential impact	Objectives	Mitigation measure (s)	Responsible person / party	Timescales	Monitoring frequency	Implementation Plan
Landscape and aesthetic amenity	Glare and lights at night	Ensure glare and lights at night are not visually intrusive.	<ul style="list-style-type: none"> Security lighting is located at the office site / maintenance area, unless otherwise required. Downward lighting to be used where possible. No up lighting of structures or signage is allowed – unless permitted or a requirement from the Civil Aviation Authority 	O&M Company	Throughout the Operation phase	Monthly	EMP to be implemented by O&M Company.
	Changes to landscape character of north-eastern areas	Reduced visual footprint.	<ul style="list-style-type: none"> The services of a garden service (or in-house management) are acquired to routinely maintain the indigenous vegetation growth on site. 				
Socio-economic management	Opportunities associated with local employment benefits.	Enhancing local employment	<ul style="list-style-type: none"> Disclosure of Recruitment Policy Share project information will be communicated to all I&APs to foster good community relations 	O&M Company	Throughout the Operation phase	Monthly	Recruitment policy EMP to be implemented by O&M Company.
	Local economic development opportunities	Enhancing local procurement	<ul style="list-style-type: none"> Support local enterprises through contracting local firms to provide goods and services where applicable and practical 	O&M Company	Throughout the Operation phase	Monthly	EMP to be implemented by O&M Company.
	Labour risks and unrest	Working conditions are compliant with national standards	<ul style="list-style-type: none"> A Human Resources (HR) Policy is to be in place. As part of the HR policy, an induction to new staff is undertaken to explain the relevant information on labour rights and employment laws. Issue each member of staff with an individual contract of employment. Insert clauses in contractors' agreements to ensure compliance with all policies, plans, procedures and identified mitigation measures. Develop and implement a worker's grievance mechanism for all employees, contractors, subcontractors, and site personnel. All complaints will be recorded, followed up and resolved expeditiously. 	O&M Company	Throughout the Operation phase	Monthly	HR Policy Workers grievance mechanism EMP to be implemented by Project Company.
	Occupation health and safety (OHS) risks	Labour management and workforce protection and safety	<ul style="list-style-type: none"> Induction and training programme for workers particularly covering health and safety procedures and handling equipment Worker Health and Safety Plan including road safety element with penalties for violation of rules and speed limits First aid needs to be available on site Maintain/implement Emergency Preparedness and Response Plan (EPRP) Incidents and accidents logs to be maintained for the life of the facility 	O&M Company	Throughout the Operation phase	Monthly	OHS plan EPRP EMP to be implemented by O&M Company

Aspect	Potential impact	Objectives	Mitigation measure (s)	Responsible person / party	Timescales	Monitoring frequency	Implementation Plan
			<ul style="list-style-type: none"> Adequate sanitation facilities are to be available on site. The ablution facilities are to be serviced daily and have a constant supply of toilet paper, soap, and water. Safe potable water supply to be provided. A lunch area needs to be available where staff can sit and eat lunch 				
	Community safety risks	Safeguarding community health, safety, and security. Restrict access to sites, especially hazardous areas.	<ul style="list-style-type: none"> Implementation of Site Security Plan. Maintain the sites designated access control point in Klopper road for safe entry and exit. Project site security measures to be maintained. Access to neighbouring properties Implementation a community grievance mechanism system for the operation phase to receive, record and respond to community complaints. 	O&M Company	Throughout the Operation phase	Monthly	Site security plan Stakeholder Engagement Plan EMP to be implemented by O&M Company.

4 Plans, Policies, and Procedures

4.1 Introduction

This section elaborates on the various framework plans mentioned in the preceding section through which the mitigation activities identified will be committed by the Project.

Specific framework plans, policies and procedures are required to ensure adequate management and monitoring of social and environmental aspects. Table 4 below summarises the key plans and policies required.

Table 4: Plans, Policies, and Procedures

Aspect	Plan / Policy	Objective / Content
Recruitment	Recruitment policy	Equity in local employment benefits to minimise social conflict. Prohibit the use of child and forced labour / promote non-discrimination and equal opportunities. Special measures to promote equal employment opportunities across ethnicities and women.
Human Resources (HR)	Human resource policy	To avoid inappropriate and unfair employment conditions, a site specific Human Resources (HR) Policy will be developed by the EPC contractor (prior to and during construction), in line with national labour standards.
Community Complaints	Community grievance mechanism	Formalised process by which grievances can be raised by the local community during construction and operation and to allow structured investigation by the Project Company to review the validity, responsibility, and response / action.
Labour Complaints	Labour grievance mechanism	Formalised process by which grievances can be raised by the workforce during construction and operation and to allow structured investigation by the Project Company to review the validity, responsibility, and response / action.
Environmental Health and Safety Management System	<ul style="list-style-type: none"> ● OHS policies and procedures ● Site Health and Safety plan ● Security plan 	OHS plan to outline safe working environment, procedures, and culture. The EPC contractor will need to develop a site security plan that informs how security companies and staff will be vetted. Any security company should be accredited. Security staff will need to be vetted for previous offences and trained in human rights and the use of force. The security plan will identify procedures for accessing the site and safeguarding materials. Equipment and signage to support security systems will be detailed in the plan.
Emergency Preparedness and Response Plan (EPRP)	EPRP	An EPRP will be developed so that the Project Company and relevant third parties (local authorities and emergency services) are prepared to respond to accidental and emergency situations in a manner that prevents and mitigates harm to people and the environment. Ensure a coordinated response in the event of an emergency and to give the local community reassurance that a plan is in place, thus reducing their concerns.
Disclosure and Consultation	Stakeholder Engagement Plan (SEP)	A SEP will be produced that will be implemented for the construction and operational phases of the Project. The objective of the SEP will be to manage stakeholder and community relations, expectation, and grievances through consultation and disclosure mechanisms. Ensure a comprehensive and culturally appropriate approach to consultation and disclosure for the life cycle of the Project Maintain a constructive relationship with stakeholders on an ongoing basis through meaningful engagement
Materials use and waste management	Material use and handling procedure. Waste management procedure and Waste Management Plan (WMP)	Identify measures for minimisation of waste and safe disposal of construction wastes. Effective materials use is a fundamental aspect of waste minimisation therefore the WMP must draw upon and create linkages between materials storage, handling, use and waste management. The overall objective of a WMP is to ensure that waste generated is segregated and managed appropriately in order to ensure maximisation of re-use and recycling and overall waste minimisation. The WMP will need to address hazardous waste, temporary waste storage and handling, and treatment and disposal of waste.
Storm water management	Storm Water Management Plan	Management plan should include strategies to be implemented to control the surface flow of storm water such that erosion, sedimentation and pollution of surface and ground water resources in the immediate and surrounding environments are mitigated. This is specifically important during the construction and operational phases of the Project. Design an appropriate storm water catchment system to prevent contaminated water from leaving site.

Aspect	Plan / Policy	Objective / Content
Transport	Traffic Management Plan (TMP)	A traffic management plan (TMP) will need to be produced by the main construction contractor. The TMP will be a starting point for further discussion between the EPC contractor, local authorities, and road agencies. The TMP will then be refined as access routes are confirmed and the timing and type of abnormal loads become known. The TMP will address the full range of issues related to routing, road furnishings, equipment maintenance, any route or time use restrictions, and driver ability.
Ecology	Alien Invasive Plant Control and Eradication Plan	Provide a framework for the management and control of alien and invasive plant species during construction and operation on site. The plan should outline control and management measures to prevent encroachment of alien plants on site, include a monitoring and eradication programme and promote natural rehabilitation and planting of locally indigenous species to prevent erosion and alien plant invasion.
Archaeology	Chance finds procedure	A project-specific procedure that outlines the actions to be taken if previously unknown cultural heritage resources, and/or archaeological resources, are encountered during the Project construction and operational phases.

5 Reporting Requirements

5.1 Introduction

Effective reporting is essential for rendering an Environmental and Social Management System (ESMS) of practical value. Routine independent auditing provides the necessary impetus for continual improvement. Performance monitoring, reporting, and auditing should be carried out to ensure compliance with the national legal requirements and compliance regarding the project's environmental authorisation. It will be the responsibility of the Project Company to oversee and monitor the implementation of relevant EMPr elements by the EPC contractor and sub-contractors that may be employed. The Project Company will monitor, audit, and assess the compliance of the EPC contractor's implementation of the relevant aspects of this EMPr during the construction phase and ensure that corrective actions are taken when necessary to maintain environmental and social performance in line with South African environmental and social norms and standards.

5.2 Non-Compliance Report

During the construction phase of the project, the ECO will be responsible for undertaking audits and inspections to verify compliance with the EMPr, and any conditions of the environmental authorisation. These compliance audits will be undertaken on a monthly basis and any non-compliances (or partial compliances) will be recorded. Weekly tracking records of compliance will be produced and discussed during weekly Environmental, Health and Safety (EHS) toolbox talks which will occur between the EPC contractor and the ECO.

Any breaches of the acceptable standards specified by law/construction permits and/or the project's environmental authorisation should be reported to GDARD (the responsible department manager), using a Non-Compliance Report (NCR) Form on a monthly basis.

A copy of each completed NCR should be held on file by the EPC contractor, as well as the GDARD reply when it is received. A record of corrective actions should also be made and tracked to their completion. Where a non-compliance is identified, actions should be taken immediately to rectify the non-compliance issue and be reported by personnel to the EHS Manager. Depending on the nature of the non-compliance (minor or major incident) the EHS manager will notify the EPC construction manager and the Project Company. All non-compliances must be investigated and a report identifying reasons for occurrence, measures required to prevent future incidents and any other recommendations including development of new procedures (if required), must be produced within two weeks of the incident occurring.

5.3 Internal and external reporting and auditing

The EPC contractor is to prepare monthly progress report for submission to the Project Company. It is recommended that the following be included in the monthly reporting:

- Monthly construction progress
- Permit and licensing status
- Environment, health and safety
- Manpower status
- Findings of the monitoring programmes, with emphasis on any breaches of the control standards, action levels or standards of general site management
- Outstanding NCRs
- Summary of any complaints by external bodies and actions taken/to be taken;
- Number of local workers to be separated from the total number of workers

- Relevant changes or possible changes in legislation, regulations and international practices (if many)

Internal audits should be undertaken by the Project Company every six months focussing on the performance of the implementation of the EMPr by the Contractors’.

An independent third party environmental audit will be undertaken quarterly during the construction phase and biannually for the duration of the operational phase of the project. The scope of the audit will as a minimum include the assessment of the effectiveness of the mitigation measures and recommendations for management of:

- Grievance incidents
- Waste
- Water
- Alien vegetation and open space
- Re-vegetation and rehabilitation
- Plant rescue and protection; and
- Traffic and transportation

The results of the internal and external audits will be recorded and will be made available to the relevant environmental authority and the I&APs on request.

6 Details of the Environmental Assessment Practitioner (EAP) and statement of independence

6.1 Appointed EAP and Contact Details

This Basic Assessment Report (BAR) was compiled by Mr Adam Bennett, the Mott MacDonald appointed Environmental Assessment Practitioner (EAP) for the SolarReserve Vogelstruisfontein Photovoltaic Project (SR PVP) (GAUT 002/17-18/E2033) (Table 3). Adam holds a professional registration with the South African Council for Natural Scientific Professions in the field of Environmental Sciences (Reg: 400142/08). Adam's career and project experience is summarised below.

Table 3: EAP Contact Details

Company details	Mott MacDonald Africa (Pty) Limited
Contact person	Adam Bennett
Postal address	PO Box 346 Pinegowrie, South Africa, 2124
Physical address	25 Scott street, Waverly, Johannesburg, 2090
Telephone	011 0521000
Cell	0835389424
Fax	0867503563
Email	Adam.bennett@mottmac.com

Source: Mott MacDonald, 2017

6.2 EAP Project Experience



Adam Bennett

Principal Environmental Consultant - Senior Air Quality Specialist

Personal summary

Year of birth: 1978

Nationality: South African

Languages:

- English – Mother Tongue
- Afrikaans - Fair

Qualifications:

- BSc (Hons) Environmental Sciences/Geography, University of the Witwatersrand (WITS)
- BSc, WITS
- Manager Excellence: Golder Associates Africa
- Project Management 24: Golder Associates Africa
- NFPA 472
- ISO 14001

Key skills:

- Air quality management
- Noise monitoring
- EAP - integrated environmental management projects
- Management and leadership
- Project management skills
- Business development and strategy
- Administration, analytical and organisational skills enabling the ability to work under pressure
- Attention to detail with good technical reporting
- HAZMAT incident response, clean up and rehabilitation

Adam has widespread air quality, environmental, noise and project management consulting experience (>14 years) in a diverse range of markets including: industry; energy & power; transport; waste management (i.e. general, hazardous & medical); mining, ore processing & refining; urban development; oil & gas, petrochemical; contaminated land & rehabilitation; HAZMAT including emergency incident response & incident commanding. Adam is professionally registered with SACNASP (# 400142/08) in the field of Environmental Science.

Experience and skills

Mott MacDonald (2016-present)

Principal Environmental Consultant - Senior Air Quality Specialist

Golder Associates Africa (2011-2016)

Group/Divisional Leader Atmospheric Management Services (2012-2016); Senior Air Quality Specialist (2011)

Gondwana Environmental Solutions (2006-2010)

Senior environmental and air quality specialist

Strategic Environmental Focus (2005-2006)

Project manager in the Mining & Industrial Unit

Dept. of Agriculture & Environmental Affairs (2003-2005)

Environmental officer in the Hazardous Chemicals & Waste Management Unit

Selected projects/experience

- **Mott MacDonald (2016- Present):** To Project Manage (PM) and carry out all responsibilities associated with air quality management/monitoring projects, noise management/monitoring projects and integrated environmental management projects as an Environmental Assessment Practitioner (EAP). Scientific technical reporting, data analysis and quality control on various environmental data sets and types. Quality control and review of developed client deliverables. Business development regarding the growth of Mott MacDonald's market share including:
 - Leadership and technical development and mentorship of junior colleagues through collaborative project work, discussion, and mentoring sessions;
 - Strategic planning regarding Mott MacDonald air quality, noise and environmental management services and contributing to the wider corporate business strategy;
 - Client relationship management; and
 - Compilation of tenders, proposals, and expressions of interest.Past project experience includes: The establishment, operation, maintenance & calibration of air quality and meteorological monitoring networks; atmospheric emission licensing (AEL), specialist air quality assessments (baseline & full impact assessment); noise monitoring and reporting, due diligence auditing; and a variety of other integrated environmental management projects including: BA, EIA, SEIA, EMP, EMPr, WUL, environmental auditing construction monitoring, IFC Performance Standards & Equator Principles etc.
- **Golder Associates Africa (2011-2016):** To manage and carry out all responsibilities associated with the Golder Atmospheric Management Services Division including: team leadership, mentoring & management, client relationship management, project management of all responsibilities associated with air quality management/monitoring projects, compilation of tenders, proposals, and expressions of interest to secure projects and the general development and growth of the services within the African air quality market. Country experience extends into the following countries: South Africa, Zambia, Ghana, Mozambique, Ethiopia, Botswana, Congo, Malawi, Uganda, Senegal, Democratic Republic of the Congo etc. Has undertaken projects in alignment with the following international standards and/or guidelines including: IFC performance standards, World Bank, European Union etc.
- **Gondwana Environmental Solutions (2006-2010):** Project management of various air quality management and monitoring projects. Business development including: marketing, client relationship management, preparation of proposals/tenders/EOI's.
- **Strategic Environmental Focus (Pty) (2005-2006):** Project management of various integrated environmental management projects, marketing and business development.

- **Dept. of Agriculture & Environmental Affairs (2003-2005):** Project management of various pollution and waste management projects, HAZMAT response to hazardous chemical incidents including environmental rehabilitation.

6.3 EAP Declaration of Independence

I **Adam Bennett** declare under oath that:

- I act as the independent environmental practitioner for this application SolarReserve Vogelstruisfontein Photovoltaic Project (SR PVP) (GDARD Ref. #: GAUT 002/17-18/E2033);
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting environmental impact assessments, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in regulation 8 of the regulations when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by interested and affected parties in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report;
- I will keep a register of all interested and affected parties that participated in a public participation process; and
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- all the particulars furnished by me in this form are true and correct;
- will perform all other obligations as expected from an environmental assessment practitioner in terms of the Regulations; and
- I realise that a false declaration is an offence in terms of regulation 71 and is punishable in terms of section 24F of the Act.

For **Basic Assessment applications**, I further declare under oath that:

- I will fix the site notice(s) in a conspicuous place, on the property(ies) where it is intended to undertake the activity(ies)
- I will place a notice in the required newspaper(s)
- I will provide the following with all the project information and give I&AP's an opportunity to register as an I&AP
 - landowners and occupiers of adjacent land
 - landowners and occupiers of land within 100 metres of the boundary of the property
 - the ward councillor
 - any organisation that represents the community in the area of the application
 - the municipality which has jurisdiction over the area in which the proposed activity will be undertaken
 - any organ of state that may have jurisdiction over any aspect of the activity of the applicant's intention to submit an application to the competent authority; and
- I will include on the register all persons as required per Regulation 55 (1) (c)
- The Reports as submitted will contain the same information (including layout, project design and mitigation) as provided to the registered I&APs for comment
- All issues raised by the I&APs during the public participation process will be included in the Comments and Response Report as attached

 Signature of the Environmental Assessment Practitioner: Company Name: Mott MacDonald Africa (Pty) Limited Date: 07/04/2017	 Signature of the Commissioner of Oaths SEBIDIKU MALESELA GABRIEL MOKWATLO PROFESSIONAL ACCOUNTANT (SA) Designation: 15 PETREA STREET Date: 07/09/2017 ESTHER PARK EXT 1 KEMPTON PARK Commissioner of Oaths Official stamp 1619 (attached):
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Appendix A: NEMAQA: National Dust Control Regulations (GN R.827 1 November 2013)

Dust fallout is one of the common causes of complaints regarding air pollution. Generally, coarse dust greater than 10µm in diameter poses little risk to human health however poses a nuisance. The NEMAQA National Dust Control Regulations (GN R.827 1 November 2013) prescribe the allowable dust fallout level, which are not to be exceeded during a specified time period in a defined area (Table 4).

As per the regulations, the monitoring method to be used for measuring dust fall rate and the guideline for locating sampling points shall be ASTM D1739:1970, or equivalent method approved by any international recognised body. During the construction phase of the SR PVP, monitoring of the dust fallout levels will be required to ensure regulatory compliance.

Table 4: National Dust Fallout Regulations Acceptable Dust Fall Rates

Restriction areas	Dust rate (D) (mg/m ² /day, 30 days average)	Permitted frequency of exceeding dust fallout rate
Residential areas	D < 600	Two within a year, not sequential months
Non-residential areas	600 < D < 1200	Two within a year, not sequential months

Source: NEMAQA National Dust Control Regulations (GN R.827 1 November 2013)

Appendix B: Expected flora and fauna species

EXPECTED PLANT SPECIES

Species	Threat status	SA Endemic
<i>Abutilon piloso-cinereum</i> A.Meeuse	LC	No
<i>Abutilon sonneratianum</i> (Cav.) Sweet	LC	No
<i>Acacia cyclops</i> A.Cunn. ex G.Don	Not Evaluated	No
<i>Acacia dealbata</i> Link	Not Evaluated	No
<i>Acalypha angustata</i> Sond.	LC	No
<i>Acalypha caperonioides</i> Baill. var. <i>caperonioides</i>	DDT	No
<i>Acalypha glabrata</i> Thunb. var. <i>pilosa</i> Pax	LC	No
<i>Acalypha peduncularis</i> E.Mey. ex Meisn.	LC	No
<i>Acalypha villicaulis</i> Hochst.	LC	No
<i>Acanthospermum australe</i> (Loefl.) Kuntze	Not Evaluated	No
<i>Achyranthes aspera</i> L. var. <i>aspera</i>	Not Evaluated	No
<i>Acokanthera oppositifolia</i> (Lam.) Codd	LC	No
<i>Acrotome hispida</i> Benth.	LC	No
<i>Adenostemma caffrum</i> DC.sens.lat.	LC	No
<i>Adiantum capillus-veneris</i> L.	LC	No
<i>Aeollanthus buchnerianus</i> Briq.	LC	No
<i>Aerva leucura</i> Moq.	LC	No
<i>Afrocanthium gilfillanii</i> (N.E.Br.) Lantz	LC	No
<i>Afrocanthium mundianum</i> (Cham. & Schldl.) Lantz	LC	No
<i>Afroscidium magalismontanum</i> (Sond.) P.J.D.Winter	LC	No
<i>Agelanthus natalitius</i> (Meisn.) Polhill & Wiens subsp. <i>zeyheri</i> (Harv.) Polhill & Wiens	LC	No
<i>Agrimonia bracteata</i> E.Mey. ex C.A.Mey.	LC	No
<i>Agrimonia procera</i> Wallr.	LC	No
<i>Agrostis eriantha</i> Hack. var. <i>eriantha</i>	LC	No
<i>Agrostis lachnantha</i> Nees var. <i>lachnantha</i>	LC	No
<i>Albuca setosa</i> Jacq.	LC	No
<i>Alectra sessiliflora</i> (Vahl) Kuntze var. <i>sessiliflora</i>	LC	No
<i>Alisma plantago-aquatica</i> L.	Not Evaluated	No
<i>Alloteropsis semialata</i> (R.Br.) Hitchc. subsp. <i>eckloniana</i> (Nees) Gibbs Russ.	LC	No

<i>Aloe arborescens</i> Mill.	LC	No
<i>Aloe cryptopoda</i> Baker	LC	No
<i>Aloe greatheadii</i> Schönland var. <i>davyana</i> (Schönland) Glen & D.S.Hardy	LC	No
<i>Aloe verecunda</i> Pole-Evans	LC	No
<i>Alysicarpus rugosus</i> (Willd.) DC. subsp. <i>perennirufus</i> J.Léonard	LC	No
<i>Amaranthus hybridus</i> L. subsp. <i>hybridus</i> var. <i>hybridus</i>	Not Evaluated	No
<i>Anagallis arvensis</i> L. subsp. <i>arvensis</i>	Not Evaluated	No
<i>Anchusa riparia</i> A.DC.	LC	No
<i>Ancylobotrys capensis</i> (Oliv.) Pichon	LC	No
<i>Andropogon appendiculatus</i> Nees	LC	No
<i>Andropogon chinensis</i> (Nees) Merr.	LC	No
<i>Andropogon eucomus</i> Nees	LC	No
<i>Andropogon huillensis</i> Rendle	LC	No
<i>Anomobryum julaceum</i> (Schrad. ex P.Gaertn., B.Mey. & Schreb.) Schimp.	Not Evaluated	No
<i>Antheophora pubescens</i> Nees	LC	No
<i>Anthospermum hispidulum</i> E.Mey. ex Sond.	LC	No
<i>Anthospermum rigidum</i> Eckl. & Zeyh. subsp. <i>rigidum</i>	LC	No
<i>Apodytes dimidiata</i> E.Mey. ex Arn. subsp. <i>dimidiata</i>	LC	No
<i>Araujia sericifera</i> Brot.	Not Evaluated	No
<i>Argemone mexicana</i> L. forma <i>mexicana</i>	Not Evaluated	No
<i>Argemone ochroleuca</i> Sweet subsp. <i>ochroleuca</i>	Not Evaluated	No
<i>Argyrobium speciosum</i> Eckl. & Zeyh.	LC	No
<i>Argyrobium tuberosum</i> Eckl. & Zeyh.	LC	No
<i>Aristida adscensionis</i> L.	LC	No
<i>Aristida aequiglumis</i> Hack.	LC	No
<i>Aristida bipartita</i> (Nees) Trin. & Rupr.	LC	No
<i>Aristida canescens</i> Henrard subsp. <i>canescens</i>	LC	No
<i>Aristida congesta</i> Roem. & Schult. subsp. <i>barbicollis</i> (Trin. & Rupr.) De Winter	LC	No
<i>Aristida congesta</i> Roem. & Schult. subsp. <i>congesta</i>	LC	No
<i>Aristida diffusa</i> Trin. subsp. <i>burkei</i> (Stapf) Melderis	LC	No
<i>Aristida junciformis</i> Trin. & Rupr. subsp. <i>junciformis</i>	LC	No
<i>Aristida scabrivalvis</i> Hack. subsp. <i>scabrivalvis</i>	LC	No
<i>Aristida stipitata</i> Hack. subsp. <i>gracilliflora</i> (Pilg.) Melderis	LC	No
<i>Aristida transvaalensis</i> Henrard	LC	No
<i>Artemisia afra</i> Jacq. ex Willd. var. <i>afra</i>	LC	No

<i>Arundinella nepalensis</i> Trin.	LC	No
<i>Arundo donax</i> L.	Not Evaluated	No
<i>Asclepias adscendens</i> (Schltr.) Schltr.	LC	No
<i>Asclepias albens</i> (E.Mey.) Schltr.	LC	No
<i>Asclepias aurea</i> (Schltr.) Schltr.	LC	No
<i>Asclepias brevipes</i> (Schltr.) Schltr.	LC	No
<i>Asclepias eminens</i> (Harv.) Schltr.	LC	No
<i>Asclepias fallax</i> (Schltr.) Schltr.	LC	No
<i>Asclepias stellifera</i> Schltr.	LC	No
<i>Asparagus africanus</i> Lam.	LC	No
<i>Asparagus angusticladus</i> (Jessop) J.-P.Lebrun & Stork	LC	No
<i>Asparagus asparagoides</i> (L.) Druce	LC	No
<i>Asparagus cooperi</i> Baker	LC	No
<i>Asparagus flavicaulis</i> (Oberm.) Fellingham & N.L.Mey. subsp. <i>flavicaulis</i>	LC	No
<i>Asparagus laricinus</i> Burch.	LC	No
<i>Asparagus suaveolens</i> Burch.	LC	No
<i>Asparagus virgatus</i> Baker	LC	No
<i>Aspidoglossum lamellatum</i> (Schltr.) Kupicha	LC	No
<i>Aspidoglossum ovalifolium</i> (Schltr.) Kupicha	LC	No
<i>Asplenium aethiopicum</i> (Burm.f.) Bech.	LC	No
<i>Asplenium capense</i> (Kunze) Bir, Fraser-Jenk. & Lovis	LC	No
<i>Aster harveyanus</i> Kuntze	LC	No
<i>Aster peglerae</i> Bolus	LC	No
<i>Aster squamatus</i> (Spreng.) Hieron.	Not Evaluated	No
<i>Asterella marginata</i> (Nees) S.W.Amell	Not Evaluated	No
<i>Astragalus atopilosulus</i> (Hochst.) Bunge subsp. <i>burkeanus</i> (Harv.) J.B.Gillett var. <i>burkeanus</i>	LC	No
<i>Athrixia elata</i> Sond.	LC	No
<i>Avena fatua</i> L.	Not Evaluated	No
<i>Babiana bainesii</i> Baker	LC	No
<i>Barleria macrostegia</i> Nees	LC	No
<i>Barleria obtusa</i> Nees	LC	No
<i>Bergia decumbens</i> Planch. ex Harv.	LC	No
<i>Berkheya insignis</i> (Harv.) Thell.	LC	No
<i>Berkheya radula</i> (Harv.) De Wild.	LC	No

<i>Berkheya seminivea</i> Harv. & Sond.	LC	No
<i>Berkheya setifera</i> DC.	LC	No
<i>Berkheya speciosa</i> (DC.) O.Hoffm. subsp. <i>lanceolata</i> Roessler	LC	No
<i>Berkheya zeyheri</i> Oliv. & Hiern subsp. <i>zeyheri</i>	LC	No
<i>Bewsia biflora</i> (Hack.) Gooss.	LC	No
<i>Bidens bipinnata</i> L.	Not Evaluated	No
<i>Bidens pilosa</i> L.	Not Evaluated	No
<i>Blepharis innocua</i> C.B.Clarke	LC	No
<i>Blepharis squarrosa</i> (Nees) T.Anderson	LC	No
<i>Blepharis stainbankiae</i> C.B.Clarke	LC	No
<i>Bonatea antennifera</i> Rolfe	LC	No
<i>Boophone disticha</i> (L.f.) Herb.	Declining	No
<i>Bothriochloa bladhii</i> (Retz.) S.T.Blake	LC	No
<i>Brachiaria advena</i> Vickery	Not Evaluated	No
<i>Brachiaria brizantha</i> (A.Rich.) Stapf	LC	No
<i>Brachiaria eruciformis</i> (Sm.) Griseb.	LC	No
<i>Brachiaria serrata</i> (Thunb.) Stapf	LC	No
<i>Brachycorythis conica</i> (Summerh.) Summerh. subsp. <i>transvaalensis</i> Summerh.	EN	No
<i>Brachycorythis tenuior</i> Rchb.f.	LC	No
<i>Brachylaena rotundata</i> S.Moore	LC	No
<i>Brachystelma chloranthum</i> (Schltr.) Peckover	LC	No
<i>Brachystelma nanum</i> (Schltr.) N.E.Br.	LC	No
<i>Briza minor</i> L.	Not Evaluated	No
<i>Bryum alpinum</i> Huds. ex With.	Not Evaluated	No
<i>Bryum argenteum</i> Hedw.	Not Evaluated	No
<i>Bryum pycnophyllum</i> (Dixon) Mohamed	Not Evaluated	No
<i>Buchnera simplex</i> (Thunb.) Druce	LC	No
<i>Buddleja saligna</i> Willd.	LC	No
<i>Buddleja salviifolia</i> (L.) Lam.	LC	No
<i>Bulbine capitata</i> Poelln.	LC	No
<i>Bulbine favosa</i> (Thunb.) Schult. & Schult.f	LC	No
<i>Bulbostylis burchellii</i> (Ficalho & Hiern) C.B.Clarke	LC	No
<i>Bulbostylis contexta</i> (Nees) M.Bodard	LC	No
<i>Bulbostylis humilis</i> (Kunth) C.B.Clarke	LC	No
<i>Bulbostylis oritrephes</i> (Ridl.) C.B.Clarke	LC	No

<i>Bulbostylis schoenoides</i> (Kunth) C.B. Clarke	LC	No
<i>Callilepis leptophylla</i> Harv.	Declining	No
<i>Calodendrum capense</i> (L.f.) Thunb.	LC	No
<i>Campuloclinium macrocephalum</i> (Less.) DC.	Not Evaluated	No
<i>Campylopus introflexus</i> (Hedw.) Brid.	Not Evaluated	No
<i>Campylopus pyriformis</i> (F.W.Schultz) Brid.	Not Evaluated	No
<i>Canna indica</i> L.	Not Evaluated	No
<i>Carissa bispinosa</i> (L.) Desf. ex Brenan	LC	No
<i>Cassinopsis ilicifolia</i> (Hochst.) Kuntze	LC	No
<i>Celtis africana</i> Burm.f.	LC	No
<i>Centella asiatica</i> (L.) Urb.	LC	No
<i>Cephalaria zeyheriana</i> Szabó	LC	No
<i>Cerastium arabis</i> E.Mey. ex Fenzl	LC	No
<i>Ceratodon purpureus</i> (Hedw.) Brid. subsp. <i>stenocarpus</i> (Bruch & Schimp. ex Müll.Hal.) Dixon	Not Evaluated	No
<i>Ceropegia rendallii</i> N.E.Br.	LC	No
<i>Cestrum aurantiacum</i> Lindl.	Not Evaluated	No
<i>Chaenostoma leve</i> (Hiern) Kornhall	LC	No
<i>Chaetacanthus costatus</i> Nees	LC	No
<i>Chamaecrista biensis</i> (Steyaert) Lock	LC	No
<i>Chamaecrista capensis</i> (Thunb.) E.Mey. var. <i>flavescens</i> (Thunb.) E.Mey.	LC	No
<i>Chamaecrista comosa</i> E.Mey. var. <i>capricornia</i> (Steyaert) Lock	LC	No
<i>Chamaecrista mimosoides</i> (L.) Greene	LC	No
<i>Cheilanthes contracta</i> (Kunze) Mett. ex Kuhn	LC	No
<i>Cheilanthes dolomiticola</i> (Schelpe) Schelpe & N.C.Anthony	LC	No
<i>Cheilanthes eckloniana</i> (Kunze) Mett.	LC	No
<i>Cheilanthes hirta</i> Sw. var. <i>brevipilosa</i> W. & N.Jacobsen	LC	No
<i>Cheilanthes hirta</i> Sw. var. <i>hirta</i>	LC	No
<i>Cheilanthes involuta</i> (Sw.) Schelpe & N.C.Anthony var. <i>involuta</i>	LC	No
<i>Cheilanthes involuta</i> (Sw.) Schelpe & N.C.Anthony var. <i>obscura</i> (N.C.Anthony) N.C.Anthony	LC	No
<i>Cheilanthes multifida</i> (Sw.) Sw. subsp. <i>lacerata</i> N.C.Anthony & Schelpe	LC	No
<i>Cheilanthes multifida</i> (Sw.) Sw. var. <i>multifida</i>	Not Evaluated	No
<i>Cheilanthes viridis</i> (Forssk.) Sw. var. <i>glauca</i> (Sim) Schelpe & N.C.Anthony	LC	No
<i>Cheilanthes viridis</i> (Forssk.) Sw. var. <i>viridis</i>	LC	No
<i>Chenopodium album</i> L.	Not Evaluated	No

<i>Chenopodium mucronatum</i> Thunb.	LC	No
<i>Chenopodium pumilio</i> R.Br.	Not Evaluated	No
<i>Chironia palustris</i> Burch. subsp. <i>transvaalensis</i> (Gilg) I.Verd.	LC	No
<i>Chironia purpurascens</i> (E.Mey.) Benth. & Hook.f. subsp. <i>humilis</i> (Gilg) I.Verd.	LC	No
<i>Chironia purpurascens</i> (E.Mey.) Benth. & Hook.f. subsp. <i>purpurascens</i>	LC	No
<i>Chloris pycnothrix</i> Trin.	LC	No
<i>Chloris virgata</i> Sw.	LC	No
<i>Chlorophytum bowkeri</i> Baker	LC	No
<i>Chlorophytum cooperi</i> (Baker) Nordal	LC	No
<i>Chlorophytum fasciculatum</i> (Baker) Kativu	LC	No
<i>Chlorophytum transvaalense</i> (Baker) Kativu	LC	No
<i>Chortolirion angolense</i> (Baker) A.Berger	LC	No
<i>Christella gueinziana</i> (Mett.) Holttum	LC	No
<i>Cichorium intybus</i> L. subsp. <i>intybus</i>	Not Evaluated	No
<i>Cineraria albicans</i> N.E.Br.	LC	No
<i>Cineraria austrotransvaalensis</i> Cron	NT	No
<i>Cineraria lobata</i> L'Hér. subsp. <i>lobata</i>	LC	No
<i>Cirsium vulgare</i> (Savi) Ten.	Not Evaluated	No
<i>Clematis brachiata</i> Thunb.	LC	No
<i>Cleome maculata</i> (Sond.) Szyszyl.	LC	No
<i>Cleome monophylla</i> L.	LC	No
<i>Cliffortia linearifolia</i> Eckl. & Zeyh.	LC	No
<i>Cliffortia nitidula</i> (Engl.) R.E.& T.C.E.Fr. subsp. <i>pilosa</i> Weim.	Not Evaluated	No
<i>Clutia natalensis</i> Bernh.	LC	No
<i>Clutia pulchella</i> L. var. <i>pulchella</i>	LC	No
<i>Coccinia adoensis</i> (A.Rich.) Cogn.	LC	No
<i>Combretum apiculatum</i> Sond. subsp. <i>apiculatum</i>	LC	No
<i>Combretum erythrophyllum</i> (Burch.) Sond.	LC	No
<i>Commelina africana</i> L. var. <i>africana</i>	LC	No
<i>Commelina africana</i> L. var. <i>krebsiana</i> (Kunth) C.B.Clarke	LC	No
<i>Commelina africana</i> L. var. <i>lancispatha</i> C.B.Clarke	LC	No
<i>Commelina benghalensis</i> L.	LC	No
<i>Commelina subulata</i> Roth	LC	No
<i>Convolvulus farinosus</i> L.	LC	No
<i>Convolvulus ocellatus</i> Hook.f. var. <i>ocellatus</i>	LC	No

<i>Convolvulus sagittatus</i> Thunb.	LC	No
<i>Convolvulus thunbergii</i> Roem. & Schult.	LC	No
<i>Conyza podocephala</i> DC.	LC	No
<i>Conyza scabrida</i> DC.	LC	No
<i>Cortaderia selloana</i> (Schult.) Asch. & Graebn.	Not Evaluated	No
<i>Cosmos bipinnatus</i> Cav.	Not Evaluated	No
<i>Cotoneaster franchetii</i> Boiss.	Not Evaluated	No
<i>Cotula hispida</i> (DC.) Harv.	LC	No
<i>Cotyledon orbiculata</i> L. var. <i>oblonga</i> (Haw.) DC.	LC	No
<i>Crassocephalum x picridifolium</i> (DC.) S.Moore	Not Evaluated	No
<i>Crassula alba</i> Forssk. var. <i>alba</i>	LC	No
<i>Crassula expansa</i> Dryand. subsp. <i>expansa</i>	LC	No
<i>Crassula setulosa</i> Harv. var. <i>jenkinsii</i> Schönland	LC	No
<i>Crassula setulosa</i> Harv. var. <i>setulosa forma setulosa</i>	Not Evaluated	No
<i>Crassula vaginata</i> Eckl. & Zeyh. subsp. <i>vaginata</i>	LC	No
<i>Crotalaria sphaerocarpa</i> Perr. ex DC. subsp. <i>sphaerocarpa</i>	LC	No
<i>Cryptolepis oblongifolia</i> (Meisn.) Schltr.	LC	No
<i>Cucumis hirsutus</i> Sond.	LC	No
<i>Cucumis zeyheri</i> Sond.	LC	No
<i>Cuscuta campestris</i> Yunck.	Not Evaluated	No
<i>Cussonia paniculata</i> Eckl. & Zeyh. subsp. <i>paniculata</i>	LC	No
<i>Cussonia paniculata</i> Eckl. & Zeyh. subsp. <i>sinuata</i> (Reyneke & Kok) De Winter	LC	No
<i>Cyanotis speciosa</i> (L.f.) Hassk.	LC	No
<i>Cyathula uncinata</i> (Schrad.) Schinz	LC	No
<i>Cyclodictyon vallis-gratiae</i> (Hampe ex Müll.Hal.) Kuntze	Not Evaluated	No
<i>Cyclopernum leptophyllum</i> (Pers.) Sprague ex Britton & P.Wilson	Not Evaluated	No
<i>Cynium tubulosum</i> (L.f.) Engl. subsp. <i>tubulosum</i>	LC	No
<i>Cymbopogon dieterlenii</i> Stapf ex E.Phillips	LC	No
<i>Cymbopogon nardus</i> (L.) Rendle	LC	No
<i>Cymbopogon prolixus</i> (Stapf) E.Phillips	LC	No
<i>Cynodon dactylon</i> (L.) Pers.	LC	No
<i>Cynodon hirsutus</i> Stent	LC	No
<i>Cynodon transvaalensis</i> Burt Davy	LC	No
<i>Cynoglossum lanceolatum</i> Forssk.	LC	No
<i>Cyperus albostrigatus</i> Schrad.	LC	No

<i>Cyperus congestus</i> Vahl	LC	No
<i>Cyperus eragrostis</i> Lam.	Not Evaluated	No
<i>Cyperus esculentus</i> L. var. <i>esculentus</i>	LC	No
<i>Cyperus leptocladus</i> Kunth	LC	No
<i>Cyperus longus</i> L. var. <i>tenuiflorus</i> (Rottb.) Boeck.	LC	No
<i>Cyperus margaritaceus</i> Vahl var. <i>margaritaceus</i>	LC	No
<i>Cyperus marginatus</i> Thunb.	LC	No
<i>Cyperus obtusiflorus</i> Vahl var. <i>flavissimus</i> (Schrad.) Boeck.	LC	No
<i>Cyperus obtusiflorus</i> Vahl var. <i>obtusiflorus</i>	LC	No
<i>Cyperus rupestris</i> Kunth var. <i>rupestris</i>	LC	No
<i>Cyperus semitrifidus</i> Schrad.	LC	No
<i>Cyperus sexangularis</i> Nees	LC	No
<i>Cyperus sphaerospermus</i> Schrad.	LC	No
<i>Cyperus uitenhagensis</i> (Steud.) C.Archer & Goetgh.	LC	No
<i>Cyphia stenopetala</i> Diels	LC	No
<i>Cyphostemma lanigerum</i> (Harv.) Desc. ex Wild & R.B.Drumm.	LC	No
<i>Dalechampia capensis</i> A.Spreng.	LC	No
<i>Datura ferox</i> L.	Not Evaluated	No
<i>Datura stramonium</i> L.	Not Evaluated	No
<i>Desmodium repandum</i> (Vahl) DC.	LC	No
<i>Dianthus mooiensis</i> F.N.Williams subsp. <i>kirkii</i> (Burt Davy) S.S.Hooper	Not Evaluated	No
<i>Dianthus mooiensis</i> F.N.Williams subsp. <i>mooiensis</i> var. <i>mooiensis</i>	Not Evaluated	No
<i>Dichilus lebeckioides</i> DC.	LC	No
<i>Dichilus pilosus</i> Conrath ex Schinz	LC	No
<i>Dichilus strictus</i> E.Mey.	LC	No
<i>Diclis rotundifolia</i> (Hiern) Hilliard & B.L.Burt	LC	No
<i>Dicoma anomala</i> Sond. subsp. <i>gerrardii</i> (Harv. ex F.C.Wilson) S.Ortiz & Rodr.Oubiña	LC	No
<i>Didymodon tophaceus</i> (Brid.) Lisa	Not Evaluated	No
<i>Didymodoxa caffra</i> (Thunb.) Friis & Wilmot-Dear	LC	No
<i>Digitaria diagonalis</i> (Nees) Stapf var. <i>diagonalis</i>	LC	No
<i>Digitaria eriantha</i> Steud.	LC	No
<i>Digitaria eylesii</i> C.E.Hubb.	LC	No
<i>Digitaria monodactyla</i> (Nees) Stapf	LC	No
<i>Digitaria ternata</i> (A.Rich.) Stapf	LC	No

<i>Digitaria velutina</i> (Forssk.) P.Beauv.	LC	No
<i>Diheteropogon amplexans</i> (Nees) Clayton var. <i>amplexans</i>	LC	No
<i>Dimorphotheca spectabilis</i> Schltr.	LC	No
<i>Dioscorea retusa</i> Mast.	LC	No
<i>Diospyros lycioides</i> Desf. subsp. <i>guerkei</i> (Kuntze) De Winter	LC	No
<i>Diospyros lycioides</i> Desf. subsp. <i>lycioides</i>	LC	No
<i>Diospyros whyteana</i> (Hiern) F.White	LC	No
<i>Disa patula</i> Sond. var. <i>transvaalensis</i> Summerh.	LC	No
<i>Disperis anthoceros</i> Rchb.f. var. <i>anthoceros</i>	LC	No
<i>Disperis micrantha</i> Lindl.	LC	No
<i>Ditrichum brachypodium</i> (Müll.Hal.) Broth.	Not Evaluated	No
<i>Dolichos angustifolius</i> Eckl. & Zeyh.	LC	No
<i>Dombeya rotundifolia</i> (Hochst.) Planch. var. <i>rotundifolia</i>	LC	No
<i>Dovyalis zeyheri</i> (Sond.) Warb.	LC	No
<i>Dracoscirpoides surculosa</i> Muasya, Reynders & Goetgh.	LC	No
<i>Drimia calcarata</i> (Baker) Stedje	LC	No
<i>Drimia depressa</i> (Baker) Jessop	LC	No
<i>Drimia intricata</i> (Baker) J.C.Manning & Goldblatt	LC	No
<i>Drimia multisetosa</i> (Baker) Jessop	LC	No
<i>Drimiopsis burkei</i> Baker subsp. <i>burkei</i>	LC	No
<i>Drosera collinsiae</i> N.E.Br. ex Burt Davy	LC	No
<i>Dryopteris athamantica</i> (Kunze) Kuntze	LC	No
<i>Echinochloa crus-galli</i> (L.) P.Beauv.	LC	No
<i>Echinochloa haploclada</i> (Stapf) Stapf	LC	No
<i>Ehretia rigida</i> (Thunb.) Druce subsp. <i>nervifolia</i> Retief & A.E.van Wyk	LC	No
<i>Ehrharta erecta</i> Lam. var. <i>erecta</i>	LC	No
<i>Eleocharis dregeana</i> Steud.	LC	No
<i>Elephantorrhiza burkei</i> Benth.	LC	No
<i>Elephantorrhiza elephantina</i> (Burch.) Skeels	LC	No
<i>Eleusine coracana</i> (L.) Gaertn. subsp. <i>africana</i> (Kenn.-O'Byrne) Hilu & de Wet	LC	No
<i>Elionurus muticus</i> (Spreng.) Kunth	LC	No
<i>Englerophytum magalimontanum</i> (Sond.) T.D.Penn.	LC	No
<i>Enneapogon pretoriensis</i> Stent	LC	No
<i>Enneapogon scoparius</i> Stapf	LC	No
<i>Epilobium salignum</i> Hausskn.	LC	No

<i>Eragrostis aspera</i> (Jacq.) Nees	LC	No
<i>Eragrostis capensis</i> (Thunb.) Trin.	LC	No
<i>Eragrostis chloromelas</i> Steud.	LC	No
<i>Eragrostis cilianensis</i> (All.) Vignolo ex Janch.	LC	No
<i>Eragrostis curvula</i> (Schrad.) Nees	LC	No
<i>Eragrostis gummiflua</i> Nees	LC	No
<i>Eragrostis heteromera</i> Stapf	LC	No
<i>Eragrostis lehmanniana</i> Nees var. <i>lehmanniana</i>	LC	No
<i>Eragrostis mexicana</i> (Hornem.) Link subsp. <i>virescens</i> (J.Presl.) S.D.Koch & Sánchez Vega	Not Evaluated	No
<i>Eragrostis patentipilosa</i> Hack.	LC	No
<i>Eragrostis plana</i> Nees	LC	No
<i>Eragrostis planiculmis</i> Nees	LC	No
<i>Eragrostis racemosa</i> (Thunb.) Steud.	LC	No
<i>Eragrostis sclerantha</i> Nees subsp. <i>sclerantha</i>	LC	No
<i>Eragrostis superba</i> Peyr.	LC	No
<i>Eragrostis tef</i> (Zuccagni) Trotter	Not Evaluated	No
<i>Erica alopecurus</i> Harv. var. <i>glabriflora</i> Bolus	LC	No
<i>Eriosema burkei</i> Benth. ex Harv. var. <i>burkei</i>	LC	No
<i>Eriosema cordatum</i> E.Mey.	LC	No
<i>Eriosema nutans</i> Schinz	LC	No
<i>Eriosema salignum</i> E.Mey.	LC	No
<i>Eriosema transvaalense</i> C.H.Stirt.	LC	No
<i>Eriospermum cooperi</i> Baker var. <i>cooperi</i>	LC	No
<i>Eriospermum flagelliforme</i> (Baker) J.C.Manning	LC	No
<i>Eriospermum porphyrium</i> Archibald	LC	No
<i>Eruca sativa</i> Mill.	Not Evaluated	No
<i>Erythrina lysistemon</i> Hutch.	LC	No
<i>Euclea crispa</i> (Thunb.) Gürke subsp. <i>crispa</i>	LC	No
<i>Euclea undulata</i> Thunb.	LC	No
<i>Eucomis autumnalis</i> (Mill.) Chitt. subsp. <i>clavata</i> (Baker) Reyneke	Not Evaluated	No
<i>Eucomis pallidiflora</i> Baker subsp. <i>pallidiflora</i>	LC	No
<i>Eulophia calanthoides</i> Schltr.	LC	No
<i>Eulophia hians</i> Spreng. var. <i>hians</i>	LC	No
<i>Eulophia hians</i> Spreng. var. <i>inaequalis</i> (Schltr.) S.Thomas	LC	No

<i>Eulophia leontoglossa</i> Rchb.f.	LC	No
<i>Eulophia ovalis</i> Lindl. var. <i>bainesii</i> (Rolfe) P.J.Cribb & la Croix	LC	No
<i>Eulophia tuberculata</i> Bolus	LC	No
<i>Eulophia welwitschii</i> (Rchb.f.) Rolfe	LC	No
<i>Euphorbia epicyparissias</i> E.Mey. ex Boiss.	LC	No
<i>Euphorbia hirta</i> L.	Not Evaluated	No
<i>Euphorbia inaequilatera</i> Sond. var. <i>inaequilatera</i>	LC	No
<i>Euphorbia pseudotuberosa</i> Pax	LC	No
<i>Euphorbia pubescens</i> Vahl	LC	No
<i>Euphorbia rhombifolia</i> Boiss.	LC	No
<i>Euphorbia striata</i> Thunb. var. <i>striata</i>	LC	No
<i>Euryops laxis</i> (Harv.) Burt Davy	LC	No
<i>Eustachys paspaloides</i> (Vahl) Lanza & Mattei	LC	No
<i>Evolvulus alsinoides</i> (L.) L.	LC	No
<i>Fallopia convolvulus</i> (L.) Holub	Not Evaluated	No
<i>Felicia fruticosa</i> (L.) G.Nicholson subsp. <i>brevipedunculata</i> (Hutch.) Grau	LC	No
<i>Felicia muricata</i> (Thunb.) Nees subsp. <i>muricata</i>	LC	No
<i>Ficinia stolonifera</i> Boeckeler	LC	No
<i>Ficus abutilifolia</i> (Miq.) Miq.	LC	No
<i>Ficus cordata</i> Thunb. subsp. <i>cordata</i>	LC	No
<i>Ficus ingens</i> (Miq.) Miq.	LC	No
<i>Ficus salicifolia</i> Vahl	LC	No
<i>Fimbristylis complanata</i> (Retz.) Link	LC	No
<i>Fissidens bryoides</i> Hedw.	Not Evaluated	No
<i>Foeniculum vulgare</i> Mill. var. <i>vulgare</i>	Not Evaluated	No
<i>Fuirena pubescens</i> (Poir.) Kunth var. <i>pubescens</i>	LC	No
<i>Fuirena stricta</i> Steud. var. <i>stricta</i>	LC	No
<i>Fumaria muralis</i> Sond. ex W.D.J.Koch subsp. <i>muralis</i>	Not Evaluated	No
<i>Galinsoga parviflora</i> Cav.	Not Evaluated	No
<i>Galium spurium</i> L. subsp. <i>africanum</i> Verdc.	LC	No
<i>Gazania krebsiana</i> Less. subsp. <i>serrulata</i> (DC.) Roessler	LC	No
<i>Geigeria burkei</i> Harv. subsp. <i>burkei</i> var. <i>intermedia</i> (S.Moore) Merxm.	LC	No
<i>Geigeria burkei</i> Harv. subsp. <i>burkei</i> var. <i>zeyheri</i> (Harv.) Merxm.	LC	No
<i>Gerbera ambigua</i> (Cass.) Sch.Bip.	LC	No
<i>Gerbera piloselloides</i> (L.) Cass.	LC	No

<i>Gladiolus antholyzoides</i> Baker	LC	No
<i>Gladiolus crassifolius</i> Baker	LC	No
<i>Gladiolus dalenii</i> Van Geel subsp. <i>dalenii</i>	LC	No
<i>Gladiolus longicollis</i> Baker subsp. <i>platypetalus</i> (Baker) Goldblatt & J.C.Manning	LC	No
<i>Gladiolus papilio</i> Hook.f.	LC	No
<i>Gladiolus permeabilis</i> D.Delaroche subsp. <i>edulis</i> (Burch. ex Ker Gawl.) Oberm.	LC	No
<i>Gladiolus woodii</i> Baker	LC	No
<i>Gnidia caffra</i> (Meisn.) Gilg	LC	No
<i>Gnidia canoargentea</i> (C.H.Wright) Gilg	LC	No
<i>Gnidia gymnostachya</i> (C.A.Mey.) Gilg	LC	No
<i>Gnidia kraussiana</i> Meisn. var. <i>kraussiana</i>	LC	No
<i>Gnidia microcephala</i> Meisn.	LC	No
<i>Gomphocarpus fruticosus</i> (L.) Aiton f. subsp. <i>decepiens</i> (N.E.Br.) Goyder & Nicholas	LC	No
<i>Gomphocarpus fruticosus</i> (L.) Aiton f. subsp. <i>fruticosus</i>	LC	No
<i>Gomphrena celosioides</i> Mart.	Not Evaluated	No
<i>Graderia subintegra</i> Mast.	LC	No
<i>Grewia occidentalis</i> L. var. <i>occidentalis</i>	LC	No
<i>Gulleminea densa</i> (Willd. ex Roem. & Schult.) Moq.	Not Evaluated	No
<i>Gymnosporia buxifolia</i> (L.) Szyszyl.	LC	No
<i>Gymnosporia polyacanthus</i> (Sond.) Szyszyl. subsp. <i>vaccinifolia</i> (P.Conrath) M.Jordaan	LC	No
<i>Habenaria barbertoni</i> Kraenzl. & Schltr.	NT	No
<i>Haemanthus humilis</i> Jacq. subsp. <i>hirsutus</i> (Baker) Snijman	LC	No
<i>Halleria lucida</i> L.	LC	No
<i>Haplocarpha scaposa</i> Harv.	LC	No
<i>Harpochloa falx</i> (L.f.) Kuntze	LC	No
<i>Harveya pumila</i> Schltr.	LC	No
<i>Hedychium gardnerianum</i> Ker Gawl.	Not Evaluated	No
<i>Helichrysum acutatum</i> DC.	LC	No
<i>Helichrysum athrixiifolium</i> (Kuntze) Moeser	LC	No
<i>Helichrysum aureonitens</i> Sch.Bip.	LC	No
<i>Helichrysum aureum</i> (Houtt.) Merr. var. <i>monocephalum</i> (DC.) Hilliard	LC	No
<i>Helichrysum caespitium</i> (DC.) Harv.	LC	No
<i>Helichrysum callicomum</i> Harv.	LC	No
<i>Helichrysum cephaloideum</i> DC.	LC	No

<i>Helichrysum cerastioides</i> DC. var. <i>cerastioides</i>	LC	No
<i>Helichrysum chionosphaerum</i> DC.	LC	No
<i>Helichrysum difficile</i> Hilliard	LC	No
<i>Helichrysum lepidissimum</i> S.Moore	LC	No
<i>Helichrysum mundtii</i> Harv.	LC	No
<i>Helichrysum nudifolium</i> (L.) Less. var. <i>nudifolium</i>	LC	No
<i>Helichrysum nudifolium</i> (L.) Less. var. <i>oxyphyllum</i> (DC.) Beentje	LC	No
<i>Helichrysum oreophilum</i> Klatt	LC	No
<i>Helichrysum paronychioides</i> DC.	LC	No
<i>Helichrysum polycladum</i> Klatt	LC	No
<i>Helichrysum rugulosum</i> Less.	LC	No
<i>Helichrysum setosum</i> Harv.	LC	No
<i>Helichrysum stenopterum</i> DC.	LC	No
<i>Helictotrichon turgidulum</i> (Stapf) Schweick.	LC	No
<i>Helinus integrifolius</i> (Lam.) Kuntze	LC	No
<i>Heliophila rigidiuscula</i> Sond.	LC	No
<i>Heliotropium nelsonii</i> C.H.Wright	LC	No
<i>Hemarthria altissima</i> (Poir.) Stapf & C.E.Hubb.	LC	No
<i>Hermannia cordata</i> (E.Mey. ex E.Phillips) De Winter	LC	No
<i>Hermannia depressa</i> N.E.Br.	LC	No
<i>Hermannia floribunda</i> Harv.	LC	No
<i>Hermannia lancifolia</i> Szyszyl.	LC	No
<i>Hermannia umbratica</i> I.Verd.	LC	No
<i>Hesperantha candida</i> Baker	LC	No
<i>Hesperantha coccinea</i> (Backh. & Harv.) Goldblatt & J.C.Manning	LC	No
<i>Hesperantha leucantha</i> Baker	LC	No
<i>Heteromorpha arborescens</i> (Spreng.) Cham. & Schldl. var. <i>abyssinica</i> (Hochst. ex A.Rich.) H.Wolff	LC	No
<i>Heteropogon contortus</i> (L.) Roem. & Schult.	LC	No
<i>Hibiscus aethiopicus</i> L. var. <i>ovatus</i> Harv.	LC	No
<i>Hibiscus engleri</i> K.Schum.	LC	No
<i>Hibiscus lunarifolius</i> Willd.	LC	No
<i>Hibiscus microcarpus</i> Garcke	LC	No
<i>Hibiscus subreniformis</i> Burt Davy	LC	No
<i>Hibiscus trionum</i> L.	Not Evaluated	No

<i>Hilliardiella aristata</i> (DC.) H.Rob.	LC	No
<i>Hilliardiella hirsuta</i> (DC.) H.Rob.	LC	No
<i>Hydrocotyle verticillata</i> Thunb.	LC	No
<i>Hyparrhenia anamesa</i> Clayton	LC	No
<i>Hyparrhenia dregeana</i> (Nees) Stapf ex Stent	LC	No
<i>Hyparrhenia filipendula</i> (Hochst.) Stapf var. <i>pilosa</i> (Hochst.) Stapf	LC	No
<i>Hyparrhenia hirta</i> (L.) Stapf	LC	No
<i>Hyparrhenia tamba</i> (Steud.) Stapf	LC	No
<i>Hypericum aethiopicum</i> Thunb. subsp. <i>sonderi</i> (Bredell) N.Robson	LC	No
<i>Hypericum lalandii</i> Choisy	LC	No
<i>Hypericum revolutum</i> Vahl subsp. <i>revolutum</i>	LC	No
<i>Hypochaeris microcephala</i> (Sch.Bip.) Cabrera var. <i>albiflora</i> (Kuntze) Cabrera	Not Evaluated	No
<i>Hypochaeris radicata</i> L.	Not Evaluated	No
<i>Hypoestes forskoolii</i> (Vahl) R.Br.	LC	No
<i>Hypoxis acuminata</i> Baker	LC	No
<i>Hypoxis argentea</i> Harv. ex Baker var. <i>argentea</i>	LC	No
<i>Hypoxis filiformis</i> Baker	LC	No
<i>Hypoxis galpinii</i> Baker	LC	No
<i>Hypoxis hemerocallidea</i> Fisch., C.A.Mey. & Avé-Lall.	Declining	No
<i>Hypoxis interjecta</i> Nel	LC	No
<i>Hypoxis iridifolia</i> Baker	LC	No
<i>Hypoxis rigidula</i> Baker var. <i>pilosissima</i> Baker	LC	No
<i>Hypoxis rigidula</i> Baker var. <i>rigidula</i>	LC	No
<i>Ilex mitis</i> (L.) Radlk. var. <i>mitis</i>	Declining	No
<i>Imperata cylindrica</i> (L.) Raeusch.	LC	No
<i>Indigastrium burkeanum</i> (Benth. ex Harv.) Schrire	LC	No
<i>Indigofera comosa</i> N.E.Br.	LC	No
<i>Indigofera confusa</i> Prain & Baker f.	LC	No
<i>Indigofera cryptantha</i> Benth. ex Harv. var. <i>cryptantha</i>	LC	No
<i>Indigofera dimidiata</i> Vogel ex Walp.	LC	No
<i>Indigofera frondosa</i> N.E.Br.	LC	No
<i>Indigofera hedyantha</i> Eckl. & Zeyh.	LC	No
<i>Indigofera hilaris</i> Eckl. & Zeyh. var. <i>hilaris</i>	LC	No
<i>Indigofera melanadenia</i> Benth. ex Harv.	LC	No
<i>Indigofera oxalidea</i> Welw. ex Baker	LC	No

<i>Indigofera oxytropis</i> Benth. ex Harv.	LC	No
<i>Indigofera zeyheri</i> Spreng. ex Eckl. & Zeyh.	LC	No
<i>Ipomoea alba</i> L.	Not Evaluated	No
<i>Ipomoea bathycolpos</i> Hallier f.	LC	No
<i>Ipomoea crassipes</i> Hook. var. <i>crassipes</i>	LC	No
<i>Ipomoea indica</i> (Burm.f.) Merr.	Not Evaluated	No
<i>Ipomoea obscura</i> (L.) Ker Gawl. var. <i>obscura</i>	LC	No
<i>Ipomoea ommanneyi</i> Rendle	LC	No
<i>Ipomoea purpurea</i> (L.) Roth	Not Evaluated	No
<i>Ipomoea simplex</i> Thunb.	LC	No
<i>Ischaemum fasciculatum</i> Brongn.	LC	No
<i>Isolepis costata</i> Hochst. ex A.Rich.	LC	No
<i>Jamesbrittenia aurantiaca</i> (Burch.) Hilliard	LC	No
<i>Jamesbrittenia burkeana</i> (Benth.) Hilliard	LC	No
<i>Juncus dregeanus</i> Kunth subsp. <i>dregeanus</i>	LC	No
<i>Juncus effusus</i> L.	LC	No
<i>Juncus exsertus</i> Buchenau	LC	No
<i>Juncus lomatophyllus</i> Spreng.	LC	No
<i>Juncus oxycarpus</i> E.Mey. ex Kunth	LC	No
<i>Kalanchoe paniculata</i> Harv.	LC	No
<i>Kalanchoe rotundifolia</i> (Haw.) Haw.	LC	No
<i>Kalanchoe thyrsoflora</i> Harv.	LC	No
<i>Khadia acutipetala</i> (N.E.Br.) N.E.Br.	LC	No
<i>Kiggelaria africana</i> L.	LC	No
<i>Kniphofia porphyrantha</i> Baker	LC	No
<i>Koeleria capensis</i> (Steud.) Nees	LC	No
<i>Kohautia amatymbica</i> Eckl. & Zeyh.	LC	No
<i>Kohautia caespitosa</i> Schnizl. subsp. <i>brachyloba</i> (Sond.) D.Mantell	LC	No
<i>Kohautia virgata</i> (Willd.) Bremek.	LC	No
<i>Kyllinga alata</i> Nees	LC	No
<i>Kyllinga erecta</i> Schumach. var. <i>erecta</i>	LC	No
<i>Kyllinga melanosperma</i> Nees	LC	No
<i>Lablab purpureus</i> (L.) Sweet subsp. <i>uncinatus</i> Verdc.	LC	No
<i>Lactuca inermis</i> Forssk.	LC	No
<i>Lagarosiphon muscoides</i> Harv.	LC	No

<i>Laggera crispata</i> (Vahl) Hepper & J.R.I.Wood	LC	No
<i>Lannea edulis</i> (Sond.) Engl. var. <i>edulis</i>	LC	No
<i>Lantana camara</i> L.	Not Evaluated	No
<i>Lantana rugosa</i> Thunb.	LC	No
<i>Laurembergia repens</i> (L.) P.J.Bergius subsp. <i>brachypoda</i> (Welw. ex Hiern) Oberm.	LC	No
<i>Lavatera arborea</i> L.	Not Evaluated	No
<i>Ledebouria burkei</i> (Baker) J.C.Manning & Goldblatt	LC	No
<i>Ledebouria cooperi</i> (Hook.f.) Jessop	LC	No
<i>Ledebouria luteola</i> Jessop	LC	No
<i>Ledebouria marginata</i> (Baker) Jessop	LC	No
<i>Ledebouria revoluta</i> (L.f.) Jessop	LC	No
<i>Leersia hexandra</i> Sw.	LC	No
<i>Leobordea eriantha</i> (Benth.) B.-E.van Wyk & Boatwr.	LC	No
<i>Leonotis nepetifolia</i> (L.) R.Br.	LC	No
<i>Leonotis ocymifolia</i> (Burm.f.) Iwarsson	LC	No
<i>Lepidium africanum</i> (Burm.f.) DC. subsp. <i>africanum</i>	LC	No
<i>Lepidium bonariense</i> L.	Not Evaluated	No
<i>Lepisorus schraderi</i> (Mett.) Ching	LC	No
<i>Leucaena leucocephala</i> (Lam.) de Wit subsp. <i>leucocephala</i>	Not Evaluated	No
<i>Leucas martinicensis</i> (Jacq.) R.Br.	LC	No
<i>Leucosidea sericea</i> Eckl. & Zeyh.	LC	No
<i>Linum thunbergii</i> Eckl. & Zeyh.	LC	No
<i>Lippia javanica</i> (Burm.f.) Spreng.	LC	No
<i>Lithospermum cinereum</i> A.DC.	LC	No
<i>Lobelia erinus</i> L.	LC	No
<i>Lolium multiflorum</i> Lam.	Not Evaluated	No
<i>Lolium perenne</i> L.	Not Evaluated	No
<i>Lophacme digitata</i> Stapf	LC	No
<i>Lopholaena coriifolia</i> (Sond.) E.Phillips & C.A.Sm.	LC	No
<i>Lotononis laxa</i> Eckl. & Zeyh.	LC	No
<i>Lotus discolor</i> E.Mey. subsp. <i>discolor</i>	LC	No
<i>Loudetia simplex</i> (Nees) C.E.Hubb.	LC	No
<i>Lunularia cruciata</i> (L.) Dumort. ex Lindb.	Not Evaluated	No
<i>Macledium zeyheri</i> (Sond.) S.Ortiz subsp. <i>zeyheri</i>	LC	No
<i>Maerua cafra</i> (DC.) Pax	LC	No

<i>Manulea paniculata</i> Benth.	LC	No
<i>Manulea parviflora</i> Benth. var. <i>parviflora</i>	LC	No
<i>Maytenus undata</i> (Thunb.) Blakelock	LC	No
<i>Melasma scabrum</i> P.J.Bergius var. <i>scabrum</i>	LC	No
<i>Melianthus comosus</i> Vahl	LC	No
<i>Melilotus albus</i> Medik.	Not Evaluated	No
<i>Melilotus indicus</i> (L.) All.	Not Evaluated	No
<i>Melinis nerviglumis</i> (Franch.) Zizka	LC	No
<i>Melinis repens</i> (Willd.) Zizka subsp. <i>repens</i>	LC	No
<i>Melolobium subspicatum</i> Conrath	VU	No
<i>Menodora africana</i> Hook.	LC	No
<i>Mentha aquatica</i> L.	LC	No
<i>Microchloa caffra</i> Nees	LC	No
<i>Mimulus gracilis</i> R.Br.	LC	No
<i>Mirabilis jalapa</i> L.	Not Evaluated	No
<i>Miscanthus junceus</i> (Stapf) Pilg.	LC	No
<i>Mohria vestita</i> Baker	LC	No
<i>Mollugo cerviana</i> (L.) Ser. ex DC. var. <i>cerviana</i>	LC	No
<i>Monocymbium cerasiiforme</i> (Nees) Stapf	LC	No
<i>Monopsis decipiens</i> (Sond.) Thulin	LC	No
<i>Monsonia angustifolia</i> E.Mey. ex A.Rich.	LC	No
<i>Monsonia attenuata</i> Harv.	LC	No
<i>Moraea pallida</i> (Baker) Goldblatt	LC	No
<i>Moraea stricta</i> Baker	LC	No
<i>Morella serrata</i> (Lam.) Killick	LC	No
<i>Mundulea sericea</i> (Willd.) A.Chev. subsp. <i>sericea</i>	LC	No
<i>Myriophyllum aquaticum</i> (Vell.) Verdc.	Not Evaluated	No
<i>Nasturtium officinale</i> R.Br.	Not Evaluated	No
<i>Nemesia fruticans</i> (Thunb.) Benth.	LC	No
<i>Nemesia rupicola</i> Hilliard	LC	No
<i>Nephrolepis exaltata</i> (L.) Schott	Not Evaluated	No
<i>Nerine angustifolia</i> (Baker) Baker	LC	No
<i>Nerium oleander</i> L.	Not Evaluated	No
<i>Nesaea sagittifolia</i> (Sond.) Koehne var. <i>sagittifolia</i>	LC	No
<i>Nesaea schinzii</i> Koehne	LC	No

<i>Nidorella anomala</i> Steetz	LC	No
<i>Nidorella hottentotica</i> DC.	LC	No
<i>Nolletia rarifolia</i> (Turcz.) Steetz	LC	No
<i>Nuxia congesta</i> R.Br. ex Fresen.	LC	No
<i>Nuxia glomerulata</i> (C.A.Sm.) I. Verd.	LC	No
<i>Ocimum obovatum</i> E.Mey. ex Benth. subsp. <i>obovatum</i> var. <i>obovatum</i>	LC	No
<i>Oenothera jamesii</i> Torr. & A.Gray	Not Evaluated	No
<i>Oenothera rosea</i> L'Hér. ex Aiton	Not Evaluated	No
<i>Oenothera stricta</i> Ledeb. ex Link subsp. <i>stricta</i>	Not Evaluated	No
<i>Oldenlandia herbacea</i> (L.) Roxb. var. <i>herbacea</i>	LC	No
<i>Oldenlandia rupicola</i> (Sond.) Kuntze var. <i>rupicola</i>	LC	No
<i>Oldenlandia tenella</i> (Hochst.) Kuntze	LC	No
<i>Olea europaea</i> L. subsp. <i>africana</i> (Mill.) P.S.Green	LC	No
<i>Olinia emarginata</i> Burt Davy	LC	No
<i>Orbea lutea</i> (N.E.Br.) Bruyns subsp. <i>lutea</i>	LC	No
<i>Ornithogalum juncifolium</i> Jacq. var. <i>juncifolium</i>	LC	No
<i>Ornithogalum tenuifolium</i> F.Delaroche subsp. <i>tenuifolium</i>	Not Evaluated	No
<i>Ornithoglossum vulgare</i> B.Nord.	LC	No
<i>Osmunda regalis</i> L.	LC	No
<i>Osteospermum muricatum</i> E.Mey. ex DC. subsp. <i>muricatum</i>	LC	No
<i>Osyris lanceolata</i> Hochst. & Steud.	LC	No
<i>Othonna natalensis</i> Sch.Bip.	LC	No
<i>Oxalis corniculata</i> L.	Not Evaluated	No
<i>Oxalis latifolia</i> Kunth	Not Evaluated	No
<i>Ozoroa paniculosa</i> (Sond.) R. & A.Fern. var. <i>paniculosa</i>	LC	No
<i>Pachycarpus schinzianus</i> (Schltr.) N.E.Br.	LC	No
<i>Pachystigma pygmaeum</i> (Schltr.) Robyns	LC	No
<i>Panicum coloratum</i> L. var. <i>coloratum</i>	LC	No
<i>Panicum maximum</i> Jacq.	LC	No
<i>Panicum natalense</i> Hochst.	LC	No
<i>Panicum schinzii</i> Hack.	LC	No
<i>Pappea capensis</i> Eckl. & Zeyh.	LC	No
<i>Parinari capensis</i> Harv. subsp. <i>capensis</i>	LC	No
<i>Paspalum dilatatum</i> Poir.	Not Evaluated	No
<i>Paspalum scrobiculatum</i> L.	LC	No

<i>Paspalum urvillei</i> Steud.	Not Evaluated	No
<i>Paspalum vaginatum</i> Sw.	LC	No
<i>Pavetta eylesii</i> S.Moore	LC	No
<i>Pavetta gardeniifolia</i> A.Rich. var. <i>subtomentosa</i> K.Schum.	LC	No
<i>Pavetta zeyheri</i> Sond. subsp. <i>zeyheri</i>	LC	No
<i>Pavonia burchellii</i> (DC.) R.A.Dyer	LC	No
<i>Pavonia columella</i> Cav.	LC	No
<i>Pearsonia aristata</i> (Schinz) Dummer	LC	No
<i>Pearsonia bracteata</i> (Benth.) Polhill	NT	No
<i>Pearsonia cajanifolia</i> (Harv.) Polhill subsp. <i>cajanifolia</i>	LC	No
<i>Pearsonia sessilifolia</i> (Harv.) Dummer subsp. <i>sessilifolia</i>	LC	No
<i>Pelargonium luridum</i> (Andrews) Sweet	LC	No
<i>Pellaea calomelanos</i> (Sw.) Link var. <i>calomelanos</i>	LC	No
<i>Peltophorum africanum</i> Sond.	LC	No
<i>Pennisetum thunbergii</i> Kunth	LC	No
<i>Pentanisia angustifolia</i> (Hochst.) Hochst.	LC	No
<i>Pentzia monocephala</i> S.Moore	LC	No
<i>Peponium caledonicum</i> (Sond.) Engl.	LC	No
<i>Persicaria attenuata</i> (R.Br.) Soják subsp. <i>africana</i> K.L.Wilson	LC	No
<i>Persicaria decipiens</i> (R.Br.) K.L.Wilson	LC	No
<i>Persicaria lapathifolia</i> (L.) Gray	Not Evaluated	No
<i>Persicaria limbata</i> (Meisn.) H.Hara	Not Evaluated	No
<i>Persicaria meisneriana</i> (Cham. & Schltld.) M.Gómez	LC	No
<i>Phalaris arundinacea</i> L.	Not Evaluated	No
<i>Philonotis falcata</i> (Hook.) Mitt.	Not Evaluated	No
<i>Philonotis hastata</i> (Duby) Wijk & Margad.	Not Evaluated	No
<i>Phragmites mauritianus</i> Kunth	LC	No
<i>Phylica paniculata</i> Willd.	LC	No
<i>Phyllanthus glaucophyllus</i> Sond.	LC	No
<i>Phyllanthus incurvus</i> Thunb.	LC	No
<i>Phymaspermum athanasoides</i> (S.Moore) Källersjö	LC	No
<i>Physalis angulata</i> L.	Not Evaluated	No
<i>Phytolacca dioica</i> L.	Not Evaluated	No
<i>Phytolacca octandra</i> L.	Not Evaluated	No
<i>Pinus patula</i> Schltld. & Cham. var. <i>patula</i>	Not Evaluated	No

<i>Pittosporum viridiflorum</i> Sims	LC	No
<i>Plagiochasma rupestre</i> (J.R. & G.Forst.) Steph. var. <i>rupestre</i>	Not Evaluated	No
<i>Plantago longissima</i> Decne.	LC	No
<i>Plantago major</i> L.	Not Evaluated	No
<i>Plectranthus cylindraceus</i> Hochst. ex Benth.	LC	No
<i>Plectranthus grallatus</i> Briq.	LC	No
<i>Plectranthus hereroensis</i> Engl.	LC	No
<i>Plumbago auriculata</i> Lam.	LC	No
<i>Plumbago zeylanica</i> L.	Not Evaluated	No
<i>Pogonarthria squarrosa</i> (Roem. & Schult.) Pilg.	LC	No
<i>Pogonatum capense</i> (Hampe) A.Jaeger	Not Evaluated	No
<i>Pohlia elongata</i> Hedw.	Not Evaluated	No
<i>Pollichia campestris</i> Aiton	LC	No
<i>Polygala gerrardii</i> Chodat	LC	No
<i>Polygala gracilentata</i> Burttt Davy	LC	No
<i>Polygala hottentotta</i> C.Presl	LC	No
<i>Polygala ohlendorffiana</i> Eckl. & Zeyh.	LC	No
<i>Polygala rehmannii</i> Chodat	LC	No
<i>Polygala transvaalensis</i> Chodat subsp. <i>transvaalensis</i>	LC	No
<i>Polypogon monspeliensis</i> (L.) Desf.	Not Evaluated	No
<i>Polypogon viridis</i> (Gouan) Breistr.	Not Evaluated	No
<i>Polytrichum commune</i> Hedw.	Not Evaluated	No
<i>Populus deltoides</i> Bartram ex Marshall subsp. <i>deltoides</i> forma <i>deltoides</i>	Not Evaluated	No
<i>Potamogeton nodosus</i> Poir.	LC	No
<i>Potamogeton octandrus</i> Poir.	LC	No
<i>Priva cordifolia</i> (L.f.) Druce var. <i>abyssinica</i> (Jaub. & Spach) Moldenke	LC	No
<i>Protea caffra</i> Meisn. subsp. <i>caffra</i>	LC	No
<i>Protea roupelliae</i> Meisn. subsp. <i>roupelliae</i>	LC	No
<i>Protea welwitschii</i> Engl.	LC	No
<i>Psammotropha myriantha</i> Sond.	LC	No
<i>Pseudognaphalium luteo-album</i> (L.) Hilliard & B.L.Burttt	LC	No
<i>Pseudognaphalium oligandrum</i> (DC.) Hilliard & B.L.Burttt	LC	No
<i>Pteris cretica</i> L.	LC	No
<i>Pterocelastrus echinatus</i> N.E.Br.	LC	No
<i>Pulicaria scabra</i> (Thunb.) Druce	LC	No

<i>Pupalia lappacea</i> (L.) A.Juss. var. <i>lappacea</i>	LC	No
<i>Pycnostachys reticulata</i> (E.Mey.) Benth.	LC	No
<i>Pycreus macranthus</i> (Boeckeler) C.B.Clarke	LC	No
<i>Pycreus mundii</i> Nees	LC	No
<i>Pygmaeothamnus zeyheri</i> (Sond.) Robyns var. <i>zeyheri</i>	LC	No
<i>Pyracantha angustifolia</i> (Franch.) C.K.Schneid.	Not Evaluated	No
<i>Ranunculus meyeri</i> Harv.	LC	No
<i>Ranunculus multifidus</i> Forssk.	LC	No
<i>Raphionacme galpinii</i> Schltr.	LC	No
<i>Raphionacme hirsuta</i> (E.Mey.) R.A.Dyer	LC	No
<i>Rendlia altera</i> (Rendle) Chiov.	LC	No
<i>Rhamnus prinoides</i> L'Hér.	LC	No
<i>Rhoicissus tridentata</i> (L.f.) Wild & R.B.Drumm. subsp. <i>tridentata</i>	Not Evaluated	No
<i>Rhynchosia caribaea</i> (Jacq.) DC.	LC	No
<i>Rhynchosia monophylla</i> Schltr.	LC	No
<i>Rhynchosia nervosa</i> Benth. ex Harv. var. <i>nervosa</i>	LC	No
<i>Rhynchosia sordida</i> (E.Mey.) Schinz	LC	No
<i>Rhynchosia totta</i> (Thunb.) DC. var. <i>totta</i>	LC	No
<i>Rhynchosia venulosa</i> (Hiern) K.Schum.	Not Evaluated	No
<i>Rhynchospora brownii</i> Roem. & Schult.	LC	No
<i>Riccia atropurpurea</i> Sim	Not Evaluated	No
<i>Richardia brasiliensis</i> Gomes	Not Evaluated	No
<i>Riocreuxia polyantha</i> Schltr.	LC	No
<i>Robinia pseudoacacia</i> L.	Not Evaluated	No
<i>Rorippa fluviatilis</i> (E.Mey. ex Sond.) Thell. var. <i>fluviatilis</i>	LC	No
<i>Rorippa nudiuscula</i> Thell.	LC	No
<i>Rothea hirsuta</i> (Hochst.) R.Fern.	LC	No
<i>Rothmannia capensis</i> Thunb.	LC	No
<i>Rubia horrida</i> (Thunb.) Puff	LC	No
<i>Rubia petiolaris</i> DC.	LC	No
<i>Rubus rigidus</i> Sm.	LC	No
<i>Rubus x proteus</i> C.H.Stirt.	Not Evaluated	No
<i>Rumex acetosella</i> L. subsp. <i>angiocarpus</i> (Murb.) Murb.	Not Evaluated	No
<i>Rumex conglomeratus</i> Murb.	LC	No
<i>Rumex crispus</i> L.	Not Evaluated	No

<i>Rumex dregeanus</i> Meisn. subsp. <i>montanus</i> B.L.Burt	LC	No
<i>Rumex sagittatus</i> Thunb.	LC	No
<i>Salix babylonica</i> L. var. <i>babylonica</i>	Not Evaluated	No
<i>Salix mucronata</i> Thunb. subsp. <i>woodii</i> (Seemen) Immelman	LC	No
<i>Salvia radula</i> Benth.	LC	No
<i>Salvia runcinata</i> L.f.	LC	No
<i>Salvia tiliifolia</i> Vahl	Not Evaluated	No
<i>Satureja biflora</i> (Buch.-Ham. ex D.Don) Briq.	LC	No
<i>Satyrium cristatum</i> Sond. var. <i>cristatum</i>	LC	No
<i>Satyrium hallackii</i> Bolus subsp. <i>ocellatum</i> (Bolus) A.V.Hall	LC	No
<i>Scabiosa columbaria</i> L.	LC	No
<i>Scadoxus puniceus</i> (L.) Friis & Nordal	LC	No
<i>Schinus molle</i> L.	Not Evaluated	No
<i>Schistostephium crataegifolium</i> (DC.) Fenzl ex Harv.	LC	No
<i>Schistostephium heptalobum</i> (DC.) Oliv. & Hiern	LC	No
<i>Schizachyrium sanguineum</i> (Retz.) Alston	LC	No
<i>Schizocarpus nervosus</i> (Burch.) Van der Merwe	LC	No
<i>Schkuhria pinnata</i> (Lam.) Kuntze ex Thell.	Not Evaluated	No
<i>Schoenoplectus brachyceras</i> (Hochst. ex A.Rich.) Lye	LC	No
<i>Schoenoplectus corymbosus</i> (Roth ex Roem. & Schult.) J.Raynal	LC	No
<i>Schoenoplectus muricinux</i> (C.B.Clark) J.Raynal	LC	No
<i>Schoenoxiphium sparteum</i> (Wahlenb.) C.B.Clark	LC	No
<i>Scleria bulbifera</i> Hochst. ex A.Rich.	LC	No
<i>Scolopia zeyheri</i> (Nees) Harv.	LC	No
<i>Searsia dentata</i> (Thunb.) F.A.Barkley	LC	No
<i>Searsia discolor</i> (E.Mey. ex Sond.) Moffett	LC	No
<i>Searsia leptodictya</i> (Diels) T.S.Yi, A.J.Mill. & J.Wen forma <i>leptodictya</i>	Not Evaluated	No
<i>Searsia magalismontana</i> (Sond.) Moffett subsp. <i>magalismontana</i>	LC	No
<i>Searsia pyroides</i> (Burch.) Moffett var. <i>integrifolia</i> (Engl.) Moffett	LC	No
<i>Searsia pyroides</i> (Burch.) Moffett var. <i>pyroides</i>	LC	No
<i>Searsia rigida</i> (Mill.) F.A.Barkley var. <i>dentata</i> (Engl.) Moffett	LC	No
<i>Searsia rigida</i> (Mill.) F.A.Barkley var. <i>margaretae</i> (Burt Davy ex Moffett) Moffett	LC	No
<i>Searsia rigida</i> (Mill.) F.A.Barkley var. <i>rigida</i>	LC	No
<i>Searsia zeyheri</i> (Sond.) Moffett	LC	No
<i>Sebaea exigua</i> (Oliv.) Schinz	LC	No

<i>Sebaea junodii</i> Schinz	LC	No
<i>Secamone alpini</i> Schult.	LC	No
<i>Selaginella dregei</i> (C.Presl) Hieron.	LC	No
<i>Selago capitellata</i> Schltr.	LC	No
<i>Selago densiflora</i> Rolfe	LC	No
<i>Senecio affinis</i> DC.	LC	No
<i>Senecio consanguineus</i> DC.	LC	No
<i>Senecio coronatus</i> (Thunb.) Harv.	LC	No
<i>Senecio erubescens</i> Aiton var. <i>erubescens</i>	LC	No
<i>Senecio glanduloso-pilosus</i> Volkens & Muschl.	LC	No
<i>Senecio gregatus</i> Hilliard	LC	No
<i>Senecio harveianus</i> MacOwan	LC	No
<i>Senecio hieracioides</i> DC.	LC	No
<i>Senecio inaequidens</i> DC.	LC	No
<i>Senecio inornatus</i> DC.	LC	No
<i>Senecio isatideus</i> DC.	LC	No
<i>Senecio laevigatus</i> Thunb. var. <i>integrifolius</i> Harv.	LC	No
<i>Senecio laevigatus</i> Thunb. var. <i>laevigatus</i>	LC	No
<i>Senecio lydenburgensis</i> Hutch. & Burt Davy	LC	No
<i>Senecio oxyriifolius</i> DC. subsp. <i>oxyriifolius</i>	LC	No
<i>Senecio scitus</i> Hutch. & Burt Davy	LC	No
<i>Senecio venosus</i> Harv.	LC	No
<i>Senegalia ataxacantha</i> DC.	LC	No
<i>Senegalia caffra</i> (Thunb.) Willd.	LC	No
<i>Senna italica</i> Mill. subsp. <i>arachoides</i> (Burch.) Lock	LC	No
<i>Seriphium plumosum</i> L.	Not Evaluated	No
<i>Setaria lindenberghiana</i> (Nees) Stapf	LC	No
<i>Setaria megaphylla</i> (Steud.) T.Durand & Schinz	LC	No
<i>Setaria nigrirostris</i> (Nees) T.Durand & Schinz	LC	No
<i>Setaria plicatilis</i> (Hochst.) Hack. ex Engl.	LC	No
<i>Setaria pumila</i> (Poir.) Roem. & Schult.	LC	No
<i>Setaria sphacelata</i> (Schumach.) Stapf & C.E.Hubb. ex M.B.Moss var. <i>sericea</i> (Stapf) Clayton	LC	No
<i>Setaria sphacelata</i> (Schumach.) Stapf & C.E.Hubb. ex M.B.Moss var. <i>sphacelata</i>	LC	No
<i>Setaria sphacelata</i> (Schumach.) Stapf & C.E.Hubb. ex M.B.Moss var. <i>torta</i> (Stapf) Clayton	LC	No

<i>Setaria verticillata</i> (L.) P.Beauv.	LC	No
<i>Sida alba</i> L.	LC	No
<i>Sida chrysantha</i> Ulbr.	LC	No
<i>Sida dregei</i> Burt Davy	LC	No
<i>Sida rhombifolia</i> L. subsp. <i>rhombifolia</i>	LC	No
<i>Sida ternata</i> L.f.	LC	No
<i>Silene burchellii</i> Otth var. <i>angustifolia</i> Sond.	Not Evaluated	No
<i>Silene gallica</i> L.	Not Evaluated	No
<i>Silene undulata</i> Aiton	LC	No
<i>Sisymbrium orientale</i> L.	Not Evaluated	No
<i>Sisyranthus randii</i> S.Moore	LC	No
<i>Solanum capense</i> L.	LC	No
<i>Solanum chenopodioides</i> Lam.	Not Evaluated	No
<i>Solanum giganteum</i> Jacq.	LC	No
<i>Solanum lichtensteinii</i> Willd.	LC	No
<i>Solanum mauritianum</i> Scop.	Not Evaluated	No
<i>Solanum pseudocapsicum</i> L.	Not Evaluated	No
<i>Solanum seforthianum</i> Andrews var. <i>disjunctum</i> O.E.Schulz	Not Evaluated	No
<i>Solanum sisymbriifolium</i> Lam.	Not Evaluated	No
<i>Solanum supinum</i> Dunal var. <i>supinum</i>	LC	No
<i>Sonchus dregeanus</i> DC.	LC	No
<i>Sonchus integrifolius</i> Harv. var. <i>integrifolius</i>	LC	No
<i>Sonchus oleraceus</i> L.	Not Evaluated	No
<i>Sorghum bicolor</i> (L.) Moench subsp. <i>drummondii</i> (Steud.) de Wet	LC	No
<i>Sphedamnocarpus pruriens</i> (A.Juss.) Szyszyl. subsp. <i>galphimifolius</i> (A.Juss.) P.D.de Villiers & D.J.Botha	LC	No
<i>Sphedamnocarpus pruriens</i> (A.Juss.) Szyszyl. subsp. <i>pruriens</i>	LC	No
<i>Sphenostylis angustifolia</i> Sond.	LC	No
<i>Sporobolus africanus</i> (Poir.) Robyns & Tournay	LC	No
<i>Sporobolus fimbriatus</i> (Trin.) Nees	LC	No
<i>Sporobolus pectinatus</i> Hack.	LC	No
<i>Sporobolus stapfianus</i> Gand.	LC	No
<i>Stachys natalensis</i> Hochst. var. <i>natalensis</i>	LC	No
<i>Stapelia gigantea</i> N.E.Br.	LC	No
<i>Stipa dregeana</i> Steud. var. <i>elongata</i> (Nees) Stapf	LC	No

<i>Striga bilabiata</i> (Thunb.) Kuntze subsp. <i>bilabiata</i>	LC	No
<i>Striga elegans</i> Benth.	LC	No
<i>Striga gesnerioides</i> (Willd.) Vatke	LC	No
<i>Strychnos pungens</i> Soler.	LC	No
<i>Sutherlandia frutescens</i> (L.) R.Br.	LC	No
<i>Symphogyna brasiliensis</i> Nees & Mont.	Not Evaluated	No
<i>Syncolostemon pretoriae</i> (Gürke) D.F.Otieno	LC	No
<i>Tagetes minuta</i> L.	Not Evaluated	No
<i>Tapinanthus rubromarginatus</i> (Engl.) Danser	LC	No
<i>Taraxacum officinale</i> Weber	Not Evaluated	No
<i>Tarchonanthus camphoratus</i> L.	LC	No
<i>Tarchonanthus parvicapitulatus</i> P.P.J.Herman	LC	No
<i>Tecoma stans</i> (L.) Juss. ex Kunth var. <i>stans</i>	Not Evaluated	No
<i>Tephrosia capensis</i> (Jacq.) Pers. var. <i>capensis</i>	LC	No
<i>Tephrosia elongata</i> E.Mey. var. <i>elongata</i>	LC	No
<i>Tephrosia longipes</i> Meisn. subsp. <i>longipes</i> var. <i>longipes</i>	LC	No
<i>Tephrosia multijuga</i> R.G.N.Young	LC	No
<i>Tephrosia semiglabra</i> Sond.	LC	No
<i>Teucrium trifidum</i> Retz.	LC	No
<i>Thelypteris confluens</i> (Thunb.) C.V.Morton	LC	No
<i>Themeda triandra</i> Forssk.	LC	No
<i>Thesium costatum</i> A.W.Hill var. <i>costatum</i>	LC	No
<i>Thesium deceptum</i> N.E.Br.	LC	No
<i>Thesium racemosum</i> Bernh.	LC	No
<i>Thesium translucens</i> A.W.Hill	LC	No
<i>Thesium transvaalense</i> Schltr.	LC	No
<i>Thesium utile</i> A.W.Hill	LC	No
<i>Tithonia diversifolia</i> (Hemsl.) A.Gray	Not Evaluated	No
<i>Tolpis capensis</i> (L.) Sch.Bip.	LC	No
<i>Trachyandra asperata</i> Kunth var. <i>swaziensis</i> Oberm.	LC	No
<i>Trachyandra saltii</i> (Baker) Oberm. var. <i>saltii</i>	LC	No
<i>Trachyphyllum gastrodes</i> (Welw. & Duby) A.Gepp	Not Evaluated	No
<i>Trachypogon spicatus</i> (L.f.) Kuntze	LC	No
<i>Tragia minor</i> Sond.	LC	No
<i>Tragia okanyua</i> Pax	LC	No

<i>Tragus berteronianus</i> Schult.	LC	No
<i>Tribulus terrestris</i> L.	LC	No
<i>Trichoneura grandiglumis</i> (Nees) Ekman	LC	No
<i>Triraphis andropogonoides</i> (Steud.) E.Phillips	LC	No
<i>Tristachya leucothrix</i> Trin. ex Nees	LC	No
<i>Tristachya rehmannii</i> Hack.	LC	No
<i>Tritonia nelsonii</i> Baker	LC	No
<i>Triumfetta sonderi</i> Ficalho & Hiern	LC	No
<i>Trochomeria macrocarpa</i> (Sond.) Hook.f. subsp. <i>macrocarpa</i>	LC	No
<i>Tulbaghia acutiloba</i> Harv.	LC	No
<i>Tulbaghia leucantha</i> Baker	LC	No
<i>Typha capensis</i> (Rohrb.) N.E.Br.	LC	No
<i>Urelytrum agropyroides</i> (Hack.) Hack.	LC	No
<i>Urochloa brachyura</i> (Hack.) Stapf	LC	No
<i>Urochloa panicoides</i> P.Beauv.	LC	No
<i>Ursinia nana</i> DC. subsp. <i>leptophylla</i> Prassler	LC	No
<i>Ursinia tenuiloba</i> DC.	LC	No
<i>Vachellia karroo</i> Hayne	LC	No
<i>Vahlia capensis</i> (L.f.) Thunb. subsp. <i>capensis</i>	LC	No
<i>Vangueria infausta</i> Burch. subsp. <i>infausta</i>	LC	No
<i>Vangueria parvifolia</i> Sond.	LC	No
<i>Verbena aristigera</i> S.Moore	Not Evaluated	No
<i>Verbena bonariensis</i> L.	Not Evaluated	No
<i>Verbena brasiliensis</i> Vell.	Not Evaluated	No
<i>Vernonia galpinii</i> Klatt	LC	No
<i>Vernonia staehelinoides</i> Harv.	LC	No
<i>Vernonia sutherlandii</i> Harv.	LC	No
<i>Veronica anagallis-aquatica</i> L.	LC	No
<i>Vigna vexillata</i> (L.) A.Rich. var. <i>davyi</i> (Bolus) B.J.Pienaar	LC	No
<i>Vigna vexillata</i> (L.) A.Rich. var. <i>vexillata</i>	LC	No
<i>Vinca major</i> L.	Not Evaluated	No
<i>Viscum rotundifolium</i> L.f.	LC	No
<i>Wahlenbergia lycopodioides</i> Schltr. & Brehmer	LC	No
<i>Wahlenbergia magaliesbergensis</i> Lammers	LC	No
<i>Wahlenbergia undulata</i> (L.f.) A.DC.	LC	No

<i>Wahlenbergia virgata</i> Engl.	LC	No
<i>Withania somnifera</i> (L.) Dunal	LC	No
<i>Xanthium strumarium</i> L.	Not Evaluated	No
<i>Xerophyta retinervis</i> Baker	LC	No
<i>Ximenia caffra</i> Sond. var. <i>caffra</i>	LC	No
<i>Xysmalobium undulatum</i> (L.) Aiton f. var. <i>undulatum</i>	LC	No
<i>Zaluzianskya katharinae</i> Hiern	LC	No
<i>Zanthoxylum capense</i> (Thunb.) Harv.	LC	No
<i>Zinnia peruviana</i> (L.) L.	Not Evaluated	No
<i>Ziziphus mucronata</i> Willd. subsp. <i>mucronata</i>	LC	No
<i>Ziziphus zeyheriana</i> Sond.	LC	No
<i>Zornia linearis</i> E.Mey.	LC	No

EXPECTED BIRD SPECIES

Species	Common Name	Conservation Satus	
		Regional (Birdlife, 2015)	Global (IUCN, 2017)
<i>Accipiter badius</i>	Shikra, Shikra	Unlisted	LC
<i>Accipiter melanoleucus</i>	Sparrowhawk, Black	Unlisted	LC
<i>Accipiter minullus</i>	Sparrowhawk, Little	Unlisted	LC
<i>Accipiter ovampensis</i>	Sparrowhawk, Ovambo	Unlisted	LC
<i>Acridotheres tristis</i>	Myna, Common	Unlisted	LC
<i>Acrocephalus arundinaceus</i>	Reed-warbler, Great	Unlisted	LC
<i>Acrocephalus baeticatus</i>	Reed-warbler, African	Unlisted	Unlisted
<i>Acrocephalus gracilirostris</i>	Swamp-warbler, Lesser	Unlisted	LC
<i>Acrocephalus palustris</i>	Warbler, Marsh	Unlisted	LC
<i>Acrocephalus schoenobaenus</i>	Warbler, Sedge	Unlisted	LC
<i>Actitis hypoleucos</i>	Sandpiper, Common	Unlisted	LC
<i>Actophilornis africanus</i>	Jacana, African	Unlisted	LC
<i>Afrotis afraoides</i>	Korhaan, Northern Black	Unlisted	LC
<i>Alcedo cristata</i>	Kingfisher, Malachite	Unlisted	Unlisted
<i>Alcedo semitorquata</i>	Kingfisher, Half-collared	NT	LC
<i>Alopochen aegyptiacus</i>	Goose, Egyptian	Unlisted	LC
<i>Amadina erythrocephala</i>	Finch, Red-headed	Unlisted	LC
<i>Amadina fasciata</i>	Finch, Cut-throat	Unlisted	LC
<i>Amandava subflava</i>	Waxbill, Orange-breasted	Unlisted	LC
<i>Amaurornis flavirostris</i>	Crake, Black	Unlisted	LC
<i>Amblyospiza albifrons</i>	Weaver, Thick-billed	Unlisted	LC
<i>Anas capensis</i>	Teal, Cape	Unlisted	LC
<i>Anas erythrorhyncha</i>	Teal, Red-billed	Unlisted	LC
<i>Anas hybrid</i>	Duck, Hybrid Mallard	Unlisted	LC
<i>Anas platyrhynchos</i>	Duck, Domestic	Unlisted	LC
<i>Anas platyrhynchos</i>	Duck, Mallard	Unlisted	LC
<i>Anas smithii</i>	Shoveler, Cape	Unlisted	LC
<i>Anas sparsa</i>	Duck, African Black	Unlisted	LC
<i>Anas undulata</i>	Duck, Yellow-billed	Unlisted	LC

<i>Anhinga rufa</i>	Darter, African	Unlisted	LC
<i>Anomalospiza imberbis</i>	Finch, Cuckoo	Unlisted	LC
<i>Anser anser</i>	Goose, Domestic	Unlisted	LC
<i>Anthoscopus minutus</i>	Penduline-tit, Cape	Unlisted	LC
<i>Anthropoides paradiseus</i>	Crane, Blue	NT	VU
<i>Anthus caffer</i>	Pipit, Bushveld	Unlisted	LC
<i>Anthus cinnamomeus</i>	Pipit, African	Unlisted	LC
<i>Anthus leucophrys</i>	Pipit, Plain-backed	Unlisted	LC
<i>Anthus lineiventris</i>	Pipit, Striped	Unlisted	LC
<i>Anthus similis</i>	Pipit, Long-billed	Unlisted	LC
<i>Anthus vaalensis</i>	Pipit, Buffy	Unlisted	LC
<i>Apalis thoracica</i>	Apalis, Bar-throated	Unlisted	LC
<i>Apus affinis</i>	Swift, Little	Unlisted	LC
<i>Apus apus</i>	Swift, Common	Unlisted	LC
<i>Apus barbatus</i>	Swift, African Black	Unlisted	LC
<i>Apus caffer</i>	Swift, White-rumped	Unlisted	LC
<i>Apus horus</i>	Swift, Horus	Unlisted	LC
<i>Aquila pennatus</i>	Eagle, Booted	Unlisted	Unlisted
<i>Aquila verreauxii</i>	Eagle, Verreaux's	VU	LC
<i>Aquila wahlbergi</i>	Eagle, Wahlberg's	Unlisted	LC
<i>Ardea cinerea</i>	Heron, Grey	Unlisted	LC
<i>Ardea melanocephala</i>	Heron, Black-headed	Unlisted	LC
<i>Ardea purpurea</i>	Heron, Purple	Unlisted	LC
<i>Ardeola ralloides</i>	Heron, Squacco	Unlisted	LC
<i>Asio capensis</i>	Owl, Marsh	Unlisted	LC
<i>Batis molitor</i>	Batis, Chinspot	Unlisted	LC
<i>Bostrychia hagedash</i>	Ibis, Hadedda	Unlisted	LC
<i>Bradornis mariquensis</i>	Flycatcher, Marico	Unlisted	LC
<i>Bradypterus baboecala</i>	Rush-warbler, Little	Unlisted	LC
<i>Bubo africanus</i>	Eagle-owl, Spotted	Unlisted	LC
<i>Bubulcus ibis</i>	Egret, Cattle	Unlisted	LC
<i>Burhinus capensis</i>	Thick-knee, Spotted	Unlisted	LC
<i>Buteo rufofuscus</i>	Buzzard, Jackal	Unlisted	LC

<i>Buteo vulpinus</i>	Buzzard, Steppe	Unlisted	Unlisted
<i>Butorides striata</i>	Heron, Green-backed	Unlisted	LC
<i>Cairina moschata</i>	Duck, Muscovy	Unlisted	LC
<i>Calamonastes fasciolatus</i>	Wren-warbler, Barred	Unlisted	LC
<i>Calandrella cinerea</i>	Lark, Red-capped	Unlisted	LC
<i>Calendulauda sabota</i>	Lark, Sabota	Unlisted	LC
<i>Calidris minuta</i>	Stint, Little	Unlisted	LC
<i>Campephaga flava</i>	Cuckoo-shrike, Black	Unlisted	LC
<i>Campethera abingoni</i>	Woodpecker, Golden-tailed	Unlisted	LC
<i>Caprimulgus pectoralis</i>	Nightjar, Fiery-necked	Unlisted	LC
<i>Caprimulgus rufigena</i>	Nightjar, Rufous-cheeked	Unlisted	LC
<i>Caprimulgus tristigma</i>	Nightjar, Freckled	Unlisted	LC
<i>Centropus burchellii</i>	Coucal, Burchell's	Unlisted	Unlisted
<i>Centropus superciliosus</i>	Coucal, White-browed	Unlisted	LC
<i>Cercomela familiaris</i>	Chat, Familiar	Unlisted	LC
<i>Cercotrichas leucophrys</i>	Scrub-robin, White-browed	Unlisted	LC
<i>Cercotrichas paena</i>	Scrub-robin, Kalahari	Unlisted	LC
<i>Certhilauda benguelensis</i>	Lark, Benguela Long-billed	Unlisted	Unlisted
<i>Certhilauda brevirostris</i>	Lark, Agulhas Long-billed	NT	Unlisted
<i>Certhilauda curvirostris</i>	Lark, Cape Long-billed	Unlisted	LC
<i>Certhilauda semitorquata</i>	Lark, Eastern Long-billed	Unlisted	LC
<i>Certhilauda subcoronata</i>	Lark, Karoo Long-billed	Unlisted	LC
<i>Ceryle rudis</i>	Kingfisher, Pied	Unlisted	LC
<i>Chalcomitra amethystina</i>	Sunbird, Amethyst	Unlisted	LC
<i>Charadrius hiaticula</i>	Plover, Common Ringed	Unlisted	LC
<i>Charadrius tricollaris</i>	Plover, Three-banded	Unlisted	LC
<i>Chersomanes albofasciata</i>	Lark, Spike-heeled	Unlisted	LC
<i>Chlidonias hybrida</i>	Tern, Whiskered	Unlisted	LC
<i>Chlidonias leucopterus</i>	Tern, White-winged	Unlisted	LC
<i>Chrysococcyx caprius</i>	Cuckoo, Diderick	Unlisted	LC

<i>Chrysococcyx klaas</i>	Cuckoo, Klaas's	Unlisted	LC
<i>Ciconia abdimii</i>	Stork, Abdim's	NT	LC
<i>Ciconia ciconia</i>	Stork, White	Unlisted	LC
<i>Cinnyricinclus leucogaster</i>	Starling, Violet-backed	Unlisted	LC
<i>Cinnyris afer</i>	Sunbird, Greater Double-collared	Unlisted	LC
<i>Cinnyris mariquensis</i>	Sunbird, Marico	Unlisted	LC
<i>Cinnyris talatala</i>	Sunbird, White-bellied	Unlisted	LC
<i>Circaetus pectoralis</i>	Snake-eagle, Black-chested	Unlisted	LC
<i>Cisticola aberrans</i>	Cisticola, Lazy	Unlisted	LC
<i>Cisticola aridulus</i>	Cisticola, Desert	Unlisted	LC
<i>Cisticola ayresii</i>	Cisticola, Wing-snapping	Unlisted	LC
<i>Cisticola chiniana</i>	Cisticola, Rattling	Unlisted	LC
<i>Cisticola fulvicapilla</i>	Neddicky, Neddicky	Unlisted	LC
<i>Cisticola juncidis</i>	Cisticola, Zitting	Unlisted	LC
<i>Cisticola lais</i>	Cisticola, Wailing	Unlisted	LC
<i>Cisticola textrix</i>	Cisticola, Cloud	Unlisted	LC
<i>Cisticola tinniens</i>	Cisticola, Levaillant's	Unlisted	LC
<i>Clamator jacobinus</i>	Cuckoo, Jacobin	Unlisted	LC
<i>Coccyzygia melanotis</i>	Waxbill, Swee	Unlisted	LC
<i>Colius colius</i>	Mousebird, White-backed	Unlisted	LC
<i>Colius striatus</i>	Mousebird, Speckled	Unlisted	LC
<i>Columba arquatrix</i>	Olive-pigeon, African	Unlisted	LC
<i>Columba guinea</i>	Pigeon, Speckled	Unlisted	LC
<i>Columba livia</i>	Dove, Rock	Unlisted	LC
<i>Coracias caudatus</i>	Roller, Lilac-breasted	Unlisted	LC
<i>Coracias garrulus</i>	Roller, European	NT	LC
<i>Corvinella melanoleuca</i>	Shrike, Magpie	Unlisted	LC
<i>Corvus albus</i>	Crow, Pied	Unlisted	LC
<i>Corvus capensis</i>	Crow, Cape	Unlisted	LC
<i>Corythaixoides concolor</i>	Go-away-bird, Grey	Unlisted	LC
<i>Cossypha caffra</i>	Robin-chat, Cape	Unlisted	LC

<i>Cossypha humeralis</i>	Robin-chat, White-throated	Unlisted	LC
<i>Coturnix coturnix</i>	Quail, Common	Unlisted	LC
<i>Creatophora cinerea</i>	Starling, Wattled	Unlisted	LC
<i>Crithagra atrogularis</i>	Canary, Black-throated	Unlisted	LC
<i>Crithagra flaviventris</i>	Canary, Yellow	Unlisted	LC
<i>Crithagra gularis</i>	Seedeater, Streaky-headed	Unlisted	LC
<i>Crithagra mozambicus</i>	Canary, Yellow-fronted	Unlisted	LC
<i>Cuculus clamosus</i>	Cuckoo, Black	Unlisted	LC
<i>Cuculus gularis</i>	Cuckoo, African	Unlisted	LC
<i>Cuculus solitarius</i>	Cuckoo, Red-chested	Unlisted	LC
<i>Cursorius temminckii</i>	Cursor, Temminck's	Unlisted	LC
<i>Cygnus olor</i>	Swan, Mute	Unlisted	LC
<i>Cypsiurus parvus</i>	Palm-swift, African	Unlisted	LC
<i>Delichon urbicum</i>	House-martin, Common	Unlisted	LC
<i>Dendrocygna viduata</i>	Duck, White-faced	Unlisted	LC
<i>Dendropicos fuscescens</i>	Woodpecker, Cardinal	Unlisted	LC
<i>Dendropicos namaquus</i>	Woodpecker, Bearded	Unlisted	LC
<i>Dicrurus adsimilis</i>	Drongo, Fork-tailed	Unlisted	LC
<i>Dryoscopus cubla</i>	Puffback, Black-backed	Unlisted	LC
<i>Egretta alba</i>	Egret, Great	Unlisted	LC
<i>Egretta ardesiaca</i>	Heron, Black	Unlisted	LC
<i>Egretta garzetta</i>	Egret, Little	Unlisted	LC
<i>Egretta intermedia</i>	Egret, Yellow-billed	Unlisted	Unlisted
<i>Elanus caeruleus</i>	Kite, Black-shouldered	Unlisted	LC
<i>Emberiza capensis</i>	Bunting, Cape	Unlisted	LC
<i>Emberiza flaviventris</i>	Bunting, Golden-breasted	Unlisted	LC
<i>Emberiza tahapisi</i>	Bunting, Cinnamon-breasted	Unlisted	LC
<i>Estrilda astrild</i>	Waxbill, Common	Unlisted	LC
<i>Estrilda erythronotos</i>	Waxbill, Black-faced	Unlisted	LC
<i>Euplectes afer</i>	Bishop, Yellow-crowned	Unlisted	LC

<i>Euplectes albonotatus</i>	Widowbird, White-winged	Unlisted	LC
<i>Euplectes ardens</i>	Widowbird, Red-collared	Unlisted	LC
<i>Euplectes capensis</i>	Bishop, Yellow	Unlisted	LC
<i>Euplectes orix</i>	Bishop, Southern Red	Unlisted	LC
<i>Euplectes progne</i>	Widowbird, Long-tailed	Unlisted	LC
<i>Eupodotis senegalensis</i>	Korhaan, White-bellied	VU	LC
<i>Falco amurensis</i>	Falcon, Amur	Unlisted	LC
<i>Falco biarmicus</i>	Falcon, Lanner	VU	LC
<i>Falco peregrinus</i>	Falcon, Peregrine	Unlisted	LC
<i>Falco rupicoloides</i>	Kestrel, Greater	Unlisted	LC
<i>Falco rupicolus</i>	Kestrel, Rock	Unlisted	Unlisted
<i>Fulica cristata</i>	Coot, Red-knobbed	Unlisted	LC
<i>Gallinago nigripennis</i>	Snipe, African	Unlisted	LC
<i>Gallinula chloropus</i>	Moorhen, Common	Unlisted	LC
<i>Glareola nordmanni</i>	Pratincole, Black-winged	NT	NT
<i>Gyps coprotheres</i>	Vulture, Cape	EN	EN
<i>Halcyon albiventris</i>	Kingfisher, Brown-hooded	Unlisted	LC
<i>Halcyon senegalensis</i>	Kingfisher, Woodland	Unlisted	LC
<i>Haliaeetus vocifer</i>	Fish-eagle, African	Unlisted	LC
<i>Himantopus himantopus</i>	Stilt, Black-winged	Unlisted	LC
<i>Hippolais icterina</i>	Warbler, Icterine	Unlisted	LC
<i>Hirundo abyssinica</i>	Swallow, Lesser Striped	Unlisted	LC
<i>Hirundo albicularis</i>	Swallow, White-throated	Unlisted	LC
<i>Hirundo cucullata</i>	Swallow, Greater Striped	Unlisted	LC
<i>Hirundo dimidiata</i>	Swallow, Pearl-breasted	Unlisted	LC
<i>Hirundo fuligula</i>	Martin, Rock	Unlisted	Unlisted
<i>Hirundo rustica</i>	Swallow, Barn	Unlisted	LC
<i>Hirundo semirufa</i>	Swallow, Red-breasted	Unlisted	LC
<i>Hirundo splodera</i>	Cliff-swallow, South African	Unlisted	LC
<i>Indicator indicator</i>	Honeyguide, Greater	Unlisted	LC
<i>Indicator minor</i>	Honeyguide, Lesser	Unlisted	LC

<i>Ixobrychus minutus</i>	Bittern, Little	Unlisted	LC
<i>Jynx ruficollis</i>	Wryneck, Red-throated	Unlisted	LC
<i>Lagonosticta rhodopareia</i>	Firefinch, Jameson's	Unlisted	LC
<i>Lagonosticta rubricata</i>	Firefinch, African	Unlisted	LC
<i>Lagonosticta senegala</i>	Firefinch, Red-billed	Unlisted	LC
<i>Lamprotornis nitens</i>	Starling, Cape Glossy	Unlisted	LC
<i>Laniarius atrococcineus</i>	Shrike, Crimson-breasted	Unlisted	LC
<i>Laniarius ferrugineus</i>	Boubou, Southern	Unlisted	LC
<i>Lanius collaris</i>	Fiscal, Common (Southern)	Unlisted	LC
<i>Lanius collurio</i>	Shrike, Red-backed	Unlisted	LC
<i>Lanius minor</i>	Shrike, Lesser Grey	Unlisted	LC
<i>Larus cirrocephalus</i>	Gull, Grey-headed	Unlisted	LC
<i>Lybius torquatus</i>	Barbet, Black-collared	Unlisted	LC
<i>Macronyx capensis</i>	Longclaw, Cape	Unlisted	LC
<i>Megaceryle maximus</i>	Kingfisher, Giant	Unlisted	Unlisted
<i>Melaenornis pammelaina</i>	Flycatcher, Southern Black	Unlisted	LC
<i>Melierax gabar</i>	Goshawk, Gabar	Unlisted	LC
<i>Merops apiaster</i>	Bee-eater, European	Unlisted	LC
<i>Merops bullockoides</i>	Bee-eater, White-fronted	Unlisted	LC
<i>Merops pusillus</i>	Bee-eater, Little	Unlisted	LC
<i>Microcarbo africanus</i>	Cormorant, Reed	Unlisted	LC
<i>Milvus aegyptius</i>	Kite, Yellow-billed	Unlisted	Unlisted
<i>Milvus migrans</i>	Kite, Black	Unlisted	LC
<i>Milvus migrans</i>	Kite, Black	Unlisted	LC
<i>Mirafrā africana</i>	Lark, Rufous-naped	Unlisted	LC
<i>Mirafrā apiata</i>	Lark, Cape Clapper	Unlisted	LC
<i>Mirafrā cheniana</i>	Lark, Melodious	LC	NT
<i>Mirafrā fasciolata</i>	Lark, Eastern Clapper	Unlisted	LC
<i>Mirafrā marjoriae</i>	Lark, Agulhas Clapper	Unlisted	Unlisted
<i>Monticola brevipes</i>	Rock-thrush, Short-toed	Unlisted	LC
<i>Monticola explorator</i>	Rock-thrush, Sentinel	Unlisted	LC

<i>Monticola rupestris</i>	Rock-thrush, Cape	Unlisted	LC
<i>Motacilla aguimp</i>	Wagtail, African Pied	Unlisted	LC
<i>Motacilla capensis</i>	Wagtail, Cape	Unlisted	LC
<i>Muscicapa striata</i>	Flycatcher, Spotted	Unlisted	LC
<i>Mycteria ibis</i>	Stork, Yellow-billed	EN	LC
<i>Myrmecocichla formicivora</i>	Chat, Anteating	Unlisted	LC
<i>Nectarinia famosa</i>	Sunbird, Malachite	Unlisted	LC
<i>Netta erythrophthalma</i>	Pochard, Southern	Unlisted	LC
<i>Nilaus afer</i>	Brubru, Brubru	Unlisted	LC
<i>Numida meleagris</i>	Guineafowl, Helmeted	Unlisted	LC
<i>Nycticorax nycticorax</i>	Night-Heron, Black-crowned	Unlisted	LC
<i>Oena capensis</i>	Dove, Namaqua	Unlisted	LC
<i>Oenanthe monticola</i>	Wheatear, Mountain	Unlisted	LC
<i>Oenanthe pileata</i>	Wheatear, Capped	Unlisted	LC
<i>Onychognathus morio</i>	Starling, Red-winged	Unlisted	LC
<i>Oriolus larvatus</i>	Oriole, Black-headed	Unlisted	LC
<i>Oriolus oriolus</i>	Oriole, Eurasian Golden	Unlisted	LC
<i>Ortygospiza atricollis</i>	Quailfinch, African	Unlisted	LC
<i>Oxyura maccoa</i>	Duck, Maccoa	NT	NT
<i>Pandion haliaetus</i>	Osprey, Osprey	Unlisted	LC
<i>Parisoma subcaeruleum</i>	Tit-babbler, Chestnut-vented	Unlisted	LC
<i>Parus cinerascens</i>	Tit, Ashy	Unlisted	LC
<i>Parus niger</i>	Tit, Southern Black	Unlisted	Unlisted
<i>Passer diffusus</i>	Sparrow, Southern Grey-headed	Unlisted	LC
<i>Passer domesticus</i>	Sparrow, House	Unlisted	LC
<i>Passer griseus</i>	Sparrow, Northern Grey-headed	Unlisted	LC
<i>Passer melanurus</i>	Sparrow, Cape	Unlisted	LC
<i>Peliperdix coqui</i>	Francolin, Coqui	Unlisted	LC
<i>Petronia supercilii</i>	Petronia, Yellow-throated	Unlisted	LC

<i>Phalacrocorax carbo</i>	Cormorant, White-breasted	Unlisted	LC
<i>Philomachus pugnax</i>	Ruff, Ruff	Unlisted	LC
<i>Phoenicopterus ruber</i>	Flamingo, Greater	Unlisted	LC
<i>Phoeniculus purpureus</i>	Wood-hoopoe, Green	Unlisted	LC
<i>Phylloscopus trochilus</i>	Warbler, Willow	Unlisted	LC
<i>Platalea alba</i>	Spoonbill, African	Unlisted	LC
<i>Plectropterus gambensis</i>	Goose, Spur-winged	Unlisted	LC
<i>Plegadis falcinellus</i>	Ibis, Glossy	Unlisted	LC
<i>Plocepasser mahali</i>	Sparrow-weaver, White-browed	Unlisted	LC
<i>Ploceus capensis</i>	Weaver, Cape	Unlisted	LC
<i>Ploceus cucullatus</i>	Weaver, Village	Unlisted	LC
<i>Ploceus velatus</i>	Masked-weaver, Southern	Unlisted	LC
<i>Podica senegalensis</i>	Finfoot, African	VU	LC
<i>Podiceps cristatus</i>	Grebe, Great Crested	Unlisted	LC
<i>Podiceps nigricollis</i>	Grebe, Black-necked	Unlisted	LC
<i>Pogoniulus chrysoconus</i>	Tinkerbird, Yellow-fronted	Unlisted	LC
<i>Polemaetus bellicosus</i>	Eagle, Martial	EN	VU
<i>Polyboroides typus</i>	Harrier-Hawk, African	Unlisted	LC
<i>Porphyrio madagascariensis</i>	Swamphen, African Purple	Unlisted	Unlisted
<i>Prinia flavicans</i>	Prinia, Black-chested	Unlisted	LC
<i>Prinia subflava</i>	Prinia, Tawny-flanked	Unlisted	LC
<i>Prodotiscus regulus</i>	Honeybird, Brown-backed	Unlisted	LC
<i>Psittacula krameri</i>	Parakeet, Rose-ringed	Unlisted	LC
<i>Psophocichla litsipsirupa</i>	Thrush, Groundscraper	Unlisted	Unlisted
<i>Pternistis natalensis</i>	Spurfowl, Natal	Unlisted	LC
<i>Pternistis swainsonii</i>	Spurfowl, Swainson's	Unlisted	LC
<i>Pycnonotus nigricans</i>	Bulbul, African Red-eyed	Unlisted	LC
<i>Pycnonotus tricolor</i>	Bulbul, Dark-capped	Unlisted	Unlisted
<i>Quelea quelea</i>	Quelea, Red-billed	Unlisted	Unlisted

<i>Rallus caerulescens</i>	Rail, African	Unlisted	LC
<i>Recurvirostra avosetta</i>	Avocet, Pied	Unlisted	LC
<i>Rhinopomastus cyanomelas</i>	Scimitarbill, Common	Unlisted	LC
<i>Riparia cincta</i>	Martin, Banded	Unlisted	LC
<i>Riparia paludicola</i>	Martin, Brown-throated	Unlisted	LC
<i>Riparia riparia</i>	Martin, Sand	Unlisted	LC
<i>Rostratula benghalensis</i>	Painted-snipe, Greater	VU	LC
<i>Sagittarius serpentarius</i>	Secretarybird	VU	VU
<i>Sarkidiornis melanotos</i>	Duck, Comb	Unlisted	LC
<i>Saxicola torquatus</i>	Stonechat, African	Unlisted	LC
<i>Scleroptila levaillantii</i>	Francolin, Red-winged	Unlisted	LC
<i>Scleroptila levaillantoides</i>	Francolin, Orange River	Unlisted	Unlisted
<i>Scleroptila shelleyi</i>	Francolin, Shelley's	Unlisted	LC
<i>Scopus umbretta</i>	Hamerkop, Hamerkop	Unlisted	LC
<i>Serinus canicollis</i>	Canary, Cape	Unlisted	LC
<i>Sigelus silens</i>	Flycatcher, Fiscal	Unlisted	LC
<i>Spermestes cucullatus</i>	Mannikin, Bronze	Unlisted	Unlisted
<i>Sphenoeacus afer</i>	Grassbird, Cape	Unlisted	LC
<i>Spizocorys conirostris</i>	Lark, Pink-billed	Unlisted	LC
<i>Sporopipes squamifrons</i>	Finch, Scaly-feathered	Unlisted	LC
<i>Spreo bicolor</i>	Starling, Pied	Unlisted	LC
<i>Stenostira scita</i>	Flycatcher, Fairy	Unlisted	LC
<i>Streptopelia capicola</i>	Turtle-dove, Cape	Unlisted	LC
<i>Streptopelia semitorquata</i>	Dove, Red-eyed	Unlisted	LC
<i>Streptopelia senegalensis</i>	Dove, Laughing	Unlisted	LC
<i>Struthio camelus</i>	Ostrich, Common	Unlisted	LC
<i>Sylvia borin</i>	Warbler, Garden	Unlisted	LC
<i>Sylvietta rufescens</i>	Crombec, Long-billed	Unlisted	LC
<i>Tachybaptus ruficollis</i>	Grebe, Little	Unlisted	LC
<i>Tachymarptis melba</i>	Swift, Alpine	Unlisted	LC
<i>Tadorna cana</i>	Shelduck, South African	Unlisted	LC
<i>Tchagra australis</i>	Tchagra, Brown-crowned	Unlisted	LC
<i>Tchagra senegalus</i>	Tchagra, Black-crowned	Unlisted	LC

<i>Telophorus sulfureopectus</i>	Bush-shrike, Orange-breasted	Unlisted	LC
<i>Telophorus zeylonus</i>	Bokmakierie, Bokmakierie	Unlisted	LC
<i>Terpsiphone viridis</i>	Paradise-flycatcher, African	Unlisted	LC
<i>Thalassornis leuconotus</i>	Duck, White-backed	Unlisted	LC
<i>Thamnolaea cinnamomeiventris</i>	Cliff-chat, Mocking	Unlisted	LC
<i>Threskiornis aethiopicus</i>	Ibis, African Sacred	Unlisted	LC
<i>Tockus leucomelas</i>	Hornbill, Southern Yellow-billed	Unlisted	LC
<i>Tockus nasutus</i>	Hornbill, African Grey	Unlisted	LC
<i>Trachyphonus vaillantii</i>	Barbet, Crested	Unlisted	LC
<i>Treron calvus</i>	Green-pigeon, African	Unlisted	LC
<i>Tricholaema leucomelas</i>	Barbet, Acacia Pied	Unlisted	LC
<i>Tringa glareola</i>	Sandpiper, Wood	Unlisted	LC
<i>Tringa nebularia</i>	Greenshank, Common	Unlisted	LC
<i>Tringa ochropus</i>	Sandpiper, Green	Unlisted	LC
<i>Tringa stagnatilis</i>	Sandpiper, Marsh	Unlisted	LC
<i>Turdoides jardineii</i>	Babbler, Arrow-marked	Unlisted	LC
<i>Turdus libyanus</i>	Thrush, Kurrichane	Unlisted	Unlisted
<i>Turdus olivaceus</i>	Thrush, Olive	Unlisted	LC
<i>Turdus smithi</i>	Thrush, Karoo	Unlisted	LC
<i>Turnix sylvaticus</i>	Buttonquail, Kurrichane	Unlisted	LC
<i>Tyto alba</i>	Owl, Barn	Unlisted	LC
<i>Tyto capensis</i>	Grass-owl, African	VU	LC
<i>Upupa africana</i>	Hoopoe, African	Unlisted	Unlisted
<i>Uraeginthus angolensis</i>	Waxbill, Blue	Unlisted	LC
<i>Urocolius indicus</i>	Mousebird, Red-faced	Unlisted	LC
<i>Vanellus armatus</i>	Lapwing, Blacksmith	Unlisted	LC
<i>Vanellus coronatus</i>	Lapwing, Crowned	Unlisted	LC
<i>Vanellus senegallus</i>	Lapwing, African Wattled	Unlisted	LC
<i>Vidua chalybeata</i>	Indigobird, Village	Unlisted	LC
<i>Vidua funerea</i>	Indigobird, Dusky	Unlisted	LC
<i>Vidua macroura</i>	Whydah, Pin-tailed	Unlisted	LC

<i>Vidua paradisaea</i>	Paradise-whydah, Long-tailed	Unlisted	LC
<i>Zosterops pallidus</i>	White-eye, Orange River	Unlisted	LC
<i>Zosterops virens</i>	White-eye, Cape	Unlisted	LC

APPENDIX C: EXPECTED MAMMAL SPECIES

Species	Common name	Presence	Origin	Seasonal	Conservation Status	
					Regional (SANBI, 2016)	IUCN (2017)
<i>Aethomys ineptus</i>	Tete Veld Rat	1	1	1	LC	LC
<i>Aethomys namaquensis</i>	Namaqua Rock Rat	1	1	1	Unlisted	LC
<i>Alcelaphus buselaphus</i>	Red Hartebeest	1	1	1	LC	LC
<i>Antidorcas marsupialis</i>	Springbok	1	1	1	LC	LC
<i>Aonyx capensis</i>	Cape Clawless Otter	1	1	1	NT	NT
<i>Atelerix frontalis</i>	South African Hedgehog	1	1	1	NT	LC
<i>Atilax paludinosus</i>	Water Mongoose	1	1	1	LC	LC
<i>Canis mesomelas</i>	Black-backed Jackal	1	1	1	LC	LC
<i>Caracal caracal</i>	Caracal	1	1	1	LC	LC
<i>Ceratotherium simum</i>	Southern White Rhinoceros	1	1	1	NT	NT
<i>Chlorocebus pygerythrus</i>	Vervet Monkey				LC	LC
<i>Connochaetes gnou</i>	Black Wildebeest	1	1	1	LC	LC
<i>Connochaetes taurinus</i>	Blue Wildebeest	1	1	1	LC	LC
<i>Crociodura cyanea</i>	Reddish-grey Musk Shrew	1	1	1	LC	LC
<i>Crociodura maquassiensis</i>	Maquassie Musk Shrew	1	1	1	VU	LC
<i>Crociodura silacea</i>	Lesser Grey-brown Musk Shrew	1	1	1	LC	LC
<i>Cryptomys hottentotus</i>	Common Mole-rat	1	1	1	LC	LC
<i>Cynictis penicillata</i>	Yellow Mongoose	1	1	1	LC	LC
<i>Dama dama</i>	Fallow Deer				Unlisted	
<i>Damaliscus pygargus</i>	Blesbok	1	1	1	LC	LC
<i>Desmodillus auricularis</i>	Short-tailed Gerbil	1	1	1	LC	LC
<i>Diceros bicornis</i>	Southwestern Black Rhinoceros	1	1	1	EN	CR
<i>Eidolon helvum</i>	African Straw-coloured Fruit Bat	1	1	1	LC	NT
<i>Elephantulus brachyrhynchus</i>	Short-snouted Sengi	1	1	1	LC	LC
<i>Elephantulus myurus</i>	Eastern Rock Sengi	1	1	1	LC	LC
<i>Epomophorus wahlbergi</i>	Wahlberg's Epauletted Fruit Bat	1	1	1	LC	LC

<i>Eptesicus hottentotus</i>	Long-tailed Serotine Bat	1	1	1	LC	LC
<i>Equus quagga</i>	Plains Zebra	1	1	1	LC	NT
<i>Felis nigripes</i>	Black-footed Cat	1	1	1	VU	VU
<i>Felis silvestris</i>	African Wildcat	1	1	1	LC	LC
<i>Genetta genetta</i>	Small-spotted Genet	1	1	1	LC	LC
<i>Genetta maculata</i>	Common Large-spotted Genet				Unlisted	LC
<i>Gerbilliscus brantsii</i>	Highveld Gerbil	1	1	1	LC	LC
<i>Gerbilliscus leucogaster</i>	Bushveld Gerbil	1	1	1	LC	LC
<i>Herpestes sanguineus</i>	Slender Mongoose	1	1	1	LC	LC
<i>Hippopotamus amphibius</i>	Common Hippopotamus				LC	VU
<i>Hydrictis maculicollis</i>	Spotted-necked Otter	1	1	1	VU	NT
<i>Hystrix africaeaustralis</i>	Cape Porcupine	1	1	1	LC	LC
<i>Ichneumia albicauda</i>	White-tailed Mongoose	1	1	1	LC	LC
<i>Ictonyx striatus</i>	Striped Polecat	1	1	1	LC	LC
<i>Kobus ellipsiprymnus</i>	Common Waterbuck				LC	LC
<i>Leptailurus serval</i>	Serval	1	1	1	NT	LC
<i>Lepus saxatilis</i>	Scrub Hare	1	1	1	LC	LC
<i>Lepus victoriae</i>	African Savanna Hare	1	1	1	LC	LC
<i>Hydrictis maculicollis</i>	Spotted-necked Otter				VU	NT
<i>Mastomys coucha</i>	Multimammate Mouse	1	1	1	LC	LC
<i>Mellivora capensis</i>	Honey Badger	1	1	1	LC	LC
<i>Mungos mungo</i>	Banded Mongoose	1	1	1	LC	LC
<i>Myotis tricolor</i>	Temnink's Hairy Bat	1	1	1	LC	LC
<i>Myotis welwitschii</i>	Welwitsch's Hairy Bat	1	1	1	LC	LC
<i>Mystromys albicaudatus</i>	White-tailed Rat	1	1	1	VU	EN
<i>Neoromicia capensis</i>	Cape Serotine Bat	1	1	1	LC	LC
<i>Neoromicia zuluensis</i>	Aloe Bat	1	1	1	LC	LC
<i>Nycteris thebaica</i>	Egyptian Slit-faced Bat	1	1	1	LC	LC
<i>Orycteropus afer</i>	Aardvark	1	1	1	LC	LC
<i>Otomys angoniensis</i>	Angoni Vlei Rat	1	1	1	LC	LC
<i>Otomys irroratus</i>	Vlei Rat	1	1	1	LC	LC
<i>Ourebia ourebi</i>	Oribi	1	1	1	EN	LC
<i>Panthera pardus</i>	Leopard	5	1	1	VU	VU
<i>Papio ursinus</i>	Chacma Baboon	1	1	1	LC	LC

<i>Parahyaena brunnea</i>	Brown Hyaena	1	1	1	NT	NT
<i>Pedetes capensis</i>	Springhare	1	1	1	LC	LC
<i>Pelea capreolus</i>	Grey Rhebok	1	1	1	NT	LC
<i>Phacochoerus africanus</i>	Common Warthog	1	1	1	LC	LC
<i>Poecilogale albinucha</i>	African Stripped Weasel	1	1	1	NT	LC
<i>Procavia capensis</i>	Rock Hyrax	1	1	1	LC	LC
<i>Pronolagus randensis</i>	Jameson's Red Rock Rabbit	1	1	1	LC	LC
<i>Proteles cristata</i>	Aardwolf	1	1	1	LC	LC
<i>Raphicerus campestris</i>	Steenbok	1	1	1	LC	LC
<i>Rattus rattus</i>	House Rat	1	1	1	Unlisted	LC
<i>Redunca fulvorufula</i>	Mountain Reedbuck	1	1	1	EN	LC
<i>Rhabdomys pumilio</i>	Xeric Four-striped Mouse	1	1	1	LC	LC
<i>Rhinolophus clivosus</i>	Geoffroy's Horseshoe Bat	1	1	1	LC	LC
<i>Rhinolophus darlingi</i>	Darling's Horseshoe Bat	1	1	1	LC	LC
<i>Saccostomus campestris</i>	Pouched Mouse	1	1	1	LC	LC
<i>Sauromys petrophilus</i>	Flat-headed Free-tail Bat	1	1	1	LC	LC
<i>Scotophilus dinganii</i>	Yellow House Bat	1	1	1	LC	LC
<i>Steatomys krebsii</i>	Krebs's Fat Mouse	1	1	1	LC	LC
<i>Steatomys pratensis</i>	Fat Mouse	1	1	1	LC	LC
<i>Suncus infinitesimus</i>	Least Dwarf Shrew				LC	LC
<i>Suncus varilla</i>	Lesser Dwarf Shrew	1	1	1	LC	LC
<i>Suricata suricatta</i>	Suricate	1	1	1	LC	LC
<i>Sylvicapra grimmia</i>	Common Duiker	1	1	1	LC	LC
<i>Syncerus caffer</i>	Southern Savannah Buffalo	1	1	1	LC	LC
<i>Tadarida aegyptiaca</i>	Egyptian Free-tailed Bat	1	1	1	LC	LC
<i>Taphozous mauritanus</i>	Mauritian Tomb Rat	1	1	1	LC	LC
<i>Tragelaphus oryx</i>	Eland	1	1	1	LC	LC
<i>Tragelaphus strepsiceros</i>	Greater Kudu				LC	LC
<i>Vulpes chama</i>	Cape Fox	1	1	1	LC	LC

EXPECTED REPTILE SPECIES

Species	Common name	Conservation Status	
		Regional (Bates et al., 2014)	Global (IUCN, 2017)
<i>Acontias gracilicauda</i>	Thin-tailed Legless Skink	Unlisted	LC
<i>Afroedura nivaria</i>	Drakensberg Flat Gecko	Unlisted	LC
<i>Afrotrophops bibronii</i>	Bibron's Blind Snake	Unlisted	LC
<i>Agama aculeata distanti</i>	Eastern Ground Agama	Unlisted	LC
<i>Agama atra</i>	Southern Rock Agama	Unlisted	LC
<i>Aparallactus capensis</i>	Black-headed Centipede-eater	LC	LC
<i>Bitis arietans</i>	Puff Adder	LC	Unlisted
<i>Boaedon capensis</i>	Common House Snake	LC	Unlisted
<i>Causus rhombeatus</i>	Rhombic Night Adder	LC	Unlisted
<i>Chamaeleo dilepis</i>	Common Flap-neck Chameleon	LC	LC
<i>Crocodylus niloticus</i>	Nile Crocodile	VU	LC
<i>Crotaphopeltis hotamboeia</i>	Red-lipped Snake	LC	Unlisted
<i>Dasypeltis scabra</i>	Rhombic Egg-eater	LC	LC
<i>Gerrosaurus flavigularis</i>	Yellow-throated Plated Lizard	LC	Unlisted
<i>Hemachatus haemachatus</i>	Rinkhals	Unlisted	LC
<i>Kinixys lobatsiana</i>	Lobatse Hinged Tortoise	Unlisted	LC
<i>Lamprophis aurora</i>	Aurora House Snake	Unlisted	LC
<i>Lygodactylus capensis</i>	Common Dwarf Gecko	LC	Unlisted
<i>Pachydactylus affinis</i>	Transvaal Gecko	Unlisted	LC
<i>Pachydactylus capensis</i>	Cape Gecko	LC	LC
<i>Panaspis wahlbergi</i>	Wahlberg's Snake-eyed Skink	Unlisted	Unlisted
<i>Prosymna ambigua</i>	East African Shovel-Snout	Unlisted	LC
<i>Psammophis brevirostris</i>	Short-snouted Grass Snake	Unlisted	LC
<i>Psammophis subtaeniatus</i>	Western Yellow-bellied Sand Snake	LC	LC
<i>Psammophylax rhombeatus</i>	Spotted Grass Snake	LC	Unlisted
<i>Psammophylax tritaeniatus</i>	Striped Grass Snake	LC	LC
<i>Python natalensis</i>	Southern African Python	LC	Unlisted
<i>Stigmochelys pardalis</i>	Leopard Tortoise	Unlisted	LC
<i>Trachylepis punctatissima</i>	Speckled Rock Skink	LC	LC
<i>Trachylepis varia</i>	Variable Skink	LC	Unlisted

EXPECTED AMPHIBIAN SPECIES

Species	Common name	Conservation Status	
		Regional (Bates et al., 2014)	IUCN (2017)
<i>Amietia angolensis</i>	Common River Frog	LC	LC
<i>Amietia delalandii</i>	Delalande's River Frog	Unlisted	Unlisted
<i>Amietia fuscigula</i>	Cape River Frog	LC	LC
<i>Breviceps adspersus</i>	Bushveld Rain Frog	LC	LC
<i>Cacosternum boettgeri</i>	Boettger's Caco	LC	LC
<i>Kassina senegalensis</i>	Bubbling Kassina	LC	LC
<i>Phrynobatrachus natalensis</i>	Snoring Puddle Frog	LC	LC
<i>Ptychadena anchietae</i>	Plain Grass Frog	LC	LC
<i>Pyxicephalus adspersus</i>	Giant Bullfrog	NT	LC
<i>Schismaderma carens</i>	Red Toad	LC	LC
<i>Sclerophrys capensis</i>	Raucous Toad	Unlisted	LC
<i>Sclerophrys garmani</i>	Eastern Olive Toad	LC	LC
<i>Sclerophrys gutturalis</i>	Guttural Toad	LC	LC
<i>Sclerophrys poweri</i>	Western Olive Toad	LC	LC
<i>Semnodactylus wealii</i>	Rattling Frog	LC	LC
<i>Strongylopus fasciatus</i>	Striped Stream Frog	LC	LC
<i>Tomopterna cryptotis</i>	Tremolo Sand Frog	LC	LC
<i>Tomopterna natalensis</i>	Natal Sand Frog	LC	LC
<i>Tomopterna tandyi</i>	Tandy's Sand Frog	LC	LC
<i>Xenopus laevis</i>	Common Platanna	LC	LC

16 Appendix E: Geotechnical Desktop Assessment



Geotechnical Desk Study

SolarReserve Vogelstruisfontein Photovoltaic
Project

28 July 2017

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Geotechnical Desk Study

SolarReserve Vogelstruisfontein Photovoltaic
Project

28 July 2017

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1 Introduction

1.1 Background

The proposed SolarReserve Vogelstruisfontein Photovoltaic Project (SR PVP) will comprise a fixed array of mounted solar photovoltaic panels and other associated infrastructure commonly associated with photovoltaic power plant, utilizing integrated on-site battery storage facilities. Total generation capacity is anticipated to be just below 10MW photovoltaic and 10MW battery storage developed on a footprint of 16ha.

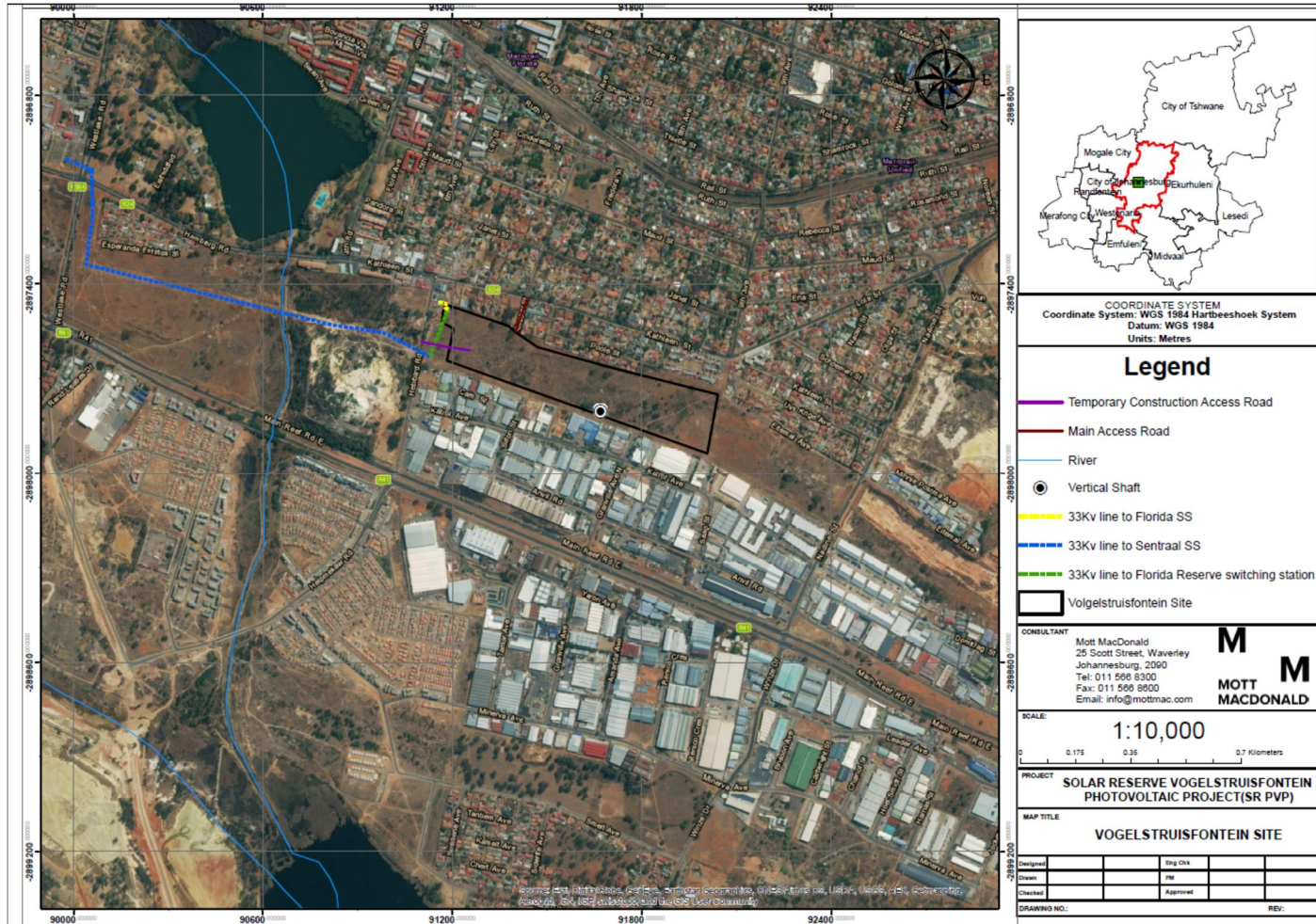
This desk study report summarises the geotechnical conditions present on site obtained from available literature and site visit.

1.2 Site description

The proposed SR PVP is located approximately 1km from Florida lake. The land is zoned as vacant land and has a history of undermining (Gold mining).

With reference to major routes, the proposed site is about 600m north of the R41 which is a provincial route in South Africa, that connects Johannesburg with Randfontein. Figure 1 below shows the locality plan.

Figure 1: Locality Plan of SolarReserve outlined in black



Source: Mott MacDonald, 2017

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The findings and opinions of this report are based on information obtained from a variety of sources, as detailed in this report. Mott MacDonald cannot and does not guarantee the authenticity or reliability of the information it has relied on from others.

2 Physical and Environmental Setting

2.1 Site Visit Observations

Mott MacDonald undertook a geotechnical site visit on 20th June 2017 and Table 1 gives a summary of the observations.

Table 1: Site visit summary

Location:	26°11'6.78"S, 27°54'55.53"E
Access:	Klopper street (north), Granville Avenue (south)
Land use:	Previously undermining
Occupancy:	Vacant
Geomorphology:	Gently sloping towards north west
Vegetation	Medium grass and shrubs, some burnt
Ground Conditions:	Undulating ground, with crown hole developments
Service Observations:	Underground gas pipeline, overhead electricity lines, vertical mine shaft
Approximate area (Hectares):	16

The ground is generally uneven and undulating with small piles of rubble and domestic waste, as typified in Figures 2 and 3. The possibility of ground subsidence cannot be discounted.

A disused vertical mine shaft is located on the southern section of the site (Figure 3). Presently the depth of the vertical shaft is unknown and the entrance to the shaft has been covered by large heaps of rubble and the area is clearly marked. A 40m radius exclusion zone is recommended.

Figure 2: Proposed site (looking westwards)



Source: Mott MacDonald, 2017

Figure 3: Disused vertical mine shaft, backfilled

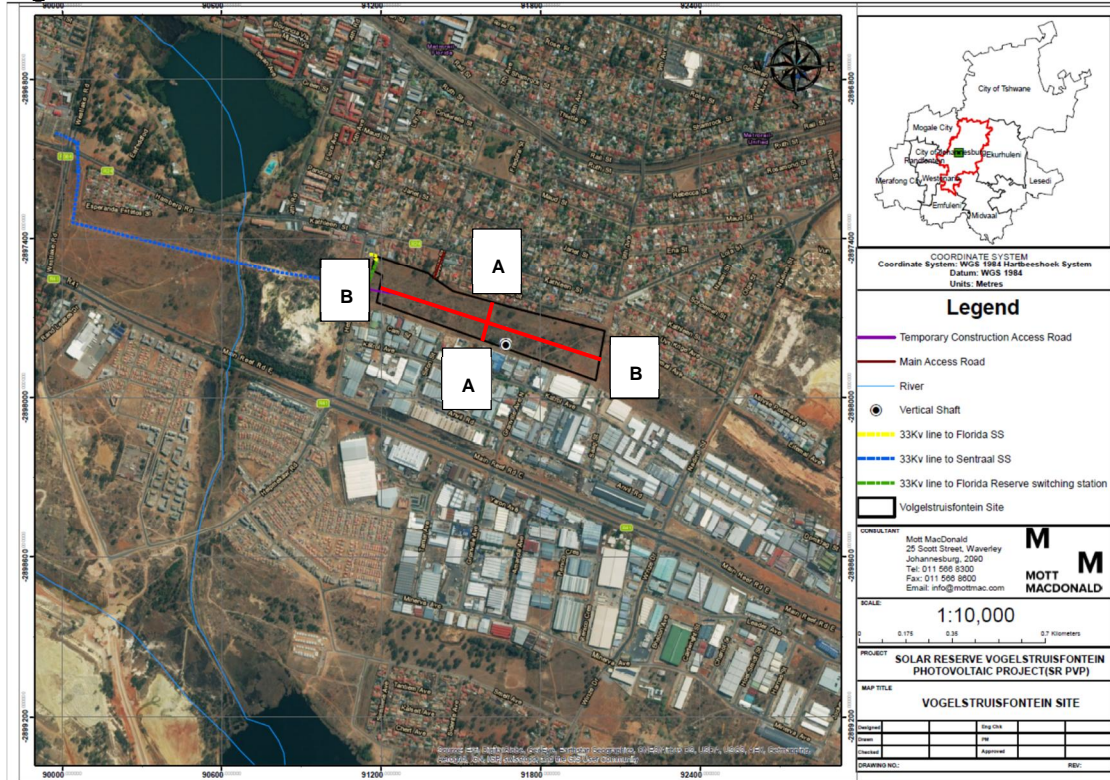


Source: Mott MacDonald, 2017

2.2 Topography

The land is generally gently sloping as shown by the two cross-sections A-A and B-B. The elevation for Section A-A varies between 1705m and 1713m above sea level (Figure 4), with the terrain sloping towards the north (2.2% slope) as well as towards the south (1.7% slope). The SolarReserve site is at the top of the hill before the gentle slope in both directions.

Figure 4: Cross-section A-A & B-B



Source: Mott MacDonald, 2017

The elevation for Section B-B varies between 1696m and 1717m above sea level (Figure 4), with the terrain sloping towards the west with an average slope of 3.4% towards the west.

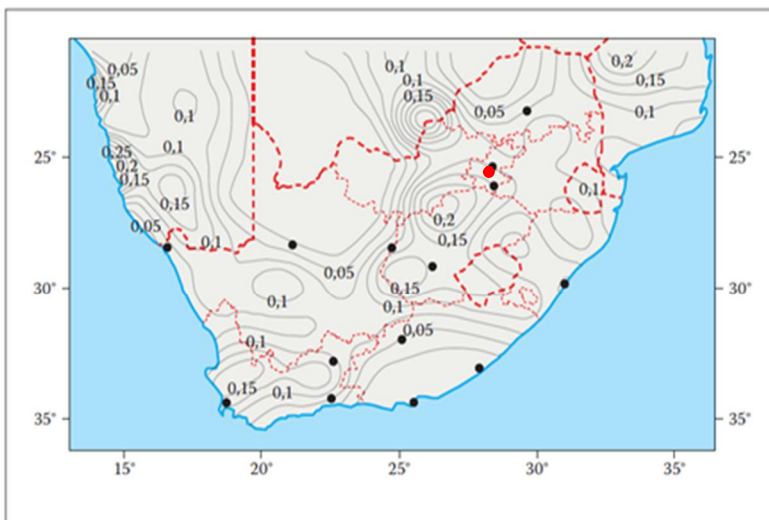
2.3 Surface hydrology

Florida Lake is located approximately 1km north west of the site. The lakes outflow flows through an artificial canal on the western boundary of the historical tailings facility west of the proposed SR RVR project (Figure 1). No drainage lines pass through the site and the site was dry at the time of the site visit.

2.4 Seismicity

Peak ground acceleration in g (gravity acceleration) with 10% probability of exceedance in 50 years for the proposed site lies between 0.1g to 0.15g (Figure 5).

Figure 5: Seismic hazard map (Red dot indicates the approximate site location)



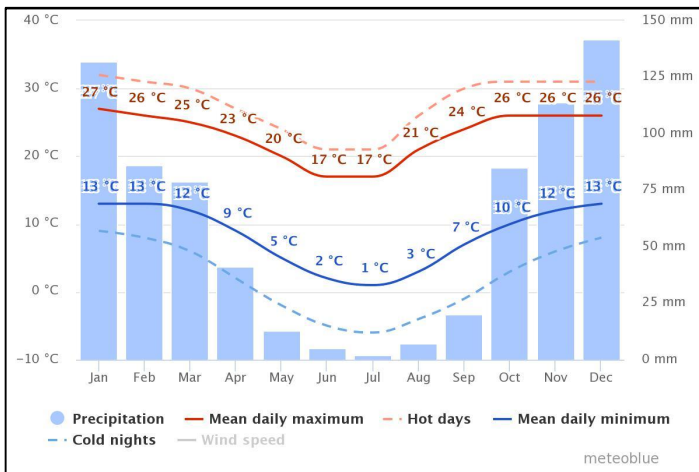
Seismic hazard map from Council of Geoscience (2003) data, showing peak ground acceleration in g (gravity acceleration) with 10% probability of exceedance in 50 years

Source: Council for Geoscience, 2003

2.5 Climate

Average precipitation of site and surrounding areas is about 450mm per year. Figure 6 shows the average rainfall values for the site per month. It receives the highest rainfall in December and January and the lowest in June, July and August.

Figure 6: Average rainfall



Source: www.meteoblue.com, June 2017

3 Geology and Hydrogeology

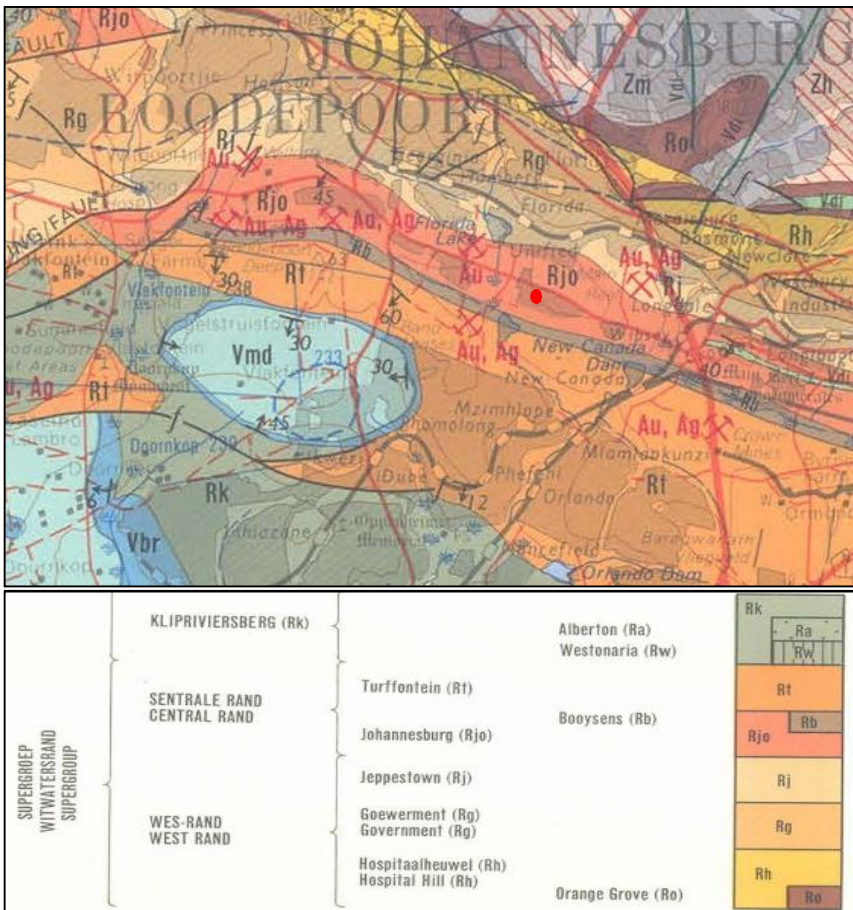
3.1 Geology

The geology of the site has been interpreted from published geological maps. The available geological maps show bedrock geology only and therefore, an understanding of the superficial geology is subject to site specific ground investigations.

3.1.1 Bedrock

The area is underlain quartzite and conglomerate of the Johannesburg formation, Central Rand group and Witwatersrand supergroup (Figure 7).

Figure 7: Approximate location of the SR PVP in relation to the geology (Red dot indicates the approximate site location)



Source: Council of Geoscience, 2625 WES-RAND

3.1.2 Made Ground

Although there is no made ground represented on the map, it was observed during the site visit that the site is used as a rubble dumping ground in places. The historical mining activities are likely to have introduced made ground in the site area. This can lead to concerns such as settlement, differential settlement, heave, shrink/swell, and chemical attack.

3.1.3 Superficial Deposits

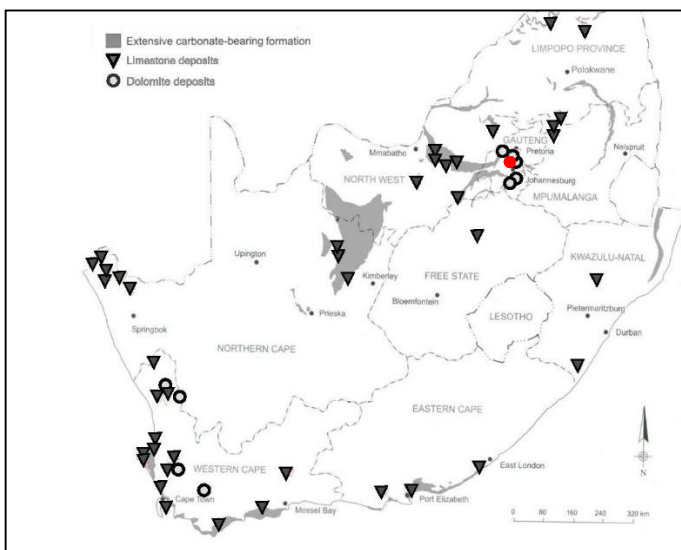
Superficial deposits may be present on the proposed site though there are no superficial deposits represented on the geology map. The strength of superficial deposits varies from very soft to very stiff and their consistency from very loose to very dense. Understanding

these processes are a pre-requisite to formulating the geological and ground models that provide the basis for predicting engineering behaviour.

3.2 Dolomitic Risk

The site falls outside the dolomitic risk area. This can be shown in the Figure 8 below which shows that the largest part site does not fall within the dolomitic risk area. Therefore, no special dolomitic investigation or construction methods are required.

Figure 8: Map showing the dolomitic risk areas in SA. The red dot denotes the approximate site location



Source: Martini, J.E.J and Wilson, M.G.C (1998)

3.3 Subsidence

The area affected by shallow undermining in the Witwatersrand goldfields of southern Gauteng is approximately 40km long and 50m wide and covers the proposed project footprint. It stretches from Randfontein (in the West Rand) to Boksburg (in the East Rand) and is located immediately south of Main Reef Road in central Johannesburg.

Although no tension cracks and/or subsidence basins were observed during the site visit, few areas exhibited crown-hole development (Figure 9).

In the absence of ground investigation data, the subsidence at the project site can be characterised as medium risk, which may give rise to general subsidence and fracturing of the ground, as previous mining activity may cause voids at shallow or intermediate depths, which lead to the formation of crown-holes in the ground above.

Figure 9: Crown hole development



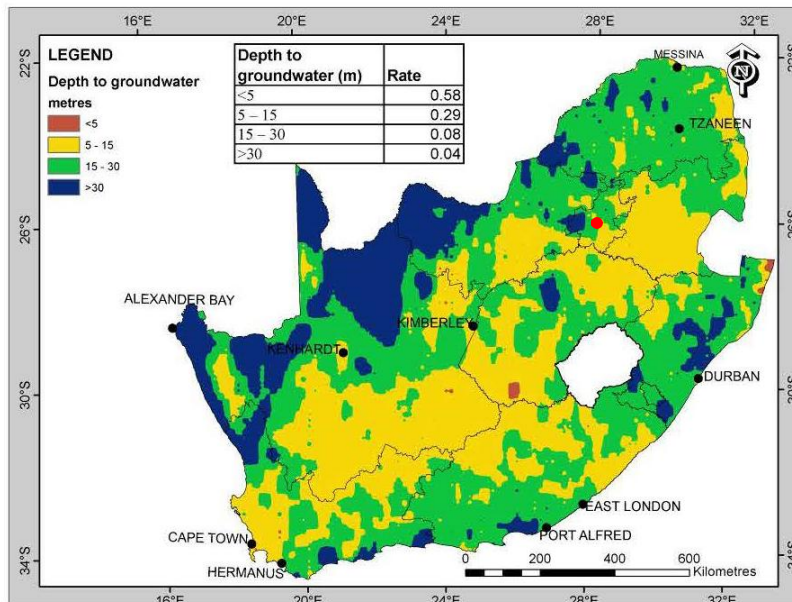
Source: Mott MacDonald, 2017

3.4 Geohydrology

Figure 10 was used to qualitatively assess the geohydrology at the site. The geohydrology indicates possible rich groundwater prospects within the region. Based on the mapped data, the depth of water table near the site is likely to range at a depth of 15m to 30m.

There are indications that within the area, intergranular and fractured aquifers show groundwater yields in the range 0.5l/s to 2l/s. However, the groundwater is likely to be in hydraulic continuity with the adjacent Florida Lake and so groundwater levels may fluctuate as river water levels vary.

Figure 10: Map showing the depth to water table. The red dot denotes the approximate site location



Source: Department of Water Affairs

4 Preliminary Geotechnical and Contamination Risk Assessment

4.1 Made Ground

- Present on site
- May be contaminated
- Low bearing capacity
- Variable density
- Likely to be unsuitable as a founding material
- Buried features such as old foundations

4.2 Bedrock

- Depth of weathering variable
- Rapidly changing bedrock depth possible
- Core-stones may be misinterpreted as bedrock

4.3 Subsidence

- Presence of crown hole development on site
- Ground investigation required to assess risk characterisation

4.4 Groundwater

- Possible rich groundwater prospects
- Water table depth estimated at 15m to 30m
- Groundwater potentially chemically aggressive due to acid rock drainage from nearby gold mining operations

4.5 Contamination

- Possible contamination of made ground
- Groundwater contamination likely due to known acid rock drainage from nearby gold mining operations

4.6 Seismic Activity

- The area is susceptible to seismic events of sufficient magnitude to cause minor structural damage. Solar plant should therefore be designed to local earthquake regulations.

5 Conclusions and Recommendations

5.1 Geotechnical assessment of the site

The types of soils likely to be found on site are known to cause design and construction problems of both earthworks and foundations.

5.2 Recommendations

It is recommended that a preliminary ground investigation (Phase 1) be undertaken to further understand the ground conditions. Thereafter foundation options can be considered.



17 Appendix F: Visual Impact Assessment

Volgelstruisfontein Photovoltaic Project (PVP) Landscape and Visual Impact Assessment: Gauteng Province, South Africa

Date: 4th September 2017

Document prepared for Mott MacDonald (Pty) Ltd,
On behalf of SolarReserve South Africa Management (Pty) Ltd;



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GLOSSARY

Best Practicable Environmental Option (BPEO)

This is the option that provides the most benefit, or causes the least damage, to the environment as a whole, at a cost acceptable to society, in the long, as well as the short, term.

Cumulative Impact

The impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person, undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time.

Glare and Glint

Glare is defined in the Oxford dictionary (<http://www.oxforddictionaries.com>) as 'shine with a strong or dazzling light'. Glint is defined as the circumstance relating to 'reflect small flashes of light'.

Impact (visual)

A description of the effect of an aspect of a development on a specified component of the visual, aesthetic or scenic environment, within a defined time and space.

Issue (visual)

Issues are concerns related to the proposed development, generally phrased as questions, taking the form of "what will the impact of some activity be on some element of the visual, aesthetic or scenic environment?"

Key Observation Points (KOPs)

KOPs refer to receptors (people affected by the visual influence of a project) located in the most critical locations surrounding the landscape modification, who make consistent use of the views associated with the site where the landscape modifications are proposed. KOPs can either be a single point of view that an observer/evaluator uses to rate an area or panorama, or a linear view along a roadway, trail or river corridor.

Management Actions

Actions that enhance the benefits of a proposed development, or avoid, mitigate, restore or compensate for, negative impacts.

Receptors

Individuals, groups or communities who would be subject to the visual influence of a particular project.

Sense of Place

The unique quality or character of a place, whether natural, rural or urban.

Scenic Corridor

A linear geographic area that contains scenic resources, usually, but not necessarily, defined by a route.

Viewshed

The outer boundary defining a view catchment area, usually along crests and ridgelines. Similar to a watershed. This reflects the area in which, or the extent to which, the landscape modification is likely to be seen.

Zone of Visual Influence (ZVI)

The ZVI is defined as 'the area within which a proposed development may have an influence or effect on visual amenity.'

LIST OF ACRONYMS

<i>Aol</i>	Area of Influence
<i>APHP</i>	Association of Professional Heritage Practitioners
<i>BLM</i>	Bureau of Land Management (United States)
<i>BPEO</i>	Best Practicable Environmental Option
<i>CALP</i>	Collaborative for Advanced Landscape Planning
<i>DEA</i>	Department of Environmental Affairs (National)
<i>DEA&DP</i>	Department of Environmental Affairs and Development Planning (Western Cape Province)
<i>DEM</i>	Digital Elevation Model
<i>DoC</i>	Degree of Contrast
<i>EIA</i>	Environmental Impact Assessment
<i>EMP</i>	Environmental Management Plan
<i>GIS</i>	Geographic Information System
<i>I&APs</i>	Interested and Affected Parties
<i>IEMA</i>	Institute of Environmental Management and Assessment (United Kingdom)
<i>IEMP</i>	Integrated Environmental Management Plan
<i>KOP</i>	Key Observation Point
<i>LVIA</i>	Landscape and Visual Impact Assessment
<i>MAMSL</i>	Metres above mean sea level
<i>NELPAG</i>	New England Light Pollution Advisory Group
<i>PSDF</i>	Provincial Spatial Development Framework
<i>PV</i>	Photovoltaic
<i>SAHRA</i>	South African National Heritage Resources Agency
<i>SDF</i>	Spatial Development Framework
<i>SEA</i>	Strategic Environmental Assessment
<i>SEF</i>	Solar Energy Facility
<i>VAC</i>	Visual Absorption Capacity
<i>VIA</i>	Visual Impact Assessment
<i>VRMA</i>	Visual Resource Management Africa
<i>VRM</i>	Visual Resource Management
<i>ZVI</i>	Zone of Visual Influence

SECTION 1: NON-TECHNICAL SUMMARY

Visual Resource Management Africa CC (VRMA) was appointed by Mott MacDonald Africa (Pty) Ltd to undertake a **Landscape and Visual Impact Assessment** for the proposed SolarReserve Volgelstruisfontein Photovoltaic Project (PVP) on behalf of SolarReserve South Africa Management (Pty) Ltd. The assessment includes a site visit (undertaken on the 7th of June 2016), viewshed mapping and impact assessment.

The overall site **Scenic Quality is graded Low**, predominantly due to the lack of uniqueness of the site, the homogeneity of the vegetation and the degraded landscapes from illegal dumping and semi-industrial development to the south of the site. The expected **Receptor Sensitivity is also graded Medium to Low**. Due to the location of the site within the City of Johannesburg, large numbers of people are located around the site and large volumes of traffic would have views of the power line. Due to the degraded and 'vacant lot' nature of the site, in conjunction with the lack of tourism related resources of the area, **Public Interest towards landscape change is likely to be Low**. There are no prominent ridgelines on the site or in the immediate surrounds. Drainage from the site is to the west to the small stream that drains from Florida Lake. There is slightly elevated ground to the south east of the proposed site, but it does not offer significantly elevated views of the proposed site. The **Area of Influence (Aol) is described as Local**. The main factor determining the Aol is the surrounding built nature of the environment. The predominantly residential single storey dwellings located to the north will contain the extent of the proposed visibility from the immediate north. Further reduction in visibility is also due to the garden shade trees that characterise the suburban nature of the settlement. Potential Visibility is contained to the south by the Robertville Industrial Park where 'big-box' warehouses define the local landscape character. Some visual exposure could take place to the east and west, but this too is constrained by trees growing in these areas. The existing tree growth to the south would effectively restrict views to the site. Based on the Aol mapping, the following receptor locations were identified as impact assessment points for the proposed PV project:

- Poole Street, Eitemal Avenue and Aurora Street.
- Klopper Street park.

Due to the higher visual absorption capacity / lower landscape significant of the power line routing as well as the temporary intrusive nature of the underground powerline, no visual impact points were identified for this power line landscape modification. Due to the Minor significance of the **Landscape Visual Significance** (without mitigation), and the limited mitigations measures required for this development to reduce residual impacts, Residual Landscape Impacts reflect the same rating as Pre-Mitigation Landscape Impacts and **remain Minor**. For the proposed PVP landscape modification, the **Visual Impact Significance** for the western (Poole Street etc...) receptors was rated **Moderate (negative) without mitigation**. This is due to the higher visual absorption capacity of the site, with views from the residential receptors mainly at ground levels and with the Robertville Industrial Park in the background. As mitigation is limited, and the impact moderate, the residual impact remains unchanged.

As no significant landscape resources will be impacted, and visual impacts are likely to be Moderate, it is the recommendation of this assessment that the project **should be authorised**.

SECTION 2: BACKGROUND

Visual Resource Management Africa CC (VRMA) was appointed by Mott MacDonald Africa (Pty) Ltd to undertake a **Landscape and Visual Impact Assessment** for the proposed SolarReserve Volgelstruisfontein Photovoltaic Project. The assessment includes a site visit (undertaken on the 18th of June 2016), viewshed mapping and impact assessment. The client generated perspective aerial view photomontages. These images facilitate in the understanding of the change to the proposed landscape and inform decision makers and interested and affected parties (I&APs) on the nature of the proposed project.

2.1 Study Team

Contributors to this study are summarised in Table 1 below.

Table 1: Authors and Contributors to this Report.

Aspect	Person	Organisation / Company	Qualifications
Landscape and Visual Assessment (author of this report)	Stephen Stead B.A (Honours) Human Geography, 1991 (UKZN, Pietermaritzburg)	VRMA	<ul style="list-style-type: none"> Accredited with the Association of Professional Heritage Practitioner and 16 years of experience in visual assessments including renewable energy, powerlines, roads, dams across southern Africa. Undertook visual assessment studies of 34 solar energy projects in southern Africa.
Contrast rating and editing.	Lisa Schultz B.A Fine Art 1989 (UKZN, Pietermaritzburg)	VRMA	<ul style="list-style-type: none"> 8 years of experience in contrast ratings.

2.2 Scope of Study

The scope of work for the visual study required the following:

- Literature and policy review and mapping
- Preparation of visual baseline
- Assessment of viewshed landscape context
- Identification and Assessment of main receptors
- Assessment of site scenic quality of landscape
- Contrast rating from Key Observation Points
- Impact assessment as per defined criteria
- Describe relevant and implementable mitigation measures to reduce, avoid, or minimise negative impacts and enhance positive impacts and recommendations; and
- Review of I&AP / Relevant Authority comments.

2.3 Project Location and Description

2.3.1 Locality

The proposed PVP project will be located on the remaining extent of portion 4 of the Farm Vogelstruisfontein 231IQ with a total size of 65.78ha. The physical development of the footprint of the panels and battery plant will be approximately 13ha. The property is accessed from Hebbard Road, off Main Reef Road, located in Roodepoort area within City of Johannesburg Municipal district (Figure 1).

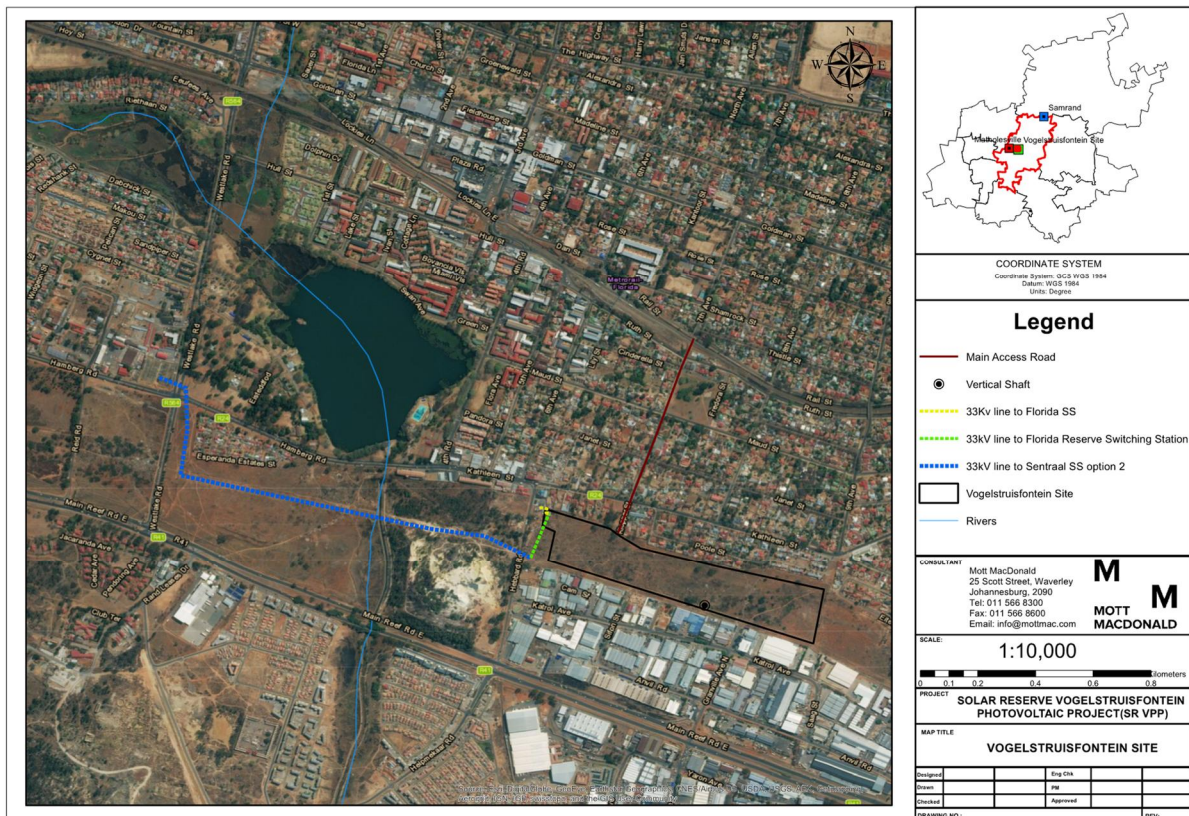


Figure 1: Project locality map with blue and green lines depicting the proposed underground routing of the powerlines.

2.3.2 Planning

The project will be constructed on a smaller, 13Ha portion cut out of the Vogelstruisfontein Farm portion 4. The project area includes a number of servitudes (Refer to Figure 2 below) which run along the north, south and eastern boundaries of the property include the following:

- Transnet pipeline
- 88KV City Power OHL servitude
- Mining ventilation shaft, Gold Mining Co.
- Gas pipeline; and
- Water pipeline

It is understood that the current land use zoning of the parcel of land to be developed is that of Vacant Land as the land is de-proclaimed mining land and therefore not part of any town planning scheme (VBDG Town Planners, 2017). VBDG Town Planners undertook discussions with the City of Johannesburg Senior Legal Advisor Mr Alwyn Nortje regarding the land use planning who indicated that no town planning process is necessary as the land is de-proclaimed mining land and therefore not part of any town planning scheme.

As the land is vacant and unmaintained, many areas on site are being used on a regular basis for illegal dumping of waste including: domestic garden waste, waste construction materials, building rubble and general domestic waste.

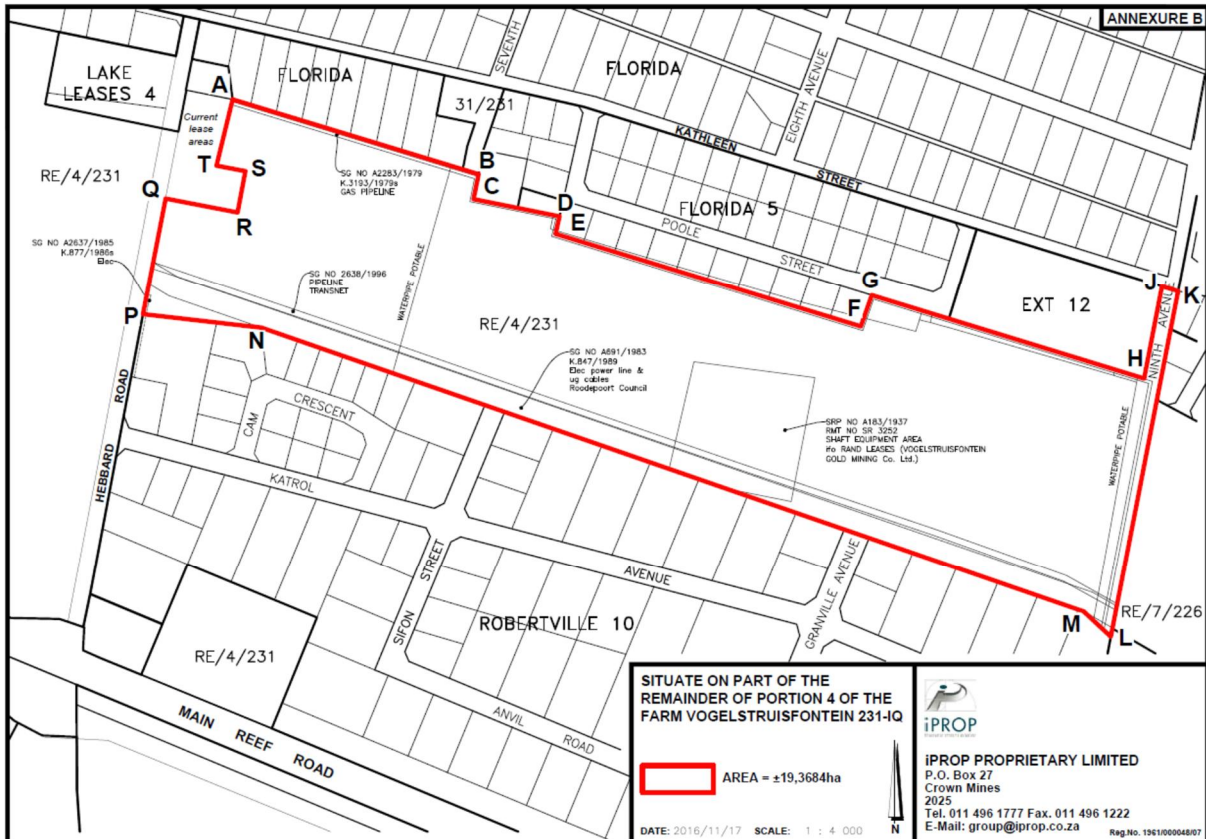


Figure 2: iProp Proprietary Limited map 2 for the remainder of Portion 4 of the farm Vogelstruisfontein

2.3.3 Photovoltaic Project



Figure 3: Project preferred layout map.

The site identified for the PV Solar (see Figure 3 above) with integrated storage project is proposed to accommodate both the solar PV panels, utility scale vanadium flow batteries as well as the associated infrastructure required for such a facility including, but not limited to:

- PV array comprising of the photovoltaic modules/panels, mounting structures and associated balance of system (tracking/fixed hardware, protection systems i.e. masts and electronics);
- 7000m² Hard standing battery storage facility platform. Vanadium flow batteries housed in 40ft containers consisting of cell stacks and vanadium electrolyte contained in tanks with all associated balance of plant (piping, pumps, and control equipment;
- Inverters, transformers and switchgear with battery storage;
- An on-site substation consisting of a 40ft container split with Project and City Power equipment in each respective section of the substation. 33KV Power line buried from City Power substation to option a) Florida substation (±47 meters – Yellow line) or option b) Sentraal substation connecting into City Power's 33KV (±1.7km – Blue & green line);
- Cabling between the project components;
- Prefabricated housing for administration offices, security and guard houses, maintenance and storage;
- Temporary man-camp of approximately 1ha;
- Temporary construction laydown area of approximately 1ha;
- Internal gravel service roads constructed by removing 300mm topsoil and backfilling with type 1 crushed stone, compacted to 97% Mod Ashto. Roads shall ± 4m in width cantilevered either side for storm water run-off;

- Raw water tank;
- Project primary access and secondary road/s, associated access point/s, internal distribution roads and crossings;
- Fencing and perimeter security system.

A potential visual issue often raised by communities living adjacent to photovoltaic installations, is related to glare that is generated from reflection of sunlight at low angles. The USA Federal Aviation Association research into this effect has found light reflection off PV panels to be insignificant. The following graphic (Figure 4) was modified from an analysis undertaken by the FAA that depicts the percentage scale of light reflecting off a variety of surfaces. As depicted on the scale, PV reflection is very low with some of the latest PV panels reflecting a little as 2% of incoming sunlight (Federal Aviation Association (USA), 2010). Although, as depicted in the photograph, some sunset glare could take place, this effect is likely to be limited, in close proximity to existing sunlight glare (due to the low angle of the sun), and would only take place for short periods of time at first and last light.

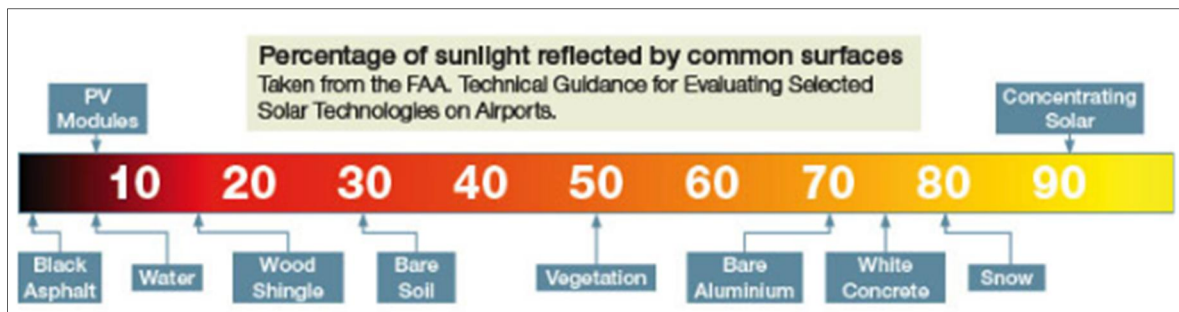


Figure 4: Percentage scale of light reflecting of a variety of surfaces (Source: Federal Aviation Association, USA).

Due to the built nature and the large trees located to the west of the site, the potential for glare is unlikely to take place. SolarReserve will also be using no glare black panels and the angle of the PV panels will be very low, so very little glint is anticipated.

The following photographs depict examples of some of the project components.



Figure 5: Photographic example of typical fixed PV arrays (Jasper Power Company, 2014).



Figure 6: Photograph of a typical containerized substation (Source: SolarReserve, 2013)

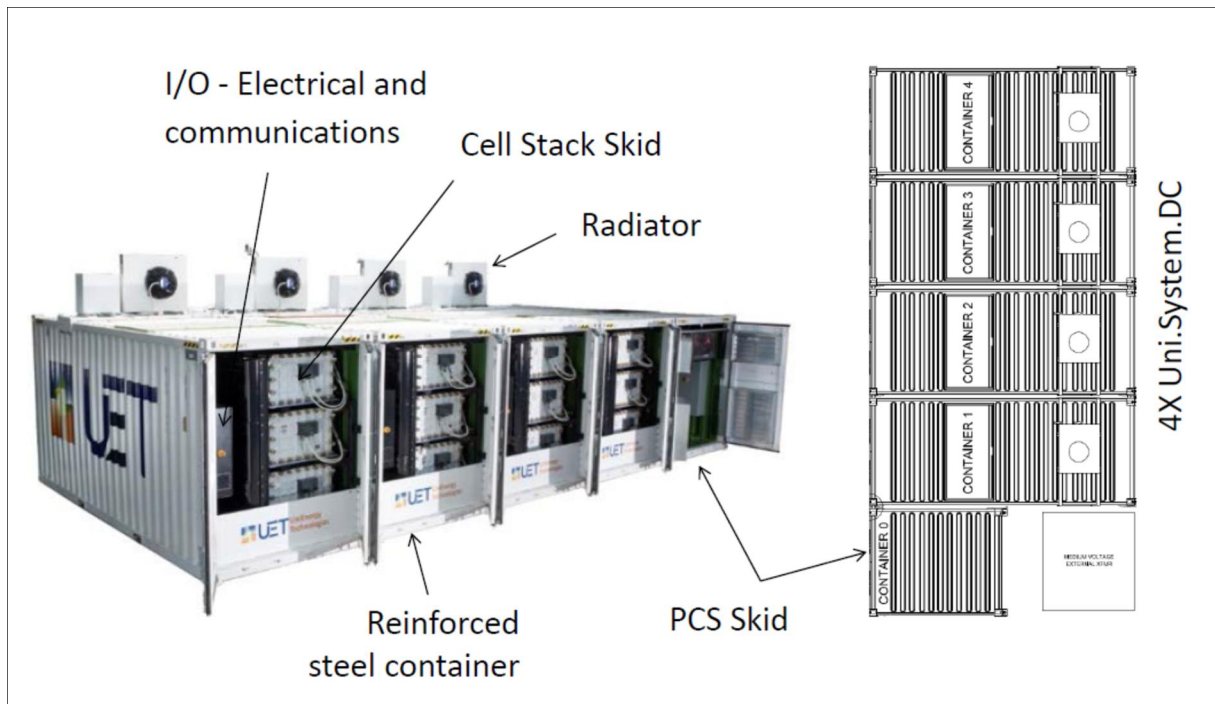


Figure 7: Schematic example of a battery storage facility (Bushveld Energy South Africa & UniEnergy Technologies, 2017)

2.3.4 Power Evacuation

The power generated by the project will be evacuated to the existing City Power Florida Substation via an underground 33kV power line. The Vogelstruisfontein Project's interconnection infrastructure will comprise of the following:

- Project substation and City Power substation both housed in a single 40ft container measuring 12.5m x 3m x 3m
- 33KV MV XLPE 300mm copper cable buried and secured (concrete) minimum depth 1m from City Power Substation to either substation Florida (circa 100m length) or Sentraal substation (circa 1.2km west) of the proposed site
- The grid connection solution
- 48 Core optical ground wire (OPGW)
- One additional breaker in the existing Florida and Sentraal substations;
- Cable trenches and cabling
- One 25m lighting/lightning masts
- Short access roads to the substations
- Standard control room located within the combined 40ft container substation
- Control Plant, AC/DC, Metering, SCADA and Telecoms; and
- Security fence with entrance gates.

The proposed power line will be a City Power owned asset, and only constructed by the Applicant under a self-build agreement with City Power.

Services required for the Project will include:

- Refuse material disposal - all refuse material generated from the proposed development will be collected by a contractor and will be disposed of at a licensed waste disposal site off site. It is most likely that the waste will be disposed of at the Marie Louise Landfill site. This service will be arranged with the municipality/waste collection company when required

- Sanitation – due to the location of the site it is proposed that the project will construct and utilise its own sanitation services as Municipal services do not service the project site. All sewage/effluent water originating from these facilities will be managed utilising temporary portable chemical toilets and portable modular sewage treatment facilities (package plants)
- Water for the construction phase will be transported to the site, using water tankers. During the operational phase, the need is minimal and will be trucked to site
- Construction electricity – the use of generators will be required during the construction phase of the plant; and
- Operational power – power for all auxiliary power services shall be drawn from the 33KV connection to the City Power Network. On site step, down auxiliary transformers will step down the 33KV MV supply to 400V.

Storm water management - No significant scaled ground works will act to change the flow of surface water across the site. The existing grass vegetation will be retained as far as possible and managed as stipulated in the EMPr. No asphalt or layer works will cover any section of the site requiring storm water channelling and associated drainage. Surface water on site is thus anticipated to naturally infiltrate and drain in alignment with the existing topography of the site.

SECTION 3: LEGAL FRAMEWORK

3.1 Legislation and Policies

In order to comply with the Visual Resource Management requirements, it is necessary to clarify which planning policies govern the proposed property area to ensure that the scale, density and nature of activities or developments are harmonious and in keeping with the sense of place and character of the area. A literature review found no guidelines that specifically related to the proposed property development.

3.2 International Good Practice

For cultural landscapes, the following documentation provides good practice guidelines, specifically:

- Guidelines for Landscape and Visual Impact Assessment (LVIA), Second Edition; (The Landscape Institute, 2003);
- Guideline for Involving Visual and Aesthetic Specialists in EIA Processes; (Oberholzer, 2005);
- International Finance Corporation (IFC) Performance Standard 6 – Biodiversity Conservation and Sustainable Management of Living Natural Resources; (IFC, 2012).

3.2.1 Guidelines for Landscape and Visual Impact Assessment, Second Edition

The Landscape Institute and the Institute of Environmental Management and Assessment have compiled a book outlining best practice in landscape and visual impact assessment. This has become a key guideline for LVIA in the United Kingdom. “The principal aim of the guideline is to encourage high standards for the scope and context of landscape and visual impact assessments, based on the collegiate opinion and practice of the members of the Landscape Institute and the Institute of Environmental Management and Assessment. The guidelines also seek to establish certain principles and will help to achieve consistency, credibility and effectiveness in landscape and visual impact assessment, when carried out as part of an EIA” (The Landscape Institute, 2003: Pg 4).

In the introduction, the guideline states that ‘Landscape encompasses the whole of our external environment, whether within village, towns, cities or in the countryside. The nature and pattern of buildings, streets, open spaces and trees – and their interrelationships within the built environment – are an equally important part of our landscape heritage’ (The Landscape Institute, 2003: Pg 9). The guideline identified the following reasons why landscape is important in both urban and rural contexts, in that it is:

- An essential part of our natural resource base;
- A reservoir of archaeological and historical evidence;
- An environment for plants and animals (including humans);
- A resource that evokes sensual, cultural and spiritual responses and contributes to our urban and rural quality of life;
- A valuable recreation resources.

3.2.2 *Guideline for Involving Visual and Aesthetic Specialists in the EIA Process*

This guideline for visual and aesthetic specialists in the EIA process was coordinated by the CSIR, compiled by Bernard Oberholzer Landscape Architects, and issued by the Provincial Government of the Western Cape (Department of Environmental Affairs and Development Planning). The purpose of this guideline was to provide decision-makers with adequate and appropriate information about the potential positive and negative visual and aesthetic impacts of a proposed development and any associated management actions in order to make an informed decision on whether or not to approve, proceed with or finance the development (Oberholzer, 2005; pg. 2). The following specific concepts should be considered during the Landscape and Visual Impact Assessment (LVIA):

- An awareness that 'visual' implies the full range of visual, aesthetic, cultural and spiritual aspects of the environment that contribute to the area's sense of place;
- The consideration of both the natural and the cultural landscape, and their inter-relatedness;
- The identification of all scenic resources, protected areas and sites of special interest, together with their relative importance in the region;
- An understanding of the landscape processes, including geological, vegetation and settlement patterns, which give the landscape its particular character or scenic attributes;
- The need to include both quantitative criteria, such as 'visibility', and qualitative criteria, such as aesthetic value or sense of place;
- The need to include visual input as an integral part of the project planning and design process, so that the findings and recommended mitigation measures can inform the final design, and hopefully the quality of the project; and
- The need to determine the value of visual/aesthetic resources through public involvement. (Oberholzer, 2005; Pg. 2).

3.2.3 *Performance Standard 6 (PS6): Biodiversity Conservation and Sustainable Management of Living Natural Resources*

The project is not being undertaken in accordance with IFC standards. However, in keeping with international best practice, the IFC Performance Standards 6 is referenced.

Under IFC PS 6, ecosystem services are organized into four categories, with the third category related to cultural services which are defined as “the non-material benefits people obtain from ecosystems”; and “may include natural areas that are sacred sites and areas of importance for recreation and aesthetic enjoyment” (IFC, 2012). The Millennium Ecosystem Assessment (2005) defined these non-material benefits that can be obtained from ecosystems:

- Inspiration: Ecosystems provide a rich source of inspiration for art, folklore, national symbols, architecture, and advertising;
- Aesthetic values: Many people find beauty or aesthetic value in various aspects of ecosystems, as reflected in the support for parks, scenic drives, and the selection of housing locations;
- Sense of place: Many people value the “sense of place” that is associated with recognised features of their environment, including aspects of the ecosystem;
- Cultural heritage values: Many societies place high value on the maintenance of either historically important landscapes (“cultural landscapes”) or culturally significant species; and

- Recreation and ecotourism: People often choose where to spend their leisure time based in part on the characteristics of the natural or cultivated landscapes in a particular area.

The Millennium Ecosystem Assessment (2005) Ecosystems and Human Well-being: Synthesis report indicates that there has been a “rapid decline in sacred groves and species” in relation to spiritual and religious values, and aesthetic values have seen a “decline in quantity and quality of natural lands”.

SECTION 4: APPROACH AND METHODS

4.1 Introduction

4.1.1 Objectives

Landscape and visual guidelines recommend that separate assessments are undertaken for landscape and visual Impacts. Landscape impacts derive from changes in the physical landscape that may give rise to changes in its character and how this is experienced. Visual impacts relate to changes that arise in the composition of available views as a result of changes to the landscape and to people's response to any changes, and the overall impacts with respect to visual amenity.

4.1.2 Approach

The following criteria represent the approach of the assessment:

- Define the scenic values of the potentially affected area required to preserve areas of high scenic value
- Review the project design in the context of the identified scenic values to identify focus areas for field work
- Undertake a field survey to confirm the visual impacts of the project and define potential mitigation through proposing alternative routing, where considered feasible; and
- Undertake a landscape and visual impact assessment of the agreed and final project.

4.1.3 Methods and Activities

The process that VRMA follows when undertaking a LVIA is based on the United States Bureau of Land Management's (BLM) Visual Resource Management (VRM) method (USDI., 2004). This mapping and GIS-based method of assessing landscape modifications allows for increased objectivity and consistency by using standard assessment criteria. Objectivity and consistency in VIA studies are increased by using the basic design elements of form, line, colour, and texture. These landscape attributes are used as the context for describing potential visual effects of proposed projects and to identify options for management intervention, such as measures for adjusting project design to minimise visual impacts. The assessment comprises two main sections, firstly the Visual Inventory to identification of the visual resources along the proposed routing and secondly, the Analysis Stage which requires a Contrast Rating to assess the expected degree of contrast the proposed power line would generate within the receiving landscape. The Visual Impacts are derived from the significance of the visual resource, in relation to the intensity of the contrast generated.

In terms of VRM methodology, landscape character is derived from a combination of scenic quality and receptor sensitivity to landscape change. Thus, the ***Importance of the Visual Resource*** is based on the findings of the Scenic Quality and Receptor Sensitivity check sheets located in Appendix D. These findings are then submitted to a VRM Matrix (Table 2) to determine VRM Classes. The VRM Classes are not prescriptive and are used as a guideline to determine the carrying capacity of a visually preferred landscape as a basis for assessing the suitability of the landscape change associated with the proposed project. The visual objectives of each of the classes are listed below:

- The Class I objective is to preserve the existing character of the landscape, the level of change to the characteristic landscape should be very low, and must not attract attention. Class I is assigned when a decision is made to maintain a natural landscape
- The Class II objective is to retain the existing character of the landscape and the level of change to the characteristic landscape should be low. The proposed development may be seen, but should not attract the attention of the casual observer, and should repeat the basic elements of form, line, colour and texture found in the predominant natural features of the characteristic landscape
- The Class III objective is to partially retain the existing character of the landscape, where the level of change to the characteristic landscape should be moderate. The proposed development may attract attention, but should not dominate the view of the casual observer, and changes should repeat the basic elements found in the predominant natural features of the characteristic landscape; and
- The Class IV objective is to provide for management activities that require major modifications of the existing character of the landscape. The level of change to the landscape can be high, and the proposed developments may dominate the view and be the major focus of the viewer's (s') attention.

Table 2: VRM Class Matrix Table

		VISUAL SENSITIVITY LEVELS								
		High			Medium			Low		
SCENIC QUALITY	A (High)	II	II	II	II	II	II	II	II	II
	B (Medium)	II	III	III/ IV *	III	IV	IV	IV	IV	IV
	C (Low)	III	IV	IV	IV	IV	IV	IV	IV	IV
DISTANCE ZONES		Fore/middle ground	Background	Seldom seen	Fore/middle ground	Background	Seldom seen	Fore/middle ground	Background	Seldom seen

* If adjacent areas are **Class III** or lower, assign **Class III**, if higher, assign **Class IV**

This contrast rating is undertaken from the receptor Key Observation Points (KOPs), where the level of change to the existing landscape is assessed in terms of line, colour, texture and form, in relation to the visual objectives defined for the area. KOPs are defined by the BLM as the people (receptors) located in strategic locations surrounding the property or development that make consistent use of the views associated with the site where the landscape modifications are proposed. To define the KOPs, potential receptor locations were identified in the viewshed analysis, and screened, based on the following generic criteria:

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

4.1.4 Assumptions and Limitations

- Although every effort to maintain accuracy was undertaken, as a result of the Digital Elevation Model (DEM) being generated from satellite imagery and not being a true representation of the earth's surface, the viewshed mapping is approximate and may not represent an exact visibility incidence
- The use of open source satellite imagery was utilised for base maps in the report
- The viewsheds were generated using ASTER elevation data. (NASA, 2009)
- Some of the mapping in this document was created using Bing Maps (previously Live Search Maps, Windows Live Maps, Windows Live Local, and MSN Virtual Earth) and powered by the Enterprise framework; and
- VRM Africa reserves the right to modify aspects of the project deliverables if and when new/additional information may become available from research or further work in the applicable field of practice, or pertaining to this study.

4.2 Surveys and Data Analysis

4.2.1 Sampling Sites/ Areas

A site survey was undertaken on the 7th of June 2017 in fair weather conditions. During the field survey, due to the uniformity of the site landscape, two sampling sites were visited for the photovoltaic site and two for the proposed underground power line routing. Four locations surrounding the proposed photovoltaic site relating to potential PV visual impacts were visited. Three locations surrounding the proposed power line routing pertaining to visual impact were visited. Photographs were taken from each of the points and approximate compass points captured. The nature of the dominant landscape was also noted. From the site, zoomed photographs were also taken of the receptors that would have views of the proposed landscape modification to inform the Area of Influence mapping. These receptor locations were then visited to determine the significance of the views and to take photographs of the views back towards the proposed site replicating the main views of the receptors. The photographs are located in Appendix B.

Table 3: List of Sampling Sites where Landscape and Aesthetic Survey was Conducted

ID	Project Component	Date	Latitude	Longitude	Landscape / Visual
Site central	PV	18 Jun 2017	26°11'11.24"S	27°55'5.56"E	Landscape
Site west	PV	18 Jun 2017	26°11'5.28"S	27°54'43.98"E	Landscape
Granville Ave	PV	18 Jun 2017	26°11'14.01"S	27°55'5.07"E	Visual
Eitemal Ave	PV	18 Jun 2017	26°11'14.08"S	27°55'24.65"E	Visual
Poole Street	PV	18 Jun 2017	26°11'6.18"S	27°55'8.07"E	Visual
Klopper Street Park	PV	18 Jun 2017	26°11'0.44"S	27°54'51.22"E	Visual
Eastern section	Powerline	18 Jun 2017	26°11'4.84"S	27°54'40.84"E	Landscape
Western section	Powerline	18 Jun 2017	26°10'57.01"S	27°54'8.07"E	Landscape
Florida Lake (south)	Powerline	18 Jun 2017	26°10'53.24"S	27°54'26.98"E	Visual
Esperanda Estates Street	Powerline	18 Jun 2017	26°10'54.52"S	27°54'7.88"E	Visual
Florida Lake Parking (southwest)	Powerline	18 Jun 2017	26°10'43.06"S	27°54'8.04"E	Visual

4.3 Impact Assessment Methodology

The following Impact Assessment criteria defined by Mott MacDonald were used in the assessment: “The Environmental Impact Assessment process will identify impacts and report on the likely significant environmental or social impacts. The criteria for determining significance are specific for each environmental and social aspect and will be defined in the specialist chapters. For each impact, the likely magnitude of the impact and the sensitivity of the receptor are defined, quantitatively to the extent possible. Generic criteria for the definition of magnitude and sensitivity are summarised *in italics* below”. (Mott MacDonald)

The two aspects of the project that will be impacted are:

- Landscape: the integrity of the proposed landscape modification in relation to the significance of the existing landscape; and
- Visual: the impact of the change to the existing or future receptors (people utilising the visual resources).

4.3.1 Magnitude Criteria

“The assessment of impact magnitude is undertaken in two steps. Firstly, the identified impacts are categorised as beneficial or adverse. Secondly, impacts are categorised as major, moderate, minor or negligible based on consideration of parameters such as:

- *Scale of the impact – how intense or severe the extent of the impact is likely to be.*
- *Duration of the impact – ranging from ‘beyond decommissioning’ to ‘temporary with no detectable impact’*
- *Spatial extent of the impact – for instance, within the site boundary, within district, regionally, nationally and internationally*
- *Reversibility – ranging from ‘permanent requiring significant intervention to return to baseline’ to ‘no change’*
- *Likelihood – ranging from ‘occurring regularly under typical conditions’ to ‘unlikely to occur’; and*
- *Compliance with legal standards and established professional criteria – ranging from ‘substantially exceeds national standards or international guidance’ to ‘meets the standards, i.e. impacts are predicted to be less than the standard would allow’.*”

The table below presents generic criteria for determining impact magnitude (for adverse impacts). Each detailed assessment will define impact magnitude in relation to its topic.

Table 4: Criteria for determining impact magnitude

Category	Description (adverse impacts)
Major	Fundamental change to the specific conditions assessed resulting in long term or permanent change, typically widespread in nature and requiring significant intervention to return to baseline; would violate national standards or Good International Industry Practice (GIIP) without mitigation.
Moderate	Detectable change to the specific conditions assessed resulting in non-fundamental temporary or permanent change.
Minor	Detectable but minor change to the specific conditions assessed.
Negligible	No perceptible change to the specific conditions assessed.

Source: Mott MacDonald

4.3.2 Sensitivity Criteria

“Sensitivity is specific to each topic and the environmental resource or population affected, with criteria generally defined on basis of baseline information. Generic criteria for determining sensitivity of receptors are outlined in the table below. Each detailed assessment will define sensitivity in relation to its topic”.

Table 5: Criteria for determining sensitivity of a receptor

Category	Description
High	Receptor (human, physical or biological) with little or no capacity to absorb proposed changes or minimal opportunities for mitigation.
Medium	Receptor with little capacity to absorb proposed changes or limited opportunities for mitigation.
Low	Receptor with some capacity to absorb proposed changes or moderate opportunities for mitigation.
Negligible	Receptor with good capacity to absorb proposed changes or and good opportunities for mitigation.

Source: Mott MacDonald

4.3.3 Impact Evaluation

“Likely impacts are evaluated taking into account the interaction between the magnitude and sensitivity criteria as presented in the impact evaluation matrix in the table below”.

Table 6: Impact evaluation matrix

		Magnitude						
		Adverse			Beneficial			
		Major	Moderate	Minor	Negligible	Minor	Moderate	Major
Sensitivity	High	Major	Major	Moderate	Negligible	Moderate	Major	Major
	Medium	Major	Moderate	Minor	Negligible	Minor	Moderate	Major
	Low	Moderate	Minor	Negligible	Negligible	Negligible	Minor	Moderate
	Negligible	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Minor

Source: Mott MacDonald

4.3.4 Determining Significance

“The objective of this Environmental Impact Assessment process is to identify the likely significant effects of the Project on the environment and people. Impacts that have been evaluated as being ‘Moderate’ or ‘Major’ are significant effects and identified as such in the specialist chapters. Consequently, impacts that are ‘Minor’ or ‘Negligible’ are not significant”.

4.3.5 Cumulative Impacts

“The assessment of cumulative impacts considers the combination of multiple impacts that may result when the Project is considered alongside other existing or proposed projects in the same geographic area or similar development timetable. The assessment of cumulative impacts will identify where particular resources or receptors would experience significant adverse or beneficial impacts as a result of a combination of projects (inter-project cumulative impacts).

It will also identify cumulative impacts on receptors resulting from impacts in different specialist areas (intra-discipline project cumulative impacts)”.

4.3.6 Mitigation and Enhancement Measures

“Where feasible the following hierarchy of mitigation measures will be applied:

- Avoid and reduce impacts through design (embedded mitigation)*
- Minimise impacts at source or at receptor*
- Repair, restore or reinstate to address temporary construction effects; and*
- Compensate for loss or damage”.*

“In addition to the above, community engagement and disclosure activities will play a key role in managing the extent of impacts and consideration has also been given to the identification of enhancement measures. Enhancement measures are actions and processes that:

- Create new positive impacts or benefits*
- Increase the reach or amount of positive impacts or benefits; and*
- Distribute positive impacts or benefits more equitably”.*

“Each technical chapter identifies relevant mitigation and enhancement measures. All the mitigation, management and monitoring measures to address likely Project impacts will be reported in the project Environmental Management Programme Report (EMPr)”.

4.3.7 Residual Impacts

“Residual impacts are those significant impacts that remain after the application of mitigation and enhancement measures. Impacts considered ‘Major’ or ‘Moderate’ after application of mitigation and enhancement measures, are presented as significant residual impacts”.

4.3.8 Uncertainty

“Any uncertainties associated with impact prediction or the sensitivity of receptors due to the absence of data or other limitations will be explicitly stated. Where applicable, the Environmental Impact Assessment process will make recommendations concerning measures that should be put in place with monitoring or environmental or social management plans to deal with the uncertainty so that they may be addressed”.

SECTION 5: BASELINE ENVIRONMENT

5.1 Area of Influence

The Visual Receptors and Area of Influence (AoI) are identified by means of a viewshed analysis. The visible extent, or Viewshed, is “the outer boundary defining a view catchment area, usually along crests and ridgelines” (Oberholzer, 2005). In order to define the extent of the possible influence of the proposed project, a viewshed analysis was undertaken from the proposed site at 4m height above ground level, making use of open source NASA ASTER for the generation of the Digital Elevation Model data (NASA, 2009). This mapped area indicates the approximate maximum visual influence. However, as this mapping does not take vegetation into consideration, and visual intensity tends to diminish over distance (Hull & Bishop, 1988), the Area of Influence is mainly informed by the site visit. A viewshed analysis was not generated for the proposed powerlines due to the temporary and underground nature of the landscape modification.

A regional digital elevation mapping exercise was undertaken to better understand the topography of the surrounding. The map (Figure 8) indicates that the regional elevation ranges from 1647mamsl to 1768mamsl. There are no prominent ridgelines on the site or in the immediate surrounds. Drainage from the site is to the northwest to the small stream that drains from Florida Lake. There is slightly elevated ground to the south east of the proposed site, but it does not offer significantly elevated views of the proposed site.

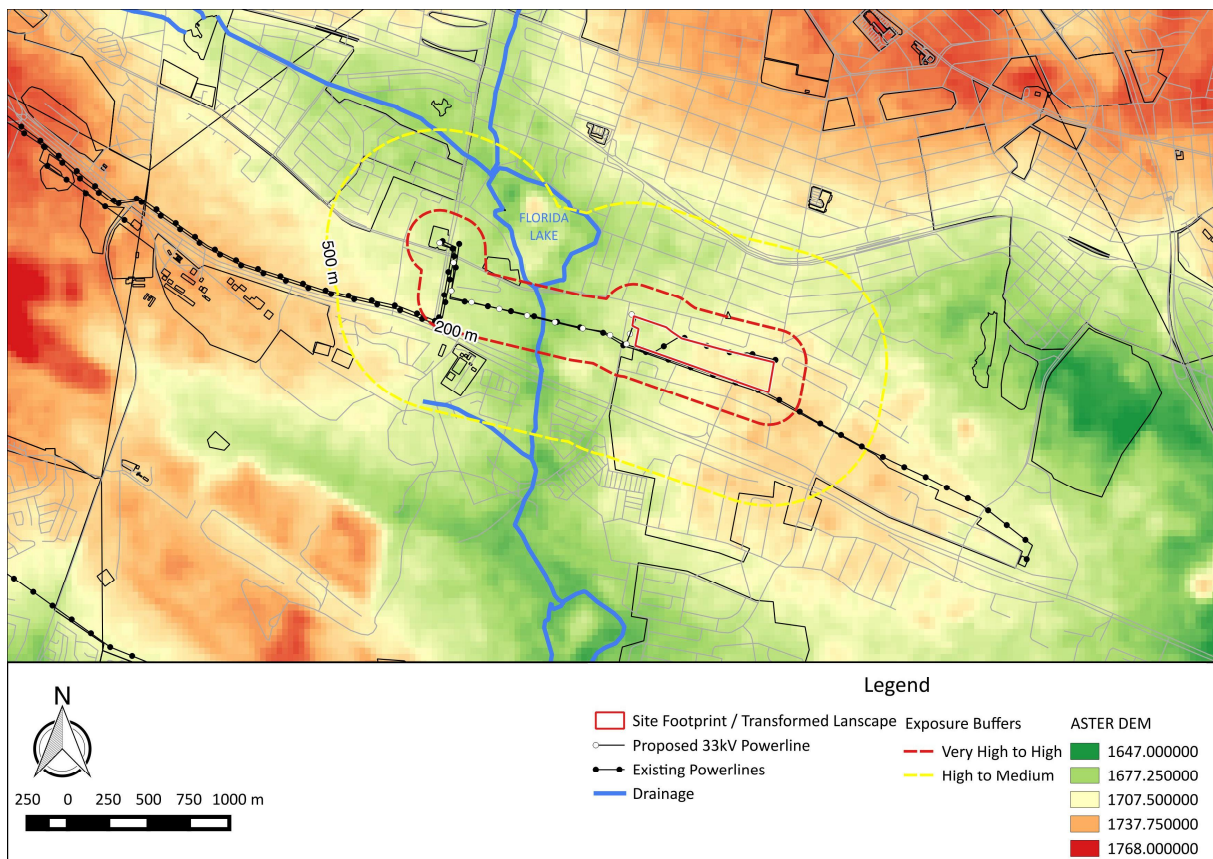


Figure 8: ASTER Digital Elevation Model of the site and surrounding areas.

The main factor determining the Aol for the PV project component is the surrounding built nature of the environment. As can be seen from the viewshed mapping overlaid onto Bing Aerial imagery below (Figure 9) the areas to the north and south are densely developed.



Figure 9 : Proposed PV project approximate viewshed map.

The predominantly residential single storey dwellings located to the north will contain the extent of the proposed visibility from the immediate north. Further reduction in visibility is also due to the garden shade trees that characterise the suburban nature of the settlement. Potential Visibility is contained to the south by the Robertville Industrial Park where ‘big-box’ warehouses define the local landscape character. Some visual exposure could take place to the east and west, but this too is constrained by trees growing in these areas. The existing tree growth to the south would effectively restrict views to the site. Overall, the PVP Aol is likely to be similar in size to the project extent, contained to the immediate extents to the north, south and west, with some localised visual spillage to the east.

Current visual issues of concern within the Aol are:

- Landscape degradation associated with vacant land where illegal dumping on and around the proposed PV and power line routings is taking place.
- Parks adjacent to the proposed PVP site which are currently degraded (e.g. Klopper Street Park).
- Residential developments where receptor sensitivity to landscape change could be high.

5.2 Visual Baseline Environment

5.2.1 Visual Receptors

Based on the Aol, receptor locations were captured and evaluated in terms of KOP Status. As all the identified receptors are located within the high exposure distance zone where views of the proposed PVP landscape modification would be clearly visible. The receptors identified as having potential views of the landscape modification are listed below:

- Robertville Industrial areas
- Eitemal Avenue
- Aurora Street
- Klopper Street; and
- Hebbard Road.

The Robertville Industrial Area



Figure 10: View of the Robertville industrial site as seen from the proposed PVP site.

The Robertville Industrial area is located to the south of the proposed PVP site and is characterised by 'big-box' warehouses and high boundary walls which restrict views of the PVP site. The existing industrial nature of this area is likely to result in lower receptor sensitivity to landscape change, especially if the proposed landscape change is also semi-industrial in nature. Views of the proposed PVP landscape modification would only be visible from the few access roads which end at the proposed PVP site. Due to the lower levels of landscape character and the likely lower receptor sensitivity, this area is not defined as a Visual Impact Point.

Eitemal Avenue



Figure 11: Photograph west of Eitemal Avenue.

Eitemal Avenue is located approximately 300m to the east of the proposed PVP site where views from residential dwellings along this road would have partial, background views of the proposed PVP landscape modification. The dwellings are mainly single story and enclosed with walls and trees. Receptor sensitivity is likely to be low as the proposed PVP landscape modification will only be seen in partial, background views. For these reasons, this locality is not defined as a visual impact assessment point.

Aurora Street



Figure 12: Photograph of the Aurora Street townhouse complex located adjacent to the proposed PVP site.

Aurora Street is located due north of the proposed site. There are residential and double storey flats with clear views of the proposed PVP site and partial views of the site from the single

storey residential dwellings. Due to the close proximity of the flats to the site with elevated views looking over the proposed PVP site, this locality is defined as a Visual Impact Point.

Klopper Street



Figure 13: Photograph of Klopper Street park located behind the rubble dumped to restrict access into the proposed development property.

Klopper Street is a residential area and City Park with clear views of the proposed site due to the close proximity. The area is degraded to some degree by illegal dumping of rubble in an attempt to reduce vehicular access to the site. Due to the official park status, this location is identified as a Landscape Impact Assessment Point.

5.2.2 Broad Landscape Descriptions

This section addresses the different landscapes found on the sites of the proposed project which are then assessed for scenic quality and receptor sensitivity in Sections 6.2.3. SANBI GIS National Vegetation Map (Figure 14) indicates the vegetation as Soweto Highveld Grassland (Green) falling within the Mesic Highveld Grassland Bioregion (South African National Biodiversity Institute, 2012). This was verified on site where the dominant vegetation was grasslands (refer to photographs in Annexure A). Other vegetation found on site included alien trees species, which included Acacia and Eucalyptus species. Due to the small extent of the site, a single landscape type for the site was defined as Alien Invaded Grasslands.

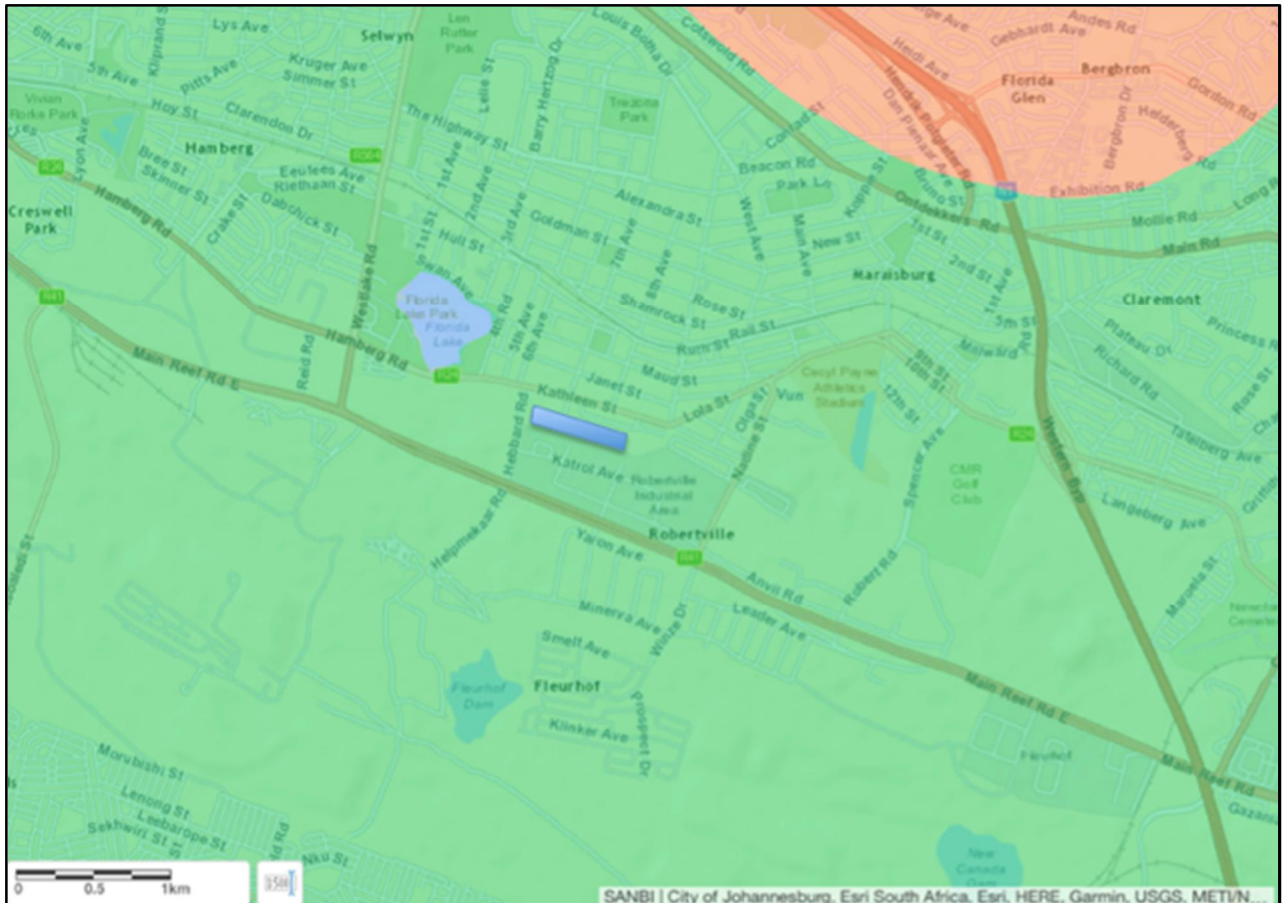


Figure 14: SANBI GIS National Vegetation Map indicating the vegetation as Soweto Highveld Grassland (Green) falling within the Mesic Highveld Grassland Bioregion in relation to the approximate site location.

5.3 Visual Resources

As indicated in the methodology, landscape character is derived from a combination of scenic quality and receptor sensitivity to landscape change. Making use to the Scenic Quality and Receptor Sensitivity check sheets located in Appendix D, the landscapes are quantified as can be seen in Table 7 below.

Table 7: Scenic Quality and Receptor Sensitivity Table

Visual Resources	Scenic Quality									Receptor Sensitivity					VRM	
	A= scenic quality rating of ≥ 19 ; B = rating of 12 – 18, C= rating of ≤ 11									H = High; M = Medium; L = Low						
NAME	Landform	Vegetation	Water	Colour	Scarcity	Adjacent Land	Cultural	Sum	Rating	Type of Users	Amount of Use	Public Interest	Adjacent Land	Special Areas	Rating	Class
Alien invaded grasslands	1	3	2	2	1	1	-2	8	C	L	H	L	M	L	M	IV
Average Value	1	3	2	2	1	1	-2		C	L	H	L	M	L	M	

5.3.1 Scenic Quality

Seven scenic quality criteria are scored on a 1 (low quality) to 5 (high quality) scale. If applicable, the Cultural Modification can be assigned a negative value if the landscape is significantly degraded by human-made modifications. The seven scenic quality criteria are defined below:

- **Land Form:** Topography becomes more of a factor as it becomes steeper, or more severely sculptured. The topography of the area is mainly flat and offers little variation
- **Vegetation:** Primary consideration given to the variety of patterns, forms, and textures created by plant life often defined the landscape character. The vegetation is mainly grasslands interspersed with small clumps of bushes or free-standing alien trees
- **Water:** The component that adds movement or serenity to a scene. Other than the small stream which the power line crosses, there is no water on the site
- **Colour:** The overall colour(s) of the basic components of the landscape (e.g., soil, rock, vegetation, etc.) are considered as they appear during seasons or periods of high use. The main colour influence relates to the grassland vegetation where seasons influence the colour. Although mainly brown in colour, the grasslands is often prone to veld fires, which result in a large portion of the site left in a blackened state
- **Scarcity:** This factor provides an opportunity to give added importance to one, or all, of the scenic features that appear to be relatively unique or rare within one physiographic region. The area does not reflect any significant scenic features, other than offer a buffer between the semi-industrial areas to the south and the residential areas to the north
- **Adjacent Land Use:** Adjacent scenery and distance enhance start to influence, the overall impression of the scenery within the site boundary. The adjacent land use to the south is semi-industrial, residential to the north and vacant lands to the east and west; and
- **Cultural Modifications:** Cultural modifications should be considered as they may detract from the scenery or complement or improve the scenic quality of an area. The vacant lot sense of place detracts from the surrounding areas, especially the residential and semi-industrial areas to the north and south. Illegal dumping is also taking place, and most of the adjacent plots have large security fencing due to the increased possibility of crime from access through the proposed site.

The scenic quality scores are totalled and assigned an A (High scenic quality), B (Moderate scenic quality) or C (Low scenic quality) category based on the following split: *A = scenic quality rating of ≥ 19 ; B = rating of 12 – 18, C = rating of ≤ 11*

5.3.2 Receptor Sensitivity

Receptor Sensitivity levels are a measure of public concern for scenic quality. Receptor sensitivity was rated in terms of Low to High as can be seen in Table ##:

- **Type of Users:** Visual sensitivity will vary with the type of users, e.g. recreational sightseers may be highly sensitive to any changes in visual quality, whereas workers who pass through the area on a regular basis may not be as sensitive to change. The site is not used for recreational activities, and would mainly be used by workers, or occasional recreational park users
- **Amount of Use:** Areas seen or used by large numbers of people are potentially more sensitive. Although not a prominent feature in the landscape, views of the site are seen from most surrounding roads

- **Public Interest:** The visual quality of an area may be of concern to local, or regional, groups. Indicators of this concern are usually expressed via public controversy created in response to proposed activities. Due to the security risks associated with the vacant lot, it is possible that the greater community could welcome a landscape change that offers increased security to the surrounding community
- **Adjacent Land Uses:** The interrelationship with land uses in adjacent lands. For example, an area within the viewshed of a residential area may be very sensitive, whereas an area surrounded by commercially developed lands may not be as visually sensitive. Residential areas and open land to the east could be influenced by the change of the site to that of PV; and
- **Special Areas:** These areas refer to landscapes that are protected status which require specific management objectives, or have a uniqueness that implies cultural landscape significance. There are no overtly unique cultural landscape modifications on site.

5.3.3 Visual Resource Management Classes

Making use of the VRM Matrix (Table 2) in the methodology section, and the ratings of Table 7 above, the VRM Class Objectives were defined for different landscape. The following VRM Classes are not prescriptive and are presented as a guideline to determine the capacity and sensitivity of the landscape to visually absorb landscape changes associated with the proposed development.

Class I is typically assigned when legislation restricts development in certain areas. The visual objective is to preserve the existing character of the landscape, the level of change to the characteristic landscape should be very low, and must not attract attention. As no protected areas were identified within the area, the Class I visual objective was not assigned to any of the landscapes.

A **Class IV** Visual Objective was assigned to the site landscape due to the Low Scenic Quality of the resource as well as the anticipated Medium to Low. The Class IV objective is to provide for management activities that require major modifications of the existing character of the landscape. The level of change to the landscape can be high, and the proposed development may dominate the view and be the major focus of the viewer's attention. However, recognition of the residential sense of place of the northern-eastern receptors, and the Florida Lake, sense of place is of importance and needs to be considered in the mitigations.

Visual Resource Class Motivation

The overall site **Scenic Quality is graded Low**, predominantly due to the lack of uniqueness of the site, the homogeneity of the vegetation and the degraded landscapes from illegal dumping and the industrial node to the south. The Landform is predominantly of shallow gradient. The vegetation is predominantly grassland but is modified with alien tree species, and some access road and foot-paths. There are no visible water bodies on site to add visual focus areas and colours are vegetation dominated and muted browns of the grasslands. The undeveloped nature of the site does not increase scarcity as due to the illegal dumping, and the vacant and unutilised nature of the site, security risks to adjacent residential dwellings are increased. Adjacent landscapes are strongly semi-industrial to the south, and residential to

the west, north and east, with some garden trees adding value to this landscape. As previously indicated, illegal dumping is taking place, which in association with the likely frequent winter burning of the grasslands, human-made modifications detract from the site landscape character.

The expected **Receptor Sensitivity is also graded Medium to Low**. Due to the adjacent semi-industrial nature of Robertville, as well as the residential areas to the north, the Type of Users are mixed. For the northern areas, the type of user is rated as Medium, but with southern and western receptors rated as having Low sensitivity. Due to the location of the site within the City of Johannesburg, large numbers of people are located around the site. For these reasons, the Amount of Use is defined as High. Due to the degraded and vacant lot nature of the site, Public Interest towards landscape change is likely to be Low. Adjacent Land Users do not include any tourists and are rated Low. The site has no formal protection status and as such is rated Low in terms of the Special Area category.

5.3.4 Threats to Scenic Quality

The probable threats to the local Scenic Quality associated with the proposed PVP development are:

- Visual intrusion to the close proximity residential areas located to the north of the proposed PVP site;
- The potential loss of landscape character of Klopper Street park; and

SECTION 6: IMPACT ASSESSMENT

Landscape and visual impacts were assessed for the construction and operation phase combined, as these two landscapes would be similar in nature and extent. Decommissioning involves the removal of all the structures and rehabilitation of the area.

After the construction of a temporary contractor lay-down site, the main construction phase would include excavations, movement of large earth-moving vehicles and limited site clearing. The photovoltaic power plant would be constructed requiring a mounting frame structure and the installation of PV modules onto the frames. Cables would be laid between the modules. Workshop and maintenance structures and battery facilities would also be constructed. The construction phase would also require the construction of a security fence around the facility.

Operation Phase activities would involve the cleaning of the modules, vegetation management around the modules, maintenance activities as well as site security monitoring. PV modules may be refurbished or replaced to continue operations.

6.1 Assessment of Landscape Impacts

Landscape impacts are related to the changes in the physical landscape and how it is experienced, which may affect the perceived value attributed to the landscape.

6.1.1 Landscape impact related to the PVP operation and construction

Table 8: Pre-mitigation impact significance rating of susceptibility of the landscape to degradation due to the PVP construction and operation.

Type of Impact		
Direct Negative Impact		
Rating of Impacts		
Characteristic	Designation	Summary of Reasoning
Extent	Local	Due to structural screening of the surrounding built environment, the extent of the landscape change is localised.
Duration	Permanent	The expected life of the project is likely to be permanent, with the panels being renewed to allow the project to continue. Due to the long lifespan of the project, the duration is defined as Permanent.
Scale	Moderate	The project is of a moderate scale in relation to the surrounding built environment.
Frequency	Continuous	Daylight views of the proposed PV structures will be continuous for proximate receptors, with night-time view limited to areas where security lighting is required.
Likelihood	Definite	Due to the large scale of the area that will be covered by PV panels, creating a large massing effect, the likelihood of the landscape change taking place is Definite.
Magnitude of the Landscape Effect		
Moderate		
Sensitivity of the Landscape Resource		
Low		
<p>The Magnitude of the Landscape Effect without mitigation is rated Moderate as the proposed PVP project will result in a noticeable change in landscape character, over a restricted area that may be infrequently perceived. The change may be medium to long term and may not be reversible.</p> <p>The Sensitivity of the Landscape Resource is defined as Low as the proposed project site reflects a landscape that is not valued in a special way by the public. It has a low level of tranquillity and features detracting elements. The landscape contains industrialised areas or may be in poor condition. Its character, land use, pattern and scale are such that it could absorb the Project without unacceptable damage.</p>		
Landscape Significance Rating Before Mitigation		
Minor		

Mitigation Measures

Mitigation options for PV-type developments are limited. They relate mainly to locality siting (non-development for significant visual resources) or can involve screening (for highly sensitive receptors in tourist landscapes). This proposed site is not a significant visual resource or a highly sensitive tourist landscape. As such, specific mitigations should include:

- Dust control during construction;
- Limited signage;
- Management of lights at night, where security lights are downward facing and not shining directly into the surrounding residential dwellings where possible or feasible.

Residual Impact

Due to the Minor significance of the **Landscape Visual Significance** (without mitigation), and the limited mitigations measures required for this development to reduce residual impacts, Residual Landscape Impacts reflect the same rating as Pre-Mitigation Landscape Impacts and **remain Minor**.

Cumulative Impacts

The potential for cumulative effects related to landscape degradation are rated Low. This is due to the semi-industrial landscape of the Robertville 'big-box' warehouses to the south, the existing power line running on either side of the property, as well as the degraded 'vacant-lot' sense of place that currently characterises the property. Historic under-mining also could restrict the type of development.

6.2 Assessment of Visual Impacts

Visual impacts relate to changes that arise in the composition of available views as a result of changes to the landscape, to people's response to any changes, and the overall impacts with respect to visual amenity. These would include the colour change and massing effects created by the PV panels covering a large area, limited early morning glare and some security lights at night as well as the possibility of glare at sunset. The following receptors were identified as having KOP status and a requirement for visual impact assessment:

- Poole Street residential dwellings and Aurora Street flats.
- Klopper Street park.

As the visual impacts are the same, only a single impact rating was undertaken for the two receptors.

6.2.1 Visual Impact: Poole Street Residential Dwellings and Klopper Street Park

Table 9: Pre-Mitigation Visual Impacts

Type of Impact		
Indirect Negative Impact		
Rating of Impacts		
Characteristic	Designation	Summary of Reasoning
Extent	Local	The extent of the impact is localised by the built structures and garden trees of the northern residential areas.
Duration	Permanent	The change is likely to be long term or permanent.
Scale	Partial	The majority of the receptors will have partial views of the proposed landscape modification. Current views from the upper story of the flat is partially degraded by illegal dumping / seasonal burnt grasses.
Frequency	Daily	The view of the PV landscape will take place on a daily basis.
Likelihood	Definite	The scale of the landscape change is such that it would definitely be perceived.
Magnitude of the Visual Effect		
Medium		
Sensitivity of the Visual Receptor		
Moderate		
The intensity of the contrast generated by the PV panels as seen from the upper story flats is likely to be medium for most receptors living on ground level, but strong with clear views for those receptors residing on the second-floor apartments.		
Although views of the proposed landscape modification could be perceived as negative, the proposed PVP site is currently in a degraded state with little management or prospect for landscape regeneration that degrades the sense of place.		
Landscape Significance Rating Before Mitigation		
Moderate		

Mitigation Measures

The following mitigations are recommended to reduce visual intrusion as seen from these receptors, enhance the local sense of place as well as reduce the risk of veld fires adjacent to the project security fence:

- Security light management such that light spillage is limited without reducing security.

Residual Impact

Due to the Moderate significance of the landscape, and the limited mitigations measures required or available for this development to reduce residual impacts, Residual Landscape Impacts reflect the same rating as Pre-Mitigation Landscape Impacts and **remain Moderate**.

SECTION 7: MITIGATION AND MONITORING

7.1 Construction and Operation Phases

The tables below set out the mitigation measures required to be implemented to avoid and minimise expected impacts of the Landscape and Visual Impacts. It is assumed that standard mitigation measures to minimise the infrastructure and works areas' footprints will be covered under a standard construction phase EMPr to be implemented by the relevant contractors. These will include restricting works areas to the minimum footprint required; managing access / haul routes used by vehicles/equipment; separation, stock-piling of topsoil and reinstatement of disturbed works areas post-construction; pollution and waste management controls, and controls on worker behaviour. Erosion control measures need to be implemented to ensure that any increased run-off from the site does not increase the risk of erosion in the grassland area between the site and the stream located to west. Dust control measures need to be implemented to ensure that nuisance dust is managed to acceptable levels. Mitigation for operational visual impacts largely relate to ensuring that the long-term erosion risks from the site are monitored and managed. Management of lights at night also needs to be implemented to ensure that light spillage is kept to a safe minimum.

Table 10: Dust Mitigation

Potential Impact	Dust management
Project Commitment	To construct and operate the proposed PVP in a manner that minimise the dust from vehicles and machinery.
Key Responsibilities	Contractors
Performance Criteria	Dust from moving vehicles is limited.
Mitigation Measures	<u>Construction and Operational Phases</u> <ul style="list-style-type: none"> - Ensure all construction vehicles adhere to designated access tracks and other works areas as marked on site plans. - As much as possible, phase the removal of vegetation. - Implement appropriate dust control measures as and when they become necessary (water / dust suppressant sprayed onto gravel roads) or other suitable best practice technique.
Monitoring & Auditing	<u>Monitoring (Construction Phases)</u> <ul style="list-style-type: none"> - On-going visual assessment to detect areas where dust is being raised from moving vehicles during construction.
Reporting & Corrective Action	- NA
Budget Considerations	<u>Monitoring</u> Contractor and staff are aware of EMPr requirements for dust control with suitable measures identified for management.

Table 11: Erosion Control Mitigation

Potential Impact	Erosion control
Project Commitment	To construct and operate the proposed PVP in a manner that minimises landscape scarring from erosion.
Key Responsibilities	Contractors and staff

Potential Impact	Erosion control
Performance Criteria	Erosion is suitably prevented.
Mitigation Measures	<u>Construction and Operational Phases</u> <ul style="list-style-type: none"> - Ensure all construction vehicles adhere to designated access tracks and other works areas as marked on site plans. - Implement erosion control measures where required.
Monitoring & Auditing	<u>Monitoring (Construction and Operational Phases)</u> <ul style="list-style-type: none"> - On-going visual assessment to monitor erosion by project staff.
Reporting & Corrective Action	- NA
Budget Considerations	<u>Monitoring</u> Contractor and staff are aware of EMPr requirements for erosion control with suitable measures identified for management. <u>Auditing</u>

Table 12: Lights at Night Mitigation

Potential Impact	Glare and lights at night
Project Commitment	To construct and operate the proposed PVP in a manner where lights at night are not visually intrusive without reducing project security.
Key Responsibilities	Contractors and staff.
Performance Criteria	Lights at night are limited to an efficient minimum.
Mitigation Measures	<u>Construction and Operational Phases</u> <ul style="list-style-type: none"> - Pre-design specifications to ensure that light spillage is minimised as much as possible, (making use of the general light mitigations provided in Annexure G). - Downward lighting is used as much as possible. - No up lighting of structures or signage is allowed.
Monitoring & Auditing	<u>Monitoring (Construction and Operational Phases)</u> <ul style="list-style-type: none"> - NA
Reporting & Corrective Action	- NA
Budget Considerations	<u>Monitoring</u> Pre-planning and procurement stage awareness of design team. <u>Auditing</u> NA

SECTION 8: OPPORTUNITIES AND CONSTRAINTS

8.1 PV Project

8.1.1 Opportunities

- Green energy electricity supply to City of Johannesburg.
- Increased work opportunity associated with the construction and operation of the proposed project.
- Increased management of an area that is currently being utilised for illegal dumping and is a vacant / degraded landscape.
- Low visual resources of the site due to the close proximity of the site to the existing Robertville Industrial Park, and the close proximity to historic mine dumps to the west of the site.

8.1.2 Constraints

- Reduction in the visual buffer space between the northern residential areas and the semi-industrial areas to the south.
- Some residential view intrusion to the local residents.

SECTION 9: REFERENCES

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SECTION 10: ANNEXURE A: SITE SURVEY PHOTOGRAPHS



Figure 15: Project PV and underground power line site survey photograph locality map.



Site Photo 1: View west from the centre of the site of the transformed grasslands and isolated gum trees.



Site Photo 2: View northeast of the thorn trees / small bushes and illegal dumping on the site.



Site Photo 3: View west from the eastern extent of the site of the burnt grasses and power line corridor on the northern border.



Site Photo 4: View west from the central extent of the site of the grasses and power line corridor and gum trees on the northern border.



Site Photo 5: View west where the proposed power line routing crosses Hebbard Road alongside the existing power line.



Site Photo 6: View south of the existing power line along which the proposed power line would be routed.



Site Photo 7: View west of the point where the proposed power line enters into the existing Hamberg Road Substation adjacent to existing power line.

SECTION 11: ANNEXURE B: PERSPECTIVE PHOTOMONTAGES



Figure 16: 3D perspective view photomontages generated by SolarReserve.

SECTION 12: ANNEXURE C: SPECIALIST INFORMATION

12.1 Curriculum Vitae

Curriculum Vitae (CV)

- 1. Position:** Owner / Director
 - 2. Name of Firm:** Visual Resource Management Africa cc (*www.vrma.co.za*)
 - 3. Name of Staff:** Stephen Stead
 - 4. Date of Birth:** 9 June 1967
 - 5. Nationality:** South African
 - 6. Contact Details:** Tel: +27 (0) 44 876 0020
Cell: +27 (0) 83 560 9911
Email: steve@vrma.co.za
-

7. Educational qualifications:

- University of Natal (Pietermaritzburg):
- Bachelor of Arts: Psychology and Geography
- Bachelor of Arts (Hons): Human Geography and Geographic Information Management Systems

8. Professional Accreditation

- Association of Professional Heritage Practitioners (APHP) Western Cape
 - Accredited VIA practitioner member of the Association (2011)

9. Association involvement:

- International Association of Impact Assessment (IAIA) South African Affiliate
 - Past President (2012 - 2013)
 - President (2012)
 - President-Elect (2011)
 - Conference Co-ordinator (2010)
 - National Executive Committee member (2009)
 - Southern Cape Chairperson (2008)

10. Conferences Attended:

- IAIAAsa 2012
- IAIAAsa 2011
- IAIA International 2011 (Mexico)
- IAIAAsa 2010
- IAIAAsa 2009

- IAIAAsa 2007

11. Continued Professional Development:

- Integrating Sustainability with Environment Assessment in South Africa (IAIAAsa Conference, 1 day)
- Achieving the full potential of SIA (Mexico, IAIA Conference, 2 days 2011)
- Researching and Assessing Heritage Resources Course (University of Cape Town, 5 days, 2009)

12. Countries of Work Experience:

- South Africa, Mozambique, Malawi, Lesotho, Kenya and Namibia

13. Relevant Experience:

Stephen gained six years of experience in the field of Geographic Information Systems mapping and spatial analysis working as a consultant for the KwaZulu-Natal Department of Health and then with an Environmental Impact Assessment company based in the Western Cape. In 2004 he set up the company Visual Resource Management Africa that specializes in visual resource management and visual impact assessments in Africa. The company makes use of the well documented Visual Resource Management methodology developed by the Bureau of Land Management (USA) for assessing the suitability of landscape modifications. In association with ILASA qualified landscape architect Liesel Stokes, he has assessed of over 100 major landscape modifications throughout southern and eastern Africa. The business has been operating for eight years and has successfully established and retained a large client base throughout Southern Africa which include amongst other, Rio Tinto (Pty) Ltd, Bannerman (Pty) Ltd, Anglo Coal (Pty) Ltd, Eskom (Pty) Ltd, NamPower and Vale (Pty) Ltd, Ariva (Pty) Ltd, Harmony Gold (Pty) Ltd, Mellium Challenge Account (USA), Pretoria Portland Cement (Pty) Ltd

14. Languages:

- English – First Language
- Afrikaans – fair in speaking, reading and writing

15. Projects:

A list of **some** of the large scale projects that VRMA has assessed has been attached below with the client list indicated per project (Refer to www.vrma.co.za for a full list of projects undertaken).

Table 13: VRM Africa Projects Assessments Table

YEAR	NAME	DESCRIPTION	LOCATION
2016	Kokerboom WEF	Wind Energy	Northern Cape
2016	Hotazel PV	Solar Energy	Northern Cape
2016	Eskom Sekgame Bulkop Power Line	Infrastructure	Northern Cape
2016	Ngonye Hydroelectric	Hydroelectric	Zambia
2016	Levensdal Infill	Settlement	Western Cape
2016	Arandis CSP	Solar Energy	Namibia
2016	Bonnievale PV	Solar Energy	Western Cape

2015	Noblesfontein 2 & 3 WEF (Scoping)	Wind Energy	Eastern Cape
2015	Ephraim Sun SEF	Solar Energy	Nothern Cape
2015	Dyasonsklip and Sirius Grid TX	Solar Energy	Nothern Cape
2015	Dyasonsklip PV	Solar Energy	Nothern Cape
2015	Zeerust PV expansion and transmission line	Solar Energy	North West
2015	Bloemsmond SEF	Solar Energy	Nothern Cape
2015	Juwi Copperton PV	Solar Energy	Nothern Cape
2015	Humansrus Capital 14 PV	Solar Energy	Nothern Cape
2015	Humansrus Capital 13 PV	Solar Energy	Nothern Cape
2015	Spitzkop East WEF (Scoping)	Solar Energy	Western Cape
2015	Lofdal Rare Earth Mine and Infrastructure	Extraction	Namibia
2015	AEP Kathu PV	Solar Energy	Nothern Cape
2014	AEP Mogobe SEF	Solar Energy	Nothern Cape
2014	Bonnievale SEF	Solar Energy	Western Cape
2014	AEP Legoko SEF	Solar Energy	Northern Cape
2014	Postmasburg PV	Solar Energy	Northern Cape
2014	Joram Solar	Solar Energy	Northern Cape
2014	RERE PV Postmasberg	Solar Energy	Northern Cape
2014	RERE CPV Upington	Solar Energy	Northern Cape
2014	Rio Tinto RUL Desalination Plant	Industrial	Namibia
2014	NamPower PV * 3	Solar Energy	Namibia
2014	Pemba Oil and Gas Port Expansion	Industrial	Mozambique
2014	Brightsource CSP Upington	Solar Energy	Northern Cape
2014	Witsand WEF (Scoping)	Wind Energy	Western Cape
2014	Kangnas WEF	Wind Energy	Western Cape
2013	Cape Winelands DM Regional Landfill	Industrial	Western Cape
2013	Drennan PV Solar Park	Solar Energy	Eastern Cape
2013	Eastern Cape Mari-culture	Mari-culture	Eastern Cape
2013	Eskom Pantom Pass Substation	Substation /Tx lines	Knysna
2013	Frankfort Paper Mill	Plant	Free State
2013	Gibson Bay Wind Farm Transmission lines	Tranmission lines	Eastern Cape
2013	Houhoek Eskom Substation	Substation /Tx lines	Western Cape
2013	Mulilo PV Solar Energy Sites (x4)	Solar Energy	Northern Cape
2013	Namies Wind Farm	Wind Energy	Northern Cape
2013	Rossing Z20 Pit and WRD	Mining	Namibia
2013	SAPPI Boiler Upgrade	Plant	Mpumalanga
2013	Tumela WRD	Mine	North West
2013	Weskusfleur Substation (Koeburg)	Substation /Tx lines	Western Cape
2013	Yzermyn coal mine	Mine	Mpumalanga
2012	Afrisam	Mine	Saldana

2012	Bitterfontein	Solar Energy	N Cape
2012	Kangnas PV	Solar Energy	N Cape
2012	Kangnas Wind	Solar Energy	N Cape
2012	Kathu CSP Tower	Solar Energy	Northern Cape
2012	Kobong Hydro	Hydro & Powerline	Lesotho
2012	Letseng Diamond Mine Upgrade	Mine	Lesotho
2012	Lunsklip Windfarm	Wind Energy	Stilbaai
2012	Mozambique Gas Engine Power Plant	Plant	Mozambique
2012	Ncondezi Thermal Power Station	Substation /Tx lines	Mozambique
2012	Sasol CSP Tower	Solar Power	Free State
2012	Sasol Upington CSP Tower	Solar Power	Northern Cape
2011	Beaufort West PV Solar Power Station	Solar Energy	Beaufort West
2011	Beaufort West Wind Farm	Wind Energy	Beaufort West
2011	De Bakke Cell Phone Mast	Mast	Western Cape
2011	ERF 7288 PV	Solar Energy	Beaufort West
2011	Gecko Industrial park	Industrial	Namibia
2011	Green View Estates	Residential	Mossel Bay
2011	Hoodia Solar	Solar Energy	Beaufort West
2011	Kalahari Solar Power Project	Solar Energy	Northern Cape
2011	Khanyisa Power Station	Power Station	Western Cape
2011	Olvyn Kolk PV	Solar Energy	Northern Cape
2011	Otjikoto Gold Mine	Mining	Namibia
2011	PPC Rheebeek West Upgrade	Industrial	Western Cape
2011	Slopes analysis Erf 7288 Beaufort West	Slopes	Beaufort West
2011	Southern Arterial	Road	George
2010	Bannerman Etango Uranium Mine	Mining	Namibia
2010	Bantamsklip Transmission	Transmission	Eastern Cape
2010	Beaufort West Urban Edge	Mapping	Beaufort West
2010	Bon Accord Nickel Mine	Mine	Barbeton
2010	Etosha National Park Infrastructure	Housing	Namibia
2010	Herolds Bay N2 Development Baseline	Residential	George
2010	MET Housing Etosha	Housing	Namibia
2010	MET Housing Etosha Amended MCDM	Residential	Namibia
2010	MTN Lattice Hub Tower	Structure	George
2010	N2 Herolds Bay Residential	Residential	Herolds Bay
2010	Onifin(Pty) Ltd Hartenbos Quarry Extension	Mining	Mossel Bay
2010	Still Bay East	Mapping	SA, WC
2010	Vale Moatize Coal Mine and Railwayline	Mining_rail	Mozambique
2010	Vodacom Mast	Structure	Reichterbosch

2010	Wadrif Dam	Dam	Beaufort West
2009	Asazani Zinyoka UISP Housing	Residential Infill	Mossel Bay
2009	Eden Telecommunication Tower	Structure Tower	George
2009	George Landscape Characterisation	George SDF	George
2009	George Visual Resource Management	George SDF	George
2009	George Western Bypass	Structure Road	George
2009	Knysna Affordable Housing Heidevallei	Residential Infill	Knysna
2009	Knysna Affordable Housing Hornlee Project	Residential Infill	Knysna
2009	Rossing Uranium Mine Phase 2	Mining	Namibia
2009	Sun Ray Wind Farm	Wind Energy	Still Bay
2008	Bantamsklip Transmission Lines Scoping	Transmission	Western Cape
2008	Erf 251 Damage Assessment	Residential VIA	Great Brak
2008	Erongo Uranium Rush SEA	SEA	Namibia
2008	Evander South Gold Mine Preliminary VIA	Mining	Mpumalanga
2008	George Open Spaces System	George SDF	George
2008	Hartenbos River Park	Residential VIA	Hartenbos
2008	Kaaimans Project	Residential	Wilderness
2008	Lagoon Garden Estate	Residential VIA	Great Brak
2008	Moquini Beach Hotel	Resort	Mossel Bay
2008	NamPower Coal fired Power Station	Power Station	Namibia
2008	Oasis Development	Residential VIA	Plettenberg Bay
2008	RUL Sulphur Handling Facility	Mining	Walvis Bay
2008	Stonehouse Development	Residential VIA	Plettenberg Bay
2008	Walvis Bay Power Station	Structure	Namibia
2007	Calitzdorp Retirement Village	Residential VIA	Calitzdorp
2007	Calitzdorp Visualisation	Visualisation	Calitzdorp
2007	Camdeboo Estate	Residential VIA	Graaff Reinet
2007	Destiny Africa	Residential	George
2007	Droogfontein Farm 245	Residential VIA	Danabaai
2007	Floating Liquified Natural Gas Facility	Structure tanker	Mossel Bay
2007	George Municipality Densification	George SDF	George
2007	Kloofsig Development	Residential VIA	Vleesbaai
2007	OCGT Power Plant Extension	Structure Power Plant	Mossel Bay
2007	Oudtshoorn Municipality SDF	Mapping	Oudtshoorn
2007	Oudtshoorn Shopping Complex	Structure Mall	Oudtshoorn
2007	Pezula Infill (Noetzie)	Residential VIA	Knysna
2007	Pierpoint Nature Reserve	Residential VIA	Knysna
2007	Pinnacle Point Golf Estate	Golf/Residential	Mossel Bay
2007	Rheebok Development Erf 252 Apeal	Residential VIA	Great Brak

2007	Rossing Uranium Mine Phase 1	Mining	Namibia
2007	Ryst Kuil/Riet Kuil Uranium Mine	Mining	Beaufort West
2007	Sedgefield Water Works	Structure	Sedgefield
2007	Sulphur Handling Station Walvis Bay Port	Industrial	Namibia
2007	Trekopje Uranium Mine	Mining	Namibia
2007	Weldon Kaya	Residential VIA	Plettenberg Bay
2006	Farm Dwarsweg 260	Residential VIA	Great Brak
2006	Fynboskruin Extention	Residential VIA	Sedgefield
2006	Hanglip Golf and Residential Estate	Golf/Residential	Plettenberg Bay
2006	Hansmoeskraal	Slopes Analysis	George
2006	Hartenbos Landgoed Phase 2	Residential VIA	Hartenbos
2006	Hersham Security Village	Residential VIA	Great Brak
2006	Ladywood Farm 437	Residential VIA	Plettenberg Bay
2006	Le Grand Golf and Residential Estate	Golf/Residential	George
2006	Paradise Coast	Residential VIA	Mossel Bay
2006	Paradyskloof Residential Estate	Residential VIA	Stellenbosch
2006	Riverhill Residential Estate	Residential VIA	Wilderness
2006	Wolwe Eiland Access Route	Road	Victoria Bay
2005	Harmony Gold Mine	Mining	Mpumalanga.
2005	Knysna River Reserve	Residential VIA	Knysna
2005	Lagoon Bay Lifestyle Estate	Residential VIA	Glentana
2005	Outeniquabosch Safari Park	Residential	Mossel Bay
2005	Proposed Hotel Farm Gansevallei	Resort	Plettenberg Bay
2005	Uitzicht Development	Residential VIA	Knysna
2005	West Dunes	Residential VIA	Knysna
2005	Wilderness Erf 2278	Residential VIA	Wilderness
2005	Wolwe Eiland Eco & Nature Estate	Residential VIA	Victoria Bay
2005	Zebra Clay Mine	Mining	Zebra
2004	Gansevallei Hotel	Residential VIA	Plettenberg Bay
2004	Lakes Eco and Golf Estate	Golf/Residential	Sedgefield
2004	Trekopje Desalination Plant	Structure Plant	Namibia
1995	Greater Durban Informal Housing Analysis	Photogrametry	Durban

SECTION 13: ANNEXURE D: VRM CHECKLISTS AND TERMINOLOGY

Table 14: Scenic Quality Checklist

KEY FACTORS RATING CRITERIA AND SCORE			
SCORE	5	3	1
Land Form	High vertical relief as expressed in prominent cliffs, spires or massive rock outcrops, or severe surface variation or highly eroded formations or detail features that are dominating and exceptionally striking and intriguing.	Steep-sided river valleys, or interesting erosion patterns or variety in size and shape of landforms; or detail features that are interesting, though not dominant or exceptional.	Low rolling hills, foothills or flat valley bottoms; few or no interesting landscape features.
Vegetation	A variety of vegetative types as expressed in interesting forms, textures and patterns.	Some variety of vegetation, but only one or two major types.	Little or no variety or contrast in vegetation.
Water	Clear and clean appearing, still or cascading white water, any of which are a dominant factor in the landscape.	Flowing, or still, but not dominant in the landscape.	Absent, or present but not noticeable.
Colour	Rich colour combinations, variety or vivid colour: or pleasing contrasts in the soil, rock, vegetation, water.	Some intensity or variety in colours and contrast of the soil, rock and vegetation, but not a dominant scenic element.	Subtle colour variations contrast or interest: generally mute tones.
Adjacent Scenery	Adjacent scenery greatly enhances visual quality.	Adjacent scenery moderately enhances overall visual quality.	Adjacent scenery has little or no influence on overall visual quality.
Scarcity	One of a kind: unusually memorable, or very rare within region. Consistent chance for exceptional wildlife or wildflower viewing etc.	Distinctive, though somewhat similar to others within the region.	Interesting within its setting, but fairly common within the region.
SCORE	2	0	-4
Cultural Modification	Modifications add favourably to visual variety, while promoting visual harmony.	Modifications add little or no visual variety to the area, and introduce no discordant elements.	Modifications add variety but are very discordant and promote strong disharmony.

Table 15: Sensitivity Level Rating Questionnaire

FACTORS	QUESTIONS	
Type of Users	Maintenance of visual quality is:	
	A major concern for most users	High
	A moderate concern for most users	Moderate
	A low concern for most users	Low
Amount of use	Maintenance of visual quality becomes more important as the level of use increases:	
	A high level of use	High
	Moderately level of use	Moderate
	Low level of use	Low
Public interest	Maintenance of visual quality:	
	A major concern for most users	High
	A moderate concern for most users	Moderate
	A low concern for most users	Low
Adjacent land Users	Maintenance of visual quality to sustain adjacent land use objectives is:	
	Very important	High
	Moderately important	Moderate
	Slightly important	Low
Special Areas	Maintenance of visual quality to sustain Special Area management objectives is:	
	Very important	High
	Moderately important	Moderate
	Slightly important	Low

Table 16: VRM Terminology Table

FORM		LINE	COLOUR		TEXTURE
Simple		Horizontal			Smooth
Weak		Vertical			Rough
Strong		Geometric			Fine
Dominant		Angular			Coarse
Flat		Acute			Patchy
Rolling		Parallel			Even
Undulating		Curved		Dark	Uneven
Complex		Wavy		Light	Complex
Plateau		Strong		Mottled	Simple
Ridge		Weak			Stark
Valley		Crisp			Clustered
Plain		Feathered			Diffuse
Steep		Indistinct			Dense
Shallow		Clean			Scattered
Organic		Prominent			Sporadic
Structured		Solid			Consistent
Simple	Basic, composed of few elements		Organic	Derived from nature; occurring or developing gradually and naturally	
Complex	Complicated; made up of many interrelated parts		Structure	Organised; planned and controlled; with definite shape, form, or pattern	
Weak	Lacking strength of character		Regular	Repeatedly occurring in an ordered fashion	
Strong	Bold, definite, having prominence		Horizontal	Parallel to the horizon	
Dominant	Controlling, influencing the surrounding environment		Vertical	Perpendicular to the horizon; upright	
Flat	Level and horizontal without any slope; even and smooth without any bumps or hollows		Geometric	Consisting of straight lines and simple shapes	
Rolling	Progressive and consistent in form, usually rounded		Angular	Sharply defined; used to describe an object identified by angles	
Undulating	Moving sinuously like waves; wavy in appearance		Acute	Less than 90°; used to describe a sharp angle	
Plateau	Uniformly elevated flat to gently undulating land bounded on one or more sides by steep slopes		Parallel	Relating to or being lines, planes, or curved surfaces that are always the same distance apart and therefore never meet	
Ridge	A narrow landform typical of a highpoint or apex; a long narrow hilltop or range of hills		Curved	Rounded or bending in shape	
Valley	Low-lying area; a long low area of land, often with a river or stream running through it, that is surrounded by higher ground		Wavy	Repeatedly curving forming a series of smooth curves that go in one direction and then another	
Plain	A flat expanse of land; fairly flat dry land, usually with few trees		Feathered	Layered; consisting of many fine parallel strands	
Steep	Sloping sharply often to the extent of being almost vertical		Indistinct	Vague; lacking clarity or form	
Prominent	Noticeable; distinguished, eminent, or well-known		Patchy	Irregular and inconsistent;	
Solid	Unadulterated or unmixed; made of the same material throughout; uninterrupted		Even	Consistent and equal; lacking slope, roughness, and irregularity	
Broken	Lacking continuity; having an uneven surface		Uneven	Inconsistent and unequal in measurement irregular	
Smooth	Consistent in line and form; even textured		Stark	Bare and plain; lacking ornament or relieving features	
Rough	Bumpy; knobby; or uneven, coarse in texture		Clustered	Densely grouped	
Fine	Intricate and refined in nature		Diffuse	Spread through; scattered over an area	
Coarse	Harsh or rough to the touch; lacking detail		Diffuse	To make something less bright or intense	

SECTION 14: ANNEXURE E: GENERAL LIGHTS AT NIGHT GUIDELINES

The International Dark-sky Association (IDA) recommend lighting with lower colour temperatures has less blue in its spectrum and is referred to as being “warm.” “Higher colour temperature sources of light are rich in blue light. (International Dark-sky Association) IDA recommends that only warm light sources be used for outdoor lighting. This includes LPS, HPS and low-colour-temperature LEDs. In some areas, the white light of even a low-colour-temperature LED can be a threat to the local night-time environment. In those cases, LPS or narrow-spectrum LEDs are preferred choices”. The following recommendations are presented by the New England Light Pollution Advisory Group (NELPAG)

What is good lighting? Good outdoor lights improve visibility, safety, and a sense of security, while minimizing energy use, operating costs, and ugly, dazzling glare.

Why should we be concerned? Many outdoor lights are poorly designed or improperly aimed. Such lights are costly, wasteful, and distractingly glary. They harm the night-time environment and neighbours’ property values. Light directed uselessly above the horizon creates murky skyglow — the “light pollution” that washes out our view of the stars.

Glare Here’s the basic rule of thumb: If you can see the bright bulb from a distance, it’s a bad light. With a good light, you see lit ground instead of the dazzling bulb. “Glare” is light that beams directly from a bulb into your eye. It hampers the vision of pedestrians, cyclists, and drivers.

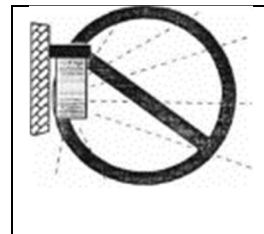
Light Trespass Poor outdoor lighting shines onto neighbours’ properties and into bedroom windows, reducing privacy, hindering sleep, and giving the area an unattractive, trashy look.

Energy Waste Many outdoor lights waste energy by spilling much of their light where it is not needed, such as up into the sky. This waste results in high operating costs. Each year we waste more than a billion dollars in the United States needlessly lighting the night sky.

Excess Lighting Some homes and businesses are flooded with much stronger light than is necessary for safety or security.

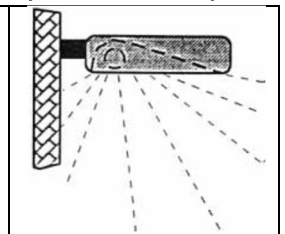
Good and Bad Light Fixtures

Typical “Wall Pack”



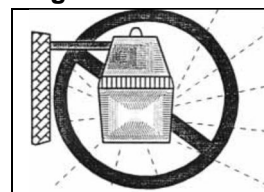
BAD
Waste light goes up and sideways

Typical “Shoe Box” (forward throw)



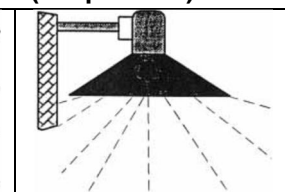
GOOD
Directs all light down

Typical “Yard Light”



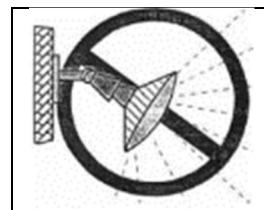
BAD
Waste light goes up and sideways

Opaque Reflector (lamp inside)



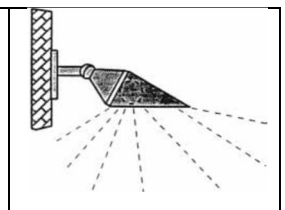
GOOD
Directs all light down

Area Flood Light



BAD
Waste light goes up and sideways

Area Flood Light with Hood



GOOD
Directs all light down

How do I switch to good lighting?

Provide only enough light for the task at hand; don't over-light, and don't spill light off your property. Specifying enough light for a job is sometimes hard to do on paper. Remember that a full Moon can make an area quite bright. Some lighting systems illuminate areas 100 times more brightly than the full Moon! More importantly, by choosing properly shielded lights, you can meet your needs without bothering neighbours or polluting the sky.

1. Aim lights down. Choose "full-cutoff shielded" fixtures that keep light from going uselessly up or sideways. Full-cutoff fixtures produce minimum glare. They create a pleasant-looking environment. They increase safety because you see illuminated people, cars, and terrain, not dazzling bulbs.

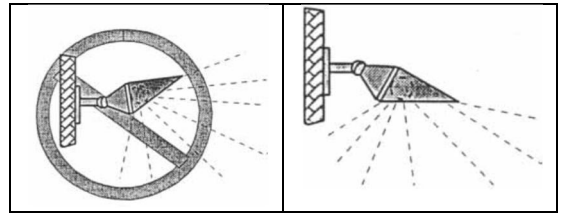
2. Install fixtures carefully to maximize their effectiveness on the targeted area and minimize their impact elsewhere. Proper aiming of fixtures is crucial. Most are aimed too high. Try to install them at night, when you can see where all the rays actually go. Properly aimed and shielded lights may cost more initially, but they save you far more in the long run. They can illuminate your target with a low-wattage bulb just as well as a wasteful light does with a high-wattage bulb.

3. If colour discrimination is not important, choose energy-efficient fixtures utilising yellowish high-pressure sodium (HPS) bulbs. If "white" light is needed, fixtures using compact fluorescent or metal-halide (MH) bulbs are more energy-efficient than those using incandescent, halogen, or mercury-vapour bulbs.

4. Where feasible, put lights on timers to turn them off each night after they are no longer needed. Put home security lights on a motion-detector switch, which turns them on only when someone enters the area; this provides a great deterrent effect!

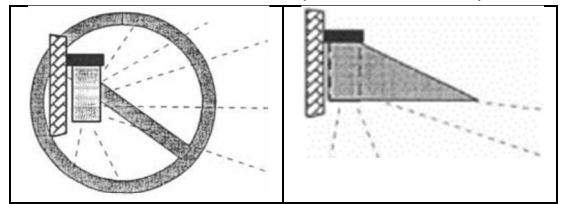
What You Can Do To Modify Existing Fixtures

Change this . . . to this (aim downward)



Floodlight:

Change this . . . to this (aim downward)

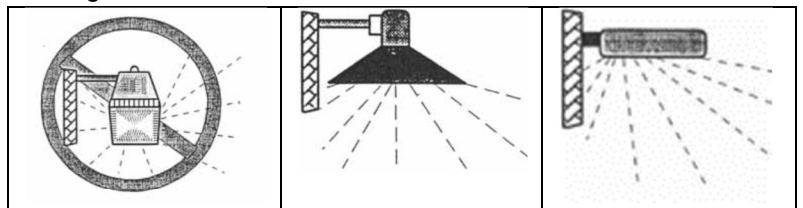


Wall Pack

Change this . . .

to this

or this



Yard Light

Opaque Reflector

Show Box

Replace bad lights with good lights.

You'll save energy and money. You'll be a good neighbour. And you'll help preserve our view of the stars.

18 Appendix G: Biodiversity Assessment



BIODIVERSITY ASSESSMENT FOR THE PROPOSED VOGELSTRUISFONTEIN URBAN SOLAR FARM (USF) PROJECT

Gauteng Province

August 2017

REFERENCE

Vogelstruisfontein

CLIENT

SOLARRESERVE®

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Report Name	BIODIVERSITY ASSESSMENT FOR THE PROPOSED VOGELSTRUISFONTEIN URBAN SOLAR FARM (USF) PROJECT	
Reference	Vogelstruisfontein	
Submitted to	Mott MacDonald	
Report writer	Jaco du Plessis	
Report reviewer	Peter Kimberg	



EXECUTIVE SUMMARY

The Biodiversity Company (TBC) was appointed by Mott MacDonald to conduct a baseline biodiversity (flora, fauna, wetlands and aquatic) assessment as part of the Basic Assessment (BA) Process for the proposed Urban Solar Farm (USF) in Florida in the Gauteng Province.

The biodiversity related field survey was conducted on the 30th June 2017, during the dry winter season.

This report, after taking into consideration the findings and recommendation provided by the specialist herein, should inform and guide the Environmental Assessment Practitioner (EAP) and regulatory authorities, enabling informed decision making, as to the ecological viability of the proposed project.

The following conclusions were reached based on the results of this assessment:

- The project area is situated in the Endangered (EN) Soweto Highveld Grassland vegetation community however the site was found to be degraded and encroached by alien invasive species. The extent of remaining grassland and therefore its conservation value can only be confirmed following a wet season survey;
- According to the Gauteng Conservation Plan (C-plan 3.3), the eastern boundary of the project area overlaps with a Critical Biodiversity Area (CBA): other Ecological Support Areas (ESA's) and CBAs occur within 500 m of the project boundary;
- The most significant anthropogenic impacts identified on site included:
 - Loss of habitat due to the encroaching developments;
 - Historical mining activities;
 - Habitat fragmentation;
 - Dumping of rubble and waste; and
 - Encroachment of alien invasive plant species.
- Ten category 1b alien invasive plant species were recorded on the site and must therefore be removed by implementing an alien invasive plant management programme in compliance of section 75 of the National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEM/BA);
- Nine (9) potential plant species of conservation concern were identified that could occur on the site. Of these species:
 - One (1) is listed as Critically Endangered (CE). *Brachycorythis conica* subsp. *transvaalensis* (Albertina Sisulu orchid) is a severely threatened orchid species which is suffering ongoing habitat loss to urban expansion (SANBI, 2017). It occurs in short, open grassland and wooded grassland in Gauteng and Mpumalanga (SANBI, 2017). In Gauteng, it is only currently known from a single remaining subpopulation near to Krugersdorp. Although the likelihood of occurrence was rated as low, the possibility of this species occurring on the



site cannot be excluded and will need to be verified during the flowering season (Jan - Mar) before the site can be cleared;

- *Melolobium subspicatum* is listed as Vulnerable (VU) on the Red List of South African Plants (SANBI, 2017). It only occurs in very small pockets of remaining habitat in the Gauteng Province and development is currently prohibited in any locations where it occurs (SANBI, 2017). It occurs in grassland communities including Carletonville Dolomite Grassland, Egoli Granite Grassland and Soweto Highveld Grassland such as which would historically have occurred in the project area. Although the likelihood of occurrence was rated as moderate the possibility of this species occurring on the site cannot be excluded and will need to be verified during the flowering season (summer) before the site can be cleared;
- Three (3) plants species are listed as Near Threatened (NT), of these the likelihood of occurrence was rated as good for 2 and moderate for 1 based on habitat preference;
- A further 4 plant species are listed as Least Concern (LC) but decreasing. These are plants that are decreasing in abundance due to excess harvesting for the medicinal plant trade;
- Of the 9 potential plant species of conservation concern 5 are listed as South African endemics, of these 2 have a high likelihood of occurrence on the site, 2 a moderate likelihood and 1 a low likelihood;
- Faunal diversity was low and the likelihood of faunal species of conservation concern occurring on the site was similarly rated as low;
- The significance of the potential loss of plant species of conservation concern was rated as high prior to implementation of mitigation measures. If an additional wet season survey is conducted and it confirmed that no plant species of conservation concern are present on the site the significance of this impact will be reduced to low; and
- The significance of potential impacts on faunal communities was rated as low due to the low expected and observed faunal diversity.

Considering the above-mentioned conclusions, it is the opinion of the specialist that approval can be granted for the development to proceed pending the completion of a full wet season vegetation survey prior to site clearing.



ABBREVIATIONS

ADU	Animal Demography Unit
CBA	Critical Biodiversity Areas
CE	Critically Endangered
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
C-Plan	Conservation Plan
DWAF	Department of Water Affairs and Forestry
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EN	Endangered
ESA	Ecological Support Areas
GDARD	Gauteng Department of Agriculture and Rural Development
IUCN	International Union for Conservation of Nature and Natural Resources
NEM:BA	National Environmental Management: Biodiversity Act
NEMA	National Environmental Management Act
NT	Near Threatened
PE	Protected Ecosystems
POSA	Plants of Southern Africa
QDS	Quarter Degree Square
RSA	Republic of South Africa
SABAP	Southern Africa Bird Atlas Project
SANBI	South African National Biodiversity Institut
TOPS	Threatened or Protected Plant Species
VU	Vulnerable



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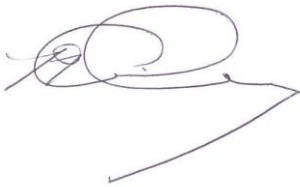
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DECLARATION

I, Peter Karl Kimberg declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.

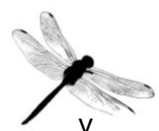


Peter Karl Kimberg

B. Hons Zoology

The Biodiversity Company

13th June 2017



1 INTRODUCTION

The Biodiversity Company (TBC) was appointed by SolarReserve (SR) to conduct a baseline biodiversity (flora, fauna, wetlands and aquatic) assessment as part of the Scoping and Environmental Impact for the proposed Urban Solar Farm (USF) in Vogelstruisfontein on 16.6 ha of the Remaining Extent of Portion 4 of the Farm Vogelstruisfontein 231 in the Gauteng Province (the “Project Site”).

The biodiversity related field survey was conducted on the 30th June 2017 during the dry winter season.

This report, after taking into consideration the findings and recommendation provided by the specialist herein, should inform and guide the Environmental Assessment Practitioner (EAP) and regulatory authorities, enabling informed decision making, as to the ecological viability of the proposed project.

1.1 Terms of Reference

The aim of the study was to undertake and compile a basic assessment report for the proposed development.

The biodiversity assessment requirements by the Gauteng Department of Agriculture and Rural Development (GDARD) (2014) were considered for the study.

1.2 Proposed Activity

Table 1 lists activities associated with the proposed USF project that require environmental authorisation prior to commencement specifically in the Gauteng Province.

Table 1: Activities associated with the proposed USF project that require environmental authorisation prior to commencement

Activity Description	Geographical areas based on environmental attributes
The clearance of an area of 300 square metres or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation.	<ul style="list-style-type: none"> • Within a Critically Endangered or Endangered ecosystem listed in NEMBA; • Within critical biodiversity areas identified in bioregional plans;
The clearance of an area of 1 hectare or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation	<ul style="list-style-type: none"> • Critical biodiversity areas and ecological support areas as identified in systematic biodiversity plans adopted by the competent authority. • Sites identified as irreplaceable or important in the Gauteng Conservation Plan.

The Vogelstruisfontein USF Project will be constructed on only a portion of the larger property, 16.6 ha portion, which will be leased areaby the Applicant from the landowner of of the larger property. The property is accessed from Hebbard Road, off Main Reef Road, located in Roodepoort area within City of Johannesburg Municipal district.

The Vogelstruisfontein USF Project will consist of the following, but not limited to:

- PV array comprising of the photovoltaic modules/panels, mounting structures and associated balance of system (tracking/fixed hardware, protection systems i.e. masts and electronica);



- 7,000 m² Hard standing battery storage facility platform. Vanadium flow batteries housed in 40 ft. containers consisting of cell stacks and vanadium electrolyte contained in tanks with all associated balance of plant (piping, pumps, and control equipment);
- Inverters, transformers and switchgear with battery storage;
- An on-site substation consisting of a 40 ft container split with Project and City Power equipment in each respective section of the substation. 33kV Power line buried from City Power substation to Florida substation (± 47 m);
- Cabling between the project components;
- Prefabricated housing for administration offices, security and guard houses, maintenance and storage;
- Temporary man-camp of approximately 1 ha;
- Temporary construction laydown area of approximately 1 ha;
- Internal gravel service roads constructed by removing 300 mm topsoil and backfilling with type 1 crushed stone, compacted to 97% Mod Ashto. Roads shall ± 4 m in width cantilevered either side for storm water run-off
- Raw water storage tank;
- Project primary and/or secondary access road/s, associated access point/s, internal distribution roads and crossings; and
- Fencing and perimeter security system around the project development footprint, and all other necessary related infrastructure.

1.2.1 Associated project services

Over and above the proposed infrastructure associated with the Vogelstruisfontein USF Project, it is envisaged that the following activities will take place during the construction and operational phases of the development:

- Waste Management Activities - all refuse material generated from the proposed development will be collected by a contractor and will be disposed of at a licensed waste disposal site off site. It is most likely that the waste will be disposed of at the Marie Louise Landfill site. This service will be arranged with the municipality/waste collection company when required;
- Sanitation – due to the location of the site it is proposed that the project will construct and utilise its own sanitation services as Municipal services do not service the project site. All sewage/effluent water originating from these facilities will be managed utilising temporary portable chemical toilets and portable modular sewage treatment facilities (package plants);
- Water for the construction phase will be transported to the site, using water tankers. During the operational phase the need is minimal and will be trucked to site;
- Construction electricity – the use of generators will be required during the construction phase of the plant;



- Operational power – power for all auxiliary power services shall be drawn from the 33 kV connection to the City Power Network. On site step-down auxiliary transformers will step down the 33 kV MV supply to 400 V; and
- Storm water management – Based on the planned construction activities, no significant scaled ground works will act to change the flow of surface water across the site other than the gravel access roads to the infrastructure. The existing grass vegetation will be retained as far as possible and managed as stipulated in the Environmental Management Programme report (EMPr). No asphalt or layer works will cover any section of the site requiring storm water channelling and associated drainage. Surface water on site is thus anticipated to naturally infiltrate and drain in alignment with the existing topography of the site.

2 LIMITATIONS

The following limitation should be noted for the study:

- Intensive sampling and trapping was not implemented for this study and the survey was conducted during the dry winter season which is not optimal for assessments of terrestrial vegetation diversity. Therefore, the confidence of the vegetation component of this assessment is low whilst the confidence in the fauna assessment is moderate; and
- The extent of habitat units that will be directly affected as well as habitats within 500 meters of the proposed project was ground truthed.

3 KEY LEGISLATIVE REQUIREMENTS

The following legal framework and requirements apply to the study:

- The National Environmental Management: Biodiversity Act (NEM/BA) No. 10 of 2004: specifically, the management and conservation of biological diversity within the RSA and of the components of such biological diversity;
- The Conservation of Agricultural Resources Act (CARA) Act 43 of 1983;
- Gauteng Conservation Plan 3.3 (C-Plan 3.3, 2011);
- Gauteng Provincial Environmental Management Framework (GPEMF) (GDARD, 2014);
- Gauteng Development Guidelines for Ridges (GDARD, 2001);
- GDARD Requirements for Biodiversity Assessments (Version 3, 2014): Gauteng's Department of Agriculture and Rural Development's (GDARD) Biodiversity Management Directorate has defined minimum necessary requirements for biodiversity studies.

4 PROJECT AREA

The site for the Urban Solar Farm (USF) lies east of Hebbard Street, approximately 800 m from Florida Lake, Florida in the Gauteng Province (Figure 1). Hebbard Street forms the western boundary, the northern and southern boundaries are composed of office and industrial



areas. The Vogelstruisfontein USF Project site falls within the Quarter Degree Square (QDS) 2627BB. The location of the USF within QDS 2627BB is shown in Figure 1.



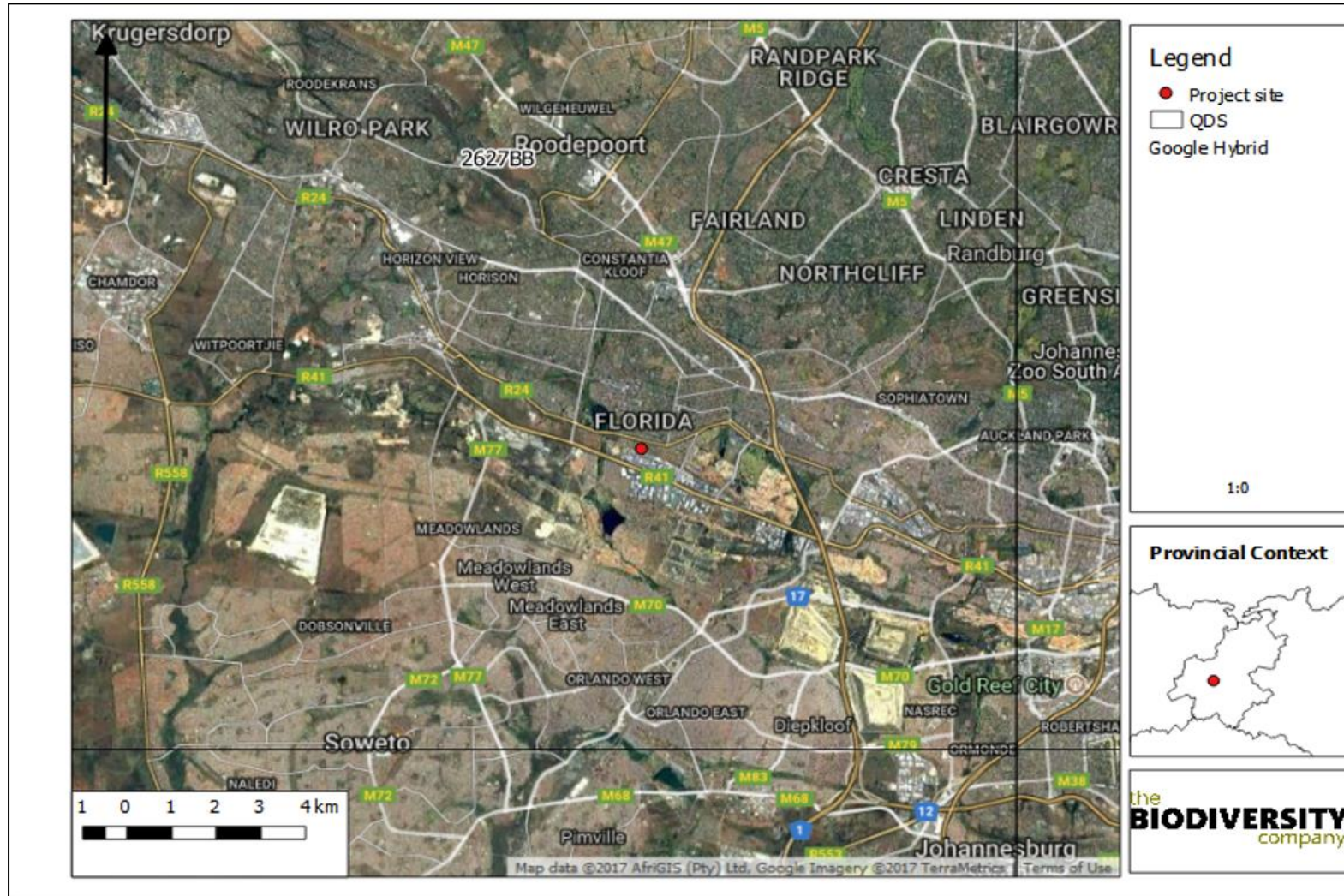


Figure 1: The location of the proposed Vogelstruisfontein USF Project and associated Quarter Degree Square (QDS) 2627BB



4.1 Gauteng Conservation Plan Version 3.3

The Gauteng Conservation Plan (Version 3.3) (GDARD, 2011) classified areas within the Province on the basis of its contribution to reach the conservation targets within the province. These areas are classified as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) to ensure sustainability in the long term. The CBAs are classified as 'Irreplaceable' (must be conserved), or 'Important' to reach the conservation targets.

According to the Gauteng Conservation Plan (C-plan), the eastern boundary of the USF overlaps with a CBA (Figure 2). This CBA is listed as 'Important' in the Gauteng C-Plan. Additionally, other CBA's and ESA's occur within 500 meters of the USF. Additional impacts on these areas should be avoided during all phases of the development.



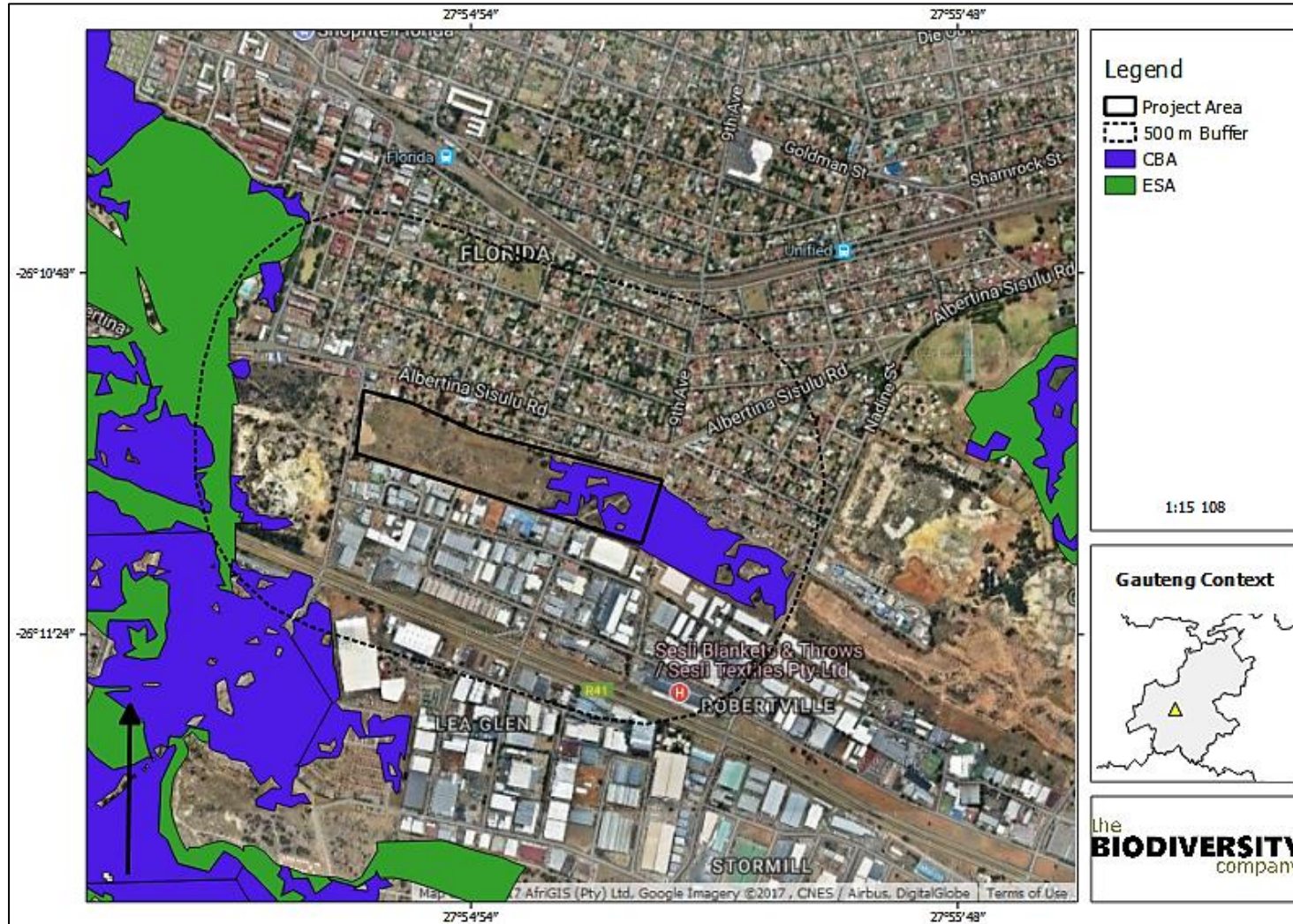


Figure 2: Vogelstruisfontein USF Project site superimposed on the Gauteng Conservation Plan Version 3.3



4.2 Listed Ecosystems

The South African Biodiversity Act (Act 10 of 2004) provides for the listing of threatened or protected ecosystems. These ecosystems are grouped into Critically Endangered-, Endangered-, Vulnerable- and Protected Ecosystems (Section 52(1) (a) of the National Environmental Management: Biodiversity Act (Government Gazette 34809, Government Notice 1002, 9 December 2011)).

The site is situated within the Soweto Highveld Grassland ecosystem. This ecosystem is rated as Endangered (EN), due to mass urban development, mining and cultivation. The conservation target for this ecosystem is 24%, only a small portion of this ecosystem is statutorily conserved within small nature reserves such as Suikerbosrand.

The Eastern Temperate Freshwater Wetland ecoregion also occurs within 500 m of the proposed USF. This vegetation type is characterised by shallow depressions and flat landscapes. This vegetation type has not yet been assessed for conservation importance, it is poorly protected with only 15% statutorily conserved.



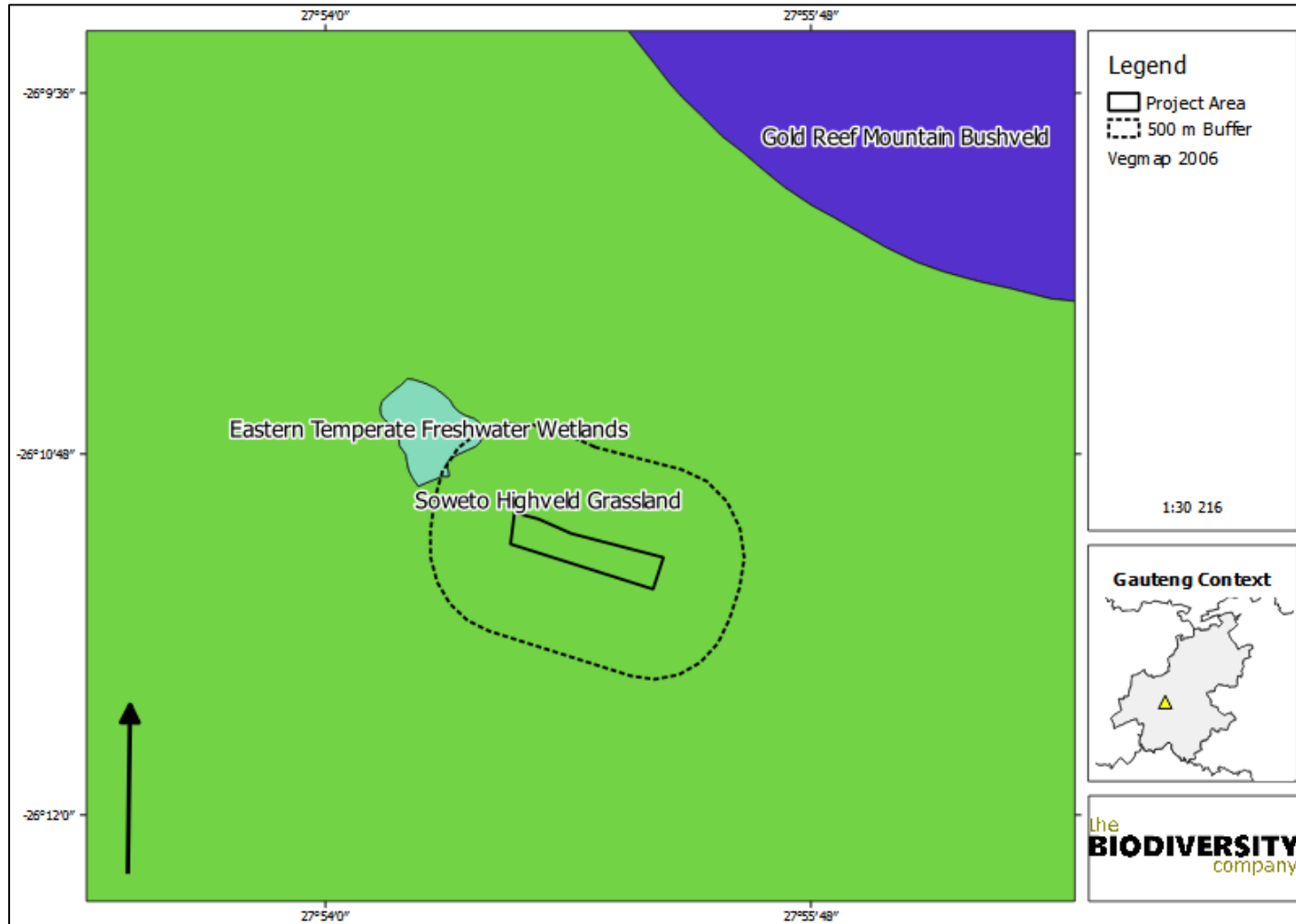


Figure 3: Vogelstruisfontein USF Project site showing the vegetation type based on the Vegetation Map of South Africa, Lesotho & Swaziland (Mucina & Rutherford, 2006)



5 METHODOLOGY

5.1 Desktop Assessment

The objectives of this assessment were to combine the aspects of the regional vegetation unit (obtained from Mucina and Rutherford 2006) with the field study to formulate a series of conclusions and any subsequent recommendations. The following datasets and sources were reviewed for the study:

- The Vegetation of South Africa, Lesotho & Swaziland (Mucina & Rutherford, 2010);
- The Southern Africa Bird Atlas Project (SABAP2, 2017) and BirdLife South Africa (2017);
- Mammal information was referenced from the Animal Demography Unit (ADU, 2016), and Skinner & Chimimba (2005); and
- Reptiles and amphibians were referenced from ADU (2016), Bates et al. (2014) and Du Preez and Carruthers (2009) respectively.

The evaluation of species of concern was considered after the field study which served to identify the potential for occurrence. Therefore, all species identified under the above-mentioned references were not necessarily analysed in detail. Plants were identified in the field using fieldguides (Van Oudtshoorn, 2004; Van Wyk & Van Wyk, 1997).

The verification of the presence of red and orange listed plant species was one of the primary ecological requirements of the floral assessment.

5.2 Field Survey

A field survey was conducted on the 30th of June 2017 by two ecologists where the floral and faunal communities in the Vogelstruisfontein USF Project area were assessed. The timing of the study represented dry season conditions which were sub-optimal in terms of the characterisation of terrestrial vegetation diversity. The project was ground-truthed on foot, which included spot checks in pre-selected areas to validate desktop data. Photographs were recorded during the site visit.

The fieldwork attempted to classify the fauna, flora and habitats, with emphasis on recording the actual and potential presence of Red Data species (also referred to as Red-Listed and Orange-Listed species), which are species of conservation concern in South African (either classified as threatened by the IUCN (2014), protected by NEM/BA (2014) or indeed other legislations applicable provincially or nationally).

5.3 Vegetation Assessment

The survey included the following:

- A survey for Red and Orange Data plant species;
- Vegetation units were identified, classified and delineated; and
- Habitat types were classified and delineated.



5.4 Faunal Assessment

The survey included the following:

- A survey of the terrestrial habitats within the proposed development area (where applicable);
- Compilation of identified species lists;
- Identification of any Red Data or listed species present or potentially occurring in the area;
- A proximity assessment to any protected or ecologically important areas; and
- Emphasis will be placed on the probability of occurrence of species of provincial, national and international conservation importance.

6 RESULTS AND DISCUSSION

6.1 Desktop Assessment

6.1.1 Vegetation Assessment

The proposed Vogelstruisfontein USF Project site is situated in the Grassland Biome that experiences summer rainfall and dry winters with frost (and fire), which are unfavourable to tree growth. Therefore, grasslands comprise mainly of grasses and plants with perennial underground storage organs, for example bulbs and tubers and suffrutex species. The Grassland Biome comprises a number of vegetation types. The site situated within the Soweto Highveld Grassland vegetation type, the Eastern Temperate Freshwater Wetland vegetation type does also occur within 500 meters of the USF (Figure 3) (Mucina & Rutherford, 2006).

The Soweto Highveld Grassland grows on a moderately undulating landscape that supports short to medium high and dense grassland dominated mainly by *Themeda triandra* (red grass) (Mucina & Rutherford, 2006). Wetlands, rocky outcrops and ridges occur within the Soweto Highveld Grassland. Very little of the original extent of Soweto Highveld Grassland is statutorily conserved, while most of its extent is transformed by mining, urban development and infrastructure. This grassland type is nationally considered to be Endangered.

The Eastern Temperate Freshwater Wetland (AZF3) occurs mainly in the following three (3) marshes, reed and sedge beds and freshwater bodies (EEC, 2017).

Based on the POSA database, 908 plant species are expected to occur in topographical grid square 2627BB (Appendix A).

6.1.1.1 Plant Species of Conservation Concern

A list of possible red and orange listed species which might occur in the study area was obtained for the Vogelstruisfontein USF Project area from the POSA database.

The Plants of Southern Africa online database per SANBI the South African National Biodiversity Institute (SANBI) published the Red List of South African Plants (Raimondo et al., 2009). An online version provides up to date information on the national conservation status of South Africa's indigenous plants (SANBI, 2017). In addition, the Gauteng Province provides



a list of red and orange listed plant species within the Province (Gauteng Department of Agriculture and Rural Development).

These are referred to as Plants of Conservation Concern and are those plants that are important for South Africa's conservation decision making processes and include all plants that are Threatened or that due to ongoing decline, could become Threatened in the near future (Figure 4). These plants are also referred to as Red Listed (Critically endangered, Endangered and Vulnerable) and Orange Listed (Near Threatened, Critically Rare, Rare, Declining and Data deficient) plants (Figure 4).

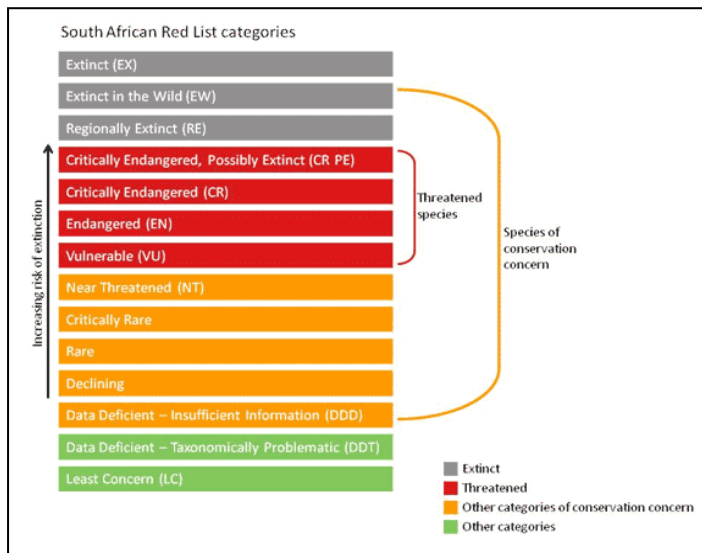


Figure 4: Threatened species and species of conservation concern (Source: <http://redlist.sanbi.org/redcat.php>)

A list of plant species of conservation concern that can be expected to occur in the Vogelstruisfontein USF Project area based on historical data is provided in Table 2 (SANBI, 2017). The likelihood of occurrence of these plant species was assessed based on habitat preferences.

Nine (9) potential plant species of conservation concern were identified for the site (Table 2). Of these species:

- One (1) is listed as Critically Endangered (CE). *Brachycorythis conica* subsp. *transvaalensis* (Albertina Sisulu orchid) is a severely threatened orchid species which is suffering ongoing habitat loss to urban expansion (SANBI, 2017). It occurs in short, open grassland and wooded grassland in Gauteng and Mpumalanga (SANBI, 2017). In Gauteng, it is only currently known from a single remaining subpopulation near to Krugersdorp. Although the likelihood of occurrence was rated as low, the possibility of this species occurring on the site cannot be excluded and will need to be verified during the flowing season (late summer) before the site can be cleared;
- *Melolobium subspicatum* is listed as Vulnerable (VU) on the Red List of South African Plants (SANBI, 2017). It only occurs in very small pockets of remaining habitat in the Gauteng Province and development is currently prohibited in any locations where it occurs (SANBI, 2017). It occurs in grassland communities including Carletonville Dolomite Grassland, Egoli Granite Grassland and Soweto Highveld Grassland such as which would historically have occurred in the Vogelstruisfontein USF Project area.



Although the likelihood of occurrence was rated as moderate the possibility of this species occurring on the site cannot be excluded and will need to be verified during the flowing season (summer) before the site can be cleared;

- Three (3) plants species are listed as Near Threatened (NT) (Table 2). Of these the likelihood of occurrence was rated as good for 2 and moderate for 1 based on habitat preference;
- A further 4 plant species are listed as Least Concern (LC) but decreasing (Table 2). These are plants that are decreasing in abundance due to excess harvesting for the medicinal plant trade; and
- Of the 9 potential plant species of conservation concern 5 are listed as South African endemics (Table 2). Of these 2 have a high likelihood of occurrence on the site, 2 a moderate likelihood and 1 a low likelihood.

Table 2: Plants of conservation concern which might occur in the Vogelstruisfontein USF Project site along with endemism, habitat preferences and likelihood of occurrence

Species	Common Name	Conservation Status (SANBI, 2017)	SA Endemic	Habitat Preference	Likelihood of Occurrence
<i>Brachycorythis conica</i> (Summerh.) Summerh. subsp. <i>transvaalensis</i> Summerh.	Albertina Sisulu orchid	CE	Yes	Grassland & Bushveld	Low
<i>Melolobium subspicatum</i> Conrath		VU	Yes	Grassland	Moderate
<i>Cineraria austrotransvaalensis</i> Cron		NT	Yes	Grassland & Savanna	Good
<i>Habenaria barbertoni</i> Kraenzl. & Schltr.		NT	Yes	Savanna	Moderate
<i>Pearsonia bracteata</i> (Benth.) Polhill		NT	Yes	Grassland & Savanna	Good
<i>Boophone disticha</i> (L.f.) Herb.	Bushman's poison bulb	LC - Decreasing	No	Fynbos, grassland & savanna	Good
<i>Callilepis leptophylla</i> Harv.	Wild Daisy	LC - Decreasing	No	Grassland & Savanna	Good
<i>Hypoxis hemerocallidea</i> Fisch., C.A.Mey. & Avé-Lall.	Star-flower	LC - Decreasing	No	Wide range of habitats	Good
<i>Ilex mitis</i> (L.) Radlk. var. <i>mitis</i>	African Holly	LC - Decreasing	No	Thickets, forests, fynbos, grasslands & savanna	Good



6.1.2 Faunal Assessment

6.1.2.1 Avifauna

Based on the South African Bird Atlas Project (SABAP, Version 2) 340 bird species are expected to occur in pentad 2610_2755 within the 2627BB QDS. The full list of expected bird species is provided in Appendix B.

Of these bird species, 17 (6.32% of expected species) are listed as being of conservation importance either on a regional or global scale (Table 3).

The expected bird species list includes:

- Three (3) species that are listed as Endangered (EN) on a regional basis;
- Six (6) species that are listed as Vulnerable (VU) on a regional basis; and
- Seven (7) species that are listed as Near Threatened (NT) on a regional basis (Table 3).

On a global scale, a single species is listed as EN, 3 as VU and 9 as NT (Table 3).

Table 3: List of bird species of regional or global conservation importance that have previously been recorded in QDS 2627BB (SABAP2, 2017, Birdlife, 2015; IUCN, 2017)

Species	Common Name	Conservation Status		Likelihood of Occurrence
		Regional (Birdlife, 2015)	Global (IUCN, 2017)	
<i>Gyps coprotheres</i>	Vulture, Cape	EN	EN	Low
<i>Mycteria ibis</i>	Stork, Yellow-billed	EN	LC	Low
<i>Polemaetus bellicosus</i>	Eagle, Martial	EN	VU	Low
<i>Aquila verreauxii</i>	Eagle, Verreaux's	VU	LC	Low
<i>Eupodotis senegalensis</i>	Korhaan, White-bellied	VU	LC	Moderate
<i>Falco biarmicus</i>	Falcon, Lanner	VU	LC	Moderate
<i>Podica senegalensis</i>	Finfoot, African	VU	LC	Low
<i>Rostratula benghalensis</i>	Painted-snipe, Greater	VU	LC	Low
<i>Sagittarius serpentarius</i>	Secretarybird	VU	VU	Low
<i>Tyto capensis</i>	Grass-owl, African	VU	LC	Low
<i>Alcedo semitorquata</i>	Kingfisher, Half-collared	NT	LC	Low
<i>Anthropoides paradiseus</i>	Crane, Blue	NT	VU	Low
<i>Ciconia abdimii</i>	Stork, Abdim's	NT	LC	Moderate
<i>Coracias garrulus</i>	Roller, European	NT	LC	Low
<i>Glareola nordmanni</i>	Pratincole, Black-winged	NT	NT	Moderate
<i>Oxyura maccoa</i>	Duck, Maccoa	NT	NT	Low
<i>Mirafra cheniana</i>	Lark, Melodious	LC	NT	Low

The likelihood of occurrence of the expected bird species of conservation concern was assessed based on habitat types observed in the Vogelstruisfontein USF Project area during



the field survey and habitat preferences as described in Birdlife International Data Zone (Birdlife International, 2017) and the IUCN Red List of Threatened Species (IUCN, 2017).

Gyps coprotheres (Cape Vulture) is rated as Endangered (EN) regionally and globally (Table 3). According to the IUCN (2017) a decrease in the availability of carrion (particularly during chick-rearing), inadvertent poisoning, electrocution on pylons or collision with cables, loss of foraging habitat and unsustainable harvesting for traditional uses are the most factors contributing to the decline of this species (Newman, 2010). With the low possibility of carrion in the area the likelihood of occurrence is rated low for this species.

Mycteria ibis (Yellow Billed Stork) is rated as Endangered (EN) regionally (Table 3). It is distributed throughout most of South Africa with the exception of semi-arid regions. It generally occurs in small groups around floodplains, rivers and wetlands. The likelihood of occurrence is low for the Vogelstruisfontein USF Project area.

Polemaetus bellicosus (Martial Eagle) is listed Endangered (EN) on a regional scale and Vulnerable (VU) on a global scale (Table 3). This species has an extensive range across much of sub-Saharan Africa but populations are declining due to deliberate and incidental poisoning, habitat loss, reduction in available prey, pollution and collisions with power lines (IUCN, 2017). It inhabits open woodland, wooded savanna, bushy grassland, thorn-bush and, in southern Africa, more open country and even subdesert (IUCN, 2017). The likelihood of occurrence is rated low for the Vogelstruisfontein USF Project area.

Aquila verreauxii (Verreaux's Eagle) is rated as Vulnerable (VU) on a region basis (Table 3). Its distributional range includes most of South Africa and is generally found in pairs associated with rocky hills and gorges (Newman, 2010). The likelihood of occurrence is low for the project area due to the absence of prey animals (especially hyraxes) as well as the high level of urbanisation.

Eupodotis senegalensis (White-bellied Bustard) is rated as Vulnerable (VU) on a regional scale (Table 3). It occurs in the Gauteng and Kwazulu-Natal Provinces. It is generally found in grasslands savanna and occurs in pairs or small groups (Newman, 2010). The likelihood of occurrence of this species in the project area is rated as moderate.

Falco biarmicus (Lanner Falcon) is rated as Vulnerable (VU) on a regional basis. It occurs throughout sub-Saharan Africa and although been non-migratory, some individuals do migrate to West Africa. They may occur in groups up to 20 individuals, but have also been observed solitary. They occur in a wide variety of habitats ranging from low-land deserts to forested mountains. Their diet is mainly composed of small birds such as pigeons and francolins (Newman, 2010). The likelihood of occurrence is rated moderate for the project area.

Podica senegalensis (African Finfoot) is rated as Vulnerable (VU) on a regional basis. It is mainly found in coastal regions and in the Northern Provinces around tree fringed rivers. There is a low likelihood of occurrence in the project area.

Rostratula benghalensis (Greater Painted-snipe) is rated as Vulnerable (VU) on a regional basis and occurs throughout most of South Africa (Newman, 2010). It is often found in pairs or small groups, around inland waters. The likelihood of occurrence is rated low for the project area.



Sagittarius serpentarius (Secretarybird) occurs throughout sub-Saharan Africa in grasslands and lightly wooded savanna (IUCN, 2017). This species feeds on a wide variety of prey items including insects but may also resort to small mammals, reptiles, snakes, eggs and young birds (IUCN, 2017). The likelihood of occurrence is low for the project area due to the absence of suitable prey items and the degree of disturbance.

Tyto capensis (African Grass-owl) is rated as Vulnerable (VU) on a regional basis. Its distribution includes the eastern parts of South Africa. It is generally solitary but does occur in pairs, in moist grasslands where it roosts. The likelihood of occurrence is rated low due to the nesting habits preferring thick grasses around wetlands and rivers.

Alcedo semitorquata (Half-collared Kingfisher) is distributed throughout sub-Saharan Africa (IUCN, 2017), with a preference for heavily wooded inland waters. This Kingfisher's diet mainly consists of small fish which it spots from a nearby perch (Newman, 2010). The likelihood of occurrence is low for this species in the project area.

Anthropoides paradiseus (Blue Crane) is a South African endemic and is rated Near Threatened (NT) regionally and Vulnerable (VU) globally (IUCN, 2017). It generally occurs in pairs or flocks throughout most of South Africa (Newman, 2010). It has a preference for grassland and wetland areas. The likelihood of occurrence for this species is rated low due to the high level of urbanisation.

Ciconia abdimii (Abdim's stork) is rated as Near Threatened (NT) regionally and occurs throughout most of the northern provinces of South Africa. It generally occurs in flocks that feed in grassland and bushveld habitats (Newman, 2010). There is a moderate likelihood of occurrence of this species in the project area.

Coracias garrulous (European Roller) is a winter migrant from south-central Europe and Asia occurring throughout sub-Saharan Africa (IUCN, 2017). It has a preference for bushy plains and dry savannah and is often seen feeding on insects in agricultural lands (IUCN, 2017). The likelihood of occurrence of this species in the project area is rated as low.

Glareola nordmanni (Black-winged Pratincole) is rated as Near Threatened (NT) regionally and globally (IUCN, 2017). It occurs in flocks around floodplains and wetlands throughout central South Africa (Newman, 2010). The likelihood of occurrence of this species in the project area is rated as moderate.

Oxyura maccoa (Maccoa Duck) is rated as Near Threatened (NT) on a global scale (IUCN, 2017). This species is distributed throughout most of South Africa but is seldom found away from water (Newman, 2010). The likelihood of occurrence of this species occurring in the project area is rated as low.

Mirafra cheniana (Melodious Lark) is mainly restricted to South Africa with scattered populations observed in Zimbabwe and Botswana (Newman, 2010). It has a preference for dry grasslands dominated by *Themeda triandra* (IUCN, 2017). The likelihood of occurrence is rated as low for the project area.

6.1.2.2 Mammals

The IUCN Red List Spatial Data (IUCN, 2017) lists 69 mammal species that could be expected to occur within the project area (Appendix B). Of these species 5 are listed as being of conservation concern on a regional or global basis (Table 4). This includes:

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- Three (3) species that are listed as VU on a regional basis; and
- One (1) that is listed as NT (Table 4).

On a global scale, 1 species is listed as EN, 1 as VU and 1 as NT (Table 4).

Table 4: List of mammal species of conservation concern that may occur in the Vogelstruisfontein USF Project area as well as their regional and global conservation statuses and likelihood of occurrence (IUCN, 2017; SANBI, 2016)

Species	Common name	Conservation Status		Likelihood of Occurrence
		Regional (SANBI, 2016)	Global (IUCN, 2017)	
<i>Crocidura maquassiensis</i>	Maquassie musk shrew	VU	LC	Low
<i>Felis nigripes</i>	Black-footed Cat	VU	VU	Low
<i>Mystromys albicaudatus</i>	White-tailed Rat	VU	EN	Low
<i>Atelerix frontalis</i>	South African Hedgehog	NT	LC	Moderate
<i>Eidolon helvum</i>	African Straw-coloured Fruit Bat	LC	NT	Low

Crocidura mariquensis (Swamp Mush Shrew) is rated as NT on a regional basis (Table 4). It has very specific habitat requirements and only occurs in close proximity to open water with a distinct preference for marshy ponds, and riverine and semi-aquatic vegetation such as reed beds (IUCN, 2017). Based on the absence of this habitat type in the project area, the likelihood of occurrence was rated as low.

Felis nigripes (Black-footed cat) has the most restricted distribution of any of the African felid species (IUCN, 2017). The species is endemic to the arid grasslands, dwarf shrub, and savannah of the Karoo and Kalahari in southern Africa (IUCN, 2017). Given the limited habitat availability and the degree of disturbance present on the site the likelihood of occurrence was rated as low (Table 4).

Mystromys albicaudatus (White-tailed Mouse) is distributed throughout most of South Africa apart from the arid regions. It prefers grasslands but is adaptable to rocky areas and karoo vegetation. They are nocturnal spending, most of their time in burrows underground. Likelihood of occurrence is rated as low due to the degree of disturbance and urbanisation of the project area (Stuart *et al*, 2015).

Atelerix frontalis (South African hedgehog) is listed as NT on a regional basis (Table 4). It has been recorded in a wide range of habitats including scrub brush, grassland and suburban gardens (IUCN, 2017). Despite the extensive degradation of the habitat on site the likelihood of occurrence was rated as moderate due to this species tolerance for a wide range of habitat types.

Eidolon helvum (African Straw-coloured Fruit Bat) is listed NT on a global scale (IUCN, 2017). This species has been recorded from a wide range of habitats across the lowland rainforest and savanna zones of Africa (IUCN, 2017). Although considered to be widespread and abundant across its range, certain populations are decreasing due to severe deforestation, hunting for food and medicinal use (IUCN, 2017). This species is known to form large roosts and colonies numbering in the thousands to even millions of individuals (IUCN, 2017). The likelihood of occurrence is rated as low for the project area.



6.1.2.3 Reptiles

Based on the IUCN Red List Spatial Data (IUCN, 2017) and the ReptileMap database provided by the Animal Demography Unit (ADU, 2017) 30 reptile species are expected to occur in the project area (Appendix C). None of the expected species are listed as being of conservation concern.

6.1.2.4 Amphibians

Based on the IUCN Red List Spatial Data (IUCN, 2017) and the AmphibianMap database provided by the Animal Demography Unit (ADU, 2017) 20 amphibian species are expected to occur in the project area (Appendix D).

Of the expected amphibian species, *Pyxicephalus adspersus* (Giant bullfrog) is listed as NT on a regional scale (Appendix D). This species has a wide distributional range, but populations have declined across much of this range. It is a species of drier savannahs and temporary pools, pans and ditches. They can tolerate habitat alteration, but not urbanization. Based on the degree of urbanisation observed in the project area the likelihood of occurrence was rated as low.

6.2 Field Survey

The field visit was conducted on the 30th of June 2017, during the dry winter season. A track log showing the area traversed by the specialists is provided in Figure 5. The area traversed covered the area proposed for the USF as well as the accessible portion of the powerline route (Figure 5).

A portion of the power line route could not be accessed due to a palisade fence. The area was assessed from a high vantage point overlooking the area and the vegetation community assessed from there (Figure 5). The proposed powerline route represents a secondary connection alternative as City Power still needs to finalise the interconnection point.





Figure 5: Map showing tracks walked by ecologist in relation to the Vogelstruisfontein USF Project site. The portion of the site along the power line route could not be accessed due to a palisade fence



6.2.1 Vegetation Assessment

A total of 27 plant species were recorded during the June 2017 field survey. The project area is in a highly modified state, the main vegetation community was composed of *Eucalyptus diversicolor* (Karri) and *Acacia mearnsii* (Black Wattle). Two (2) indigenous tree species were observed in the project area namely *Searsia lancea* and *Vachellia karroo*.

The grass community consisted of eleven grass species commonly associated with grasslands and disturbed areas namely: *Aristida congesta congesta*, *Cortaderia selloana*, *Cymbopogon caesius*, *Cynodon dactylon*, *Eragrostis lehmanniana*, *Hyperthelia dissolute*, *Melinis repens*, *Pogonarthia squarrosa*, *Seriphium plumosum*, *Sporobolus africanus* and *Phragmites australis*.

Other trees and shrubs that were found in the project area are listed in Table 5.

Table 5: Trees, shrubs and grasses found in the Vogelstruisfontein USF Project area during the June 2017 survey

Species	Common Name	Threat status (SANBI, 2017)	SA Endemic	NEM/BA (2004)
<i>Aristida congesta congesta</i>	Three-awned Grass	LC	No	
<i>Acacia mearnsii</i>	Black wattle	Unlisted	No	2
<i>Agave americana</i>	Spreading century plant	Unlisted	No	2
<i>Commelina benghalensis</i>	Benghal dayflower	LC	No	
<i>Cortaderia selloana</i>	Common pampas grass	Not Evaluated	No	1b
<i>Cymbopogon caesius</i>	Common turpentine grass	LC	No	
<i>Cynodon dactylon</i>	Couch grass	LC	No	
<i>Datura ferox</i>	Large thorn apple	Unlisted	No	1b
<i>Eragrostis lehmanniana</i> <i>Nees var. lehmanniana</i>	Lehman Love Grass	LC	No	
<i>Eucalyptus diversicolor</i>	Karri	Unlisted	No	1b
<i>Hyperthelia dissoluta</i>	Thatching Grass	LC	No	
<i>Melia azedarach</i>	Syringa	Unlisted	No	1b
<i>Melinis repens</i>	Natal Red Top	LC	No	
<i>Opuntia ficus-indica</i>	Prickly pear	Unlisted	No	1b



<i>Phragmites australis</i>	Common Reed	LC	No	
<i>Pogonarthia squarrosa</i>	Herringbone grass	Unlisted	No	
<i>Schinus molle</i>	Pepper tree	Unlisted	No	1b
<i>Searsia lancea</i>	Karee	LC	No	
<i>Seriphium plumosum</i>		LC	No	
<i>Solanum mauritanum</i>	Bugweed	Unlisted	No	1b
<i>Sporobolus africanus</i>	Ratstail Dropseed	LC	No	
<i>Syngonium podophyllum</i>	Goosefoot	Unlisted	No	1b
<i>Tagetes minuta</i>	Khaki bush	Unlisted	No	
<i>Thevetia peruviana</i>	Oleander	Unlisted	No	1b
<i>Trichoneura grandiglumis</i>	Rolling Grass	LC	No	
<i>Vachellia karroo</i>	Cape Thorn Tree	LC	No	
<i>Verbena bonariensis</i>	Wild verbena	Unlisted	No	1b

6.2.1.1.1 Alien Invasive Plant Species

Declared weeds and invader plant species have the tendency to dominate or replace the canopy or herbaceous layer of natural ecosystems, thereby transforming the structure, composition and function of natural ecosystems. Therefore, it is important that these plants are controlled and eradicated by means of an eradication and monitoring programme. Some invader plants may also degrade ecosystems through superior competitive capabilities to exclude native plant species (Henderson, 2001).

The National Environmental Management: Biodiversity Act (NEM/BA) is the most recent legislation pertaining to alien invasive plant species. Prior to this the management of alien invasive weeds was administered by the Conservation of Agricultural Resources Act (CARA) 43 of 1983. The objective of the CARA was the protection of indigenous vegetation communities through and agricultural resources through, amongst other things:

- The control of weeds and invader plants;
- The restoration or reclamation of eroded land or land which is otherwise disturbed or denuded.

In August 2014, the list of Alien Invasive Species was published in terms of the National Environmental Management: Biodiversity Act (Act 10 of 2004) (Government Gazette No 78 of 2014). The Alien and Invasive Species Regulations were published in the Government Gazette No. 37886, 1 August 2014. The legislation calls for the removal and / or control of



alien invasive plant species (Category 1 species). In addition, unless authorised thereto in terms of the National Water Act, 1998 (Act No. 36 of 1998), no land user shall allow Category 2 plants to occur within 30 meters of the 1:50 year flood line of a river, stream, spring, natural channel in which water flows regularly or intermittently, lake, dam or wetland. Category 3 plants are also prohibited from occurring within close proximity to a watercourse.

Below is a brief explanation of the three categories in terms of the National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEM/BA):

Category 1a: Invasive species requiring compulsory control. Remove and destroy. Any specimens of Category 1a listed species need, by law, to be eradicated from the environment. No permits will be issued.

Category 1b: Invasive species requiring compulsory control as part of an invasive species control programme. Remove and destroy. These plants are deemed to have such a high invasive potential that infestations can qualify to be placed under a government sponsored invasive species management programme. No permits will be issued.

Category 2: Invasive species regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy or accept as a gift any plants listed as Category 2 plants. No permits will be issued for Category 2 plants to exist in riparian zones.

Category 3: Invasive species regulated by activity. An individual plant permit is required to undertake any of the following restricted activities (import, possess, grow, breed, move, sell, buy or accept as a gift) involving a Category 3 species. No permits will be issued for Category 3 plants to exist in riparian zones.

The alien plant species identified on the study site are listed in Appendix E. Note that according to the regulations, a person who has under his or her control a category 1b listed invasive species must immediately:

- a) Notify the competent authority in writing;
- b) Take steps to manage the listed invasive species in compliance with
 - i. section 75 of the Act;
 - ii. the relevant invasive species management programme developed in terms of regulation 4; and
 - iii. any directive issued in terms of section 73(3) of the Act.

Seven category 1b species were recorded and must therefore be removed by implementing an alien invasive plant management programme in compliance of section 75 of the Act as stated above. These species are: *Cortaderia selloana*, *Datura ferox*, *Eucalyptus diversicolor*, *Melia azedarach*, *Opuntia ficus-indica*, *Schinus molle*, *Solanum mauritanum*, *Syngonium podophyllum*, *Thevetia peruviana*, *Verbena bonariensis*.

Category 2 plants identified on site included *Acacia mearnsii* and *Agave americana*.



6.2.2 Faunal Assessment

6.2.2.1 Avifauna

A total of 17 bird species were observed in the project area during the June 2017 survey (Table 6). None of the observed species are of conservation concern (Table 6).

Table 6: Bird species observed in the Vogelstruisfontein USF Project area during the June 2017 survey

Species	Common Name	Conservation Status	
		Regional (Birdlife, 2015)	Global (IUCN, 2017)
<i>Acridotheres tristis</i>	Myna, Common	Unlisted	LC
<i>Ardea cinerea</i>	Heron, Grey	Unlisted	LC
<i>Bostrychia hagedash</i>	Ibis, Hadedda	Unlisted	LC
<i>Cisticola chiniana</i>	Cisticola, Rattling	Unlisted	LC
<i>Columba guinea</i>	Pigeon, Speckled	Unlisted	LC
<i>Corvinella melanoleuca</i>	Shrike, Magpie	Unlisted	LC
<i>Corvus albus</i>	Crow, Pied	Unlisted	LC
<i>Dendroperdix sephaena</i>	Francolin, Crested	Unlisted	LC
<i>Lamprotornis nitens</i>	Starling, Cape Glossy	Unlisted	LC
<i>Lanius collaris</i>	Fiscal, Common (Southern)	Unlisted	LC
<i>Numida meleagris</i>	Guineafowl, Helmeted	Unlisted	LC
<i>Passer melanurus</i>	Sparrow, Cape	Unlisted	LC
<i>Streptopelia senegalensis</i>	Dove, Laughing	Unlisted	LC
<i>Threskiornis aethiopicus</i>	Ibis, African Sacred	Unlisted	LC
<i>Vanellus coronatus</i>	Lapwing, Crowned	Unlisted	LC

6.2.2.2 Mammals

One mammal species was observed during the June 2017 survey, namely *Lepus victoriae* (African Savanna Hare). Due to the limited duration of the survey additional sampling methods, such as small mammal trapping, was not employed. The likelihood that other mammal species occur in the project area is rated as high.

6.2.2.3 Herpetofauna (reptiles & amphibians)

No reptiles or amphibians were observed during the survey, the cold temperature experienced during the survey was a limiting factor of reptile and amphibian diversity.

It is likely that under better climatic conditions some of the expected reptile and amphibian species will be present on the site.

6.3 Sensitivity Assessment

A sensitivity map was compiled for the site based on the results of the June 2017 dry season assessment (Figure 6). Although the area was found to be disturbed the potential presence of plant species of conservation concern could not be discounted based on the results of a dry season survey only. The precautionary principle was therefore applied when assigning sensitivities to the site. The sensitivity of the proposed solar farm footprint was classified as moderate (Figure 6). The sensitivity of the previously mined area immediately to the west of



the site was classified as low (Figure 6). The sensitivity of the westernmost portion of the project site, which is traversed by the powerline, was classified as high as the possibility of plant species of conservation concern occurring in this area could not be discounted (Figure 6).

The sensitivity map will be updated once the wet season vegetation survey has been completed.



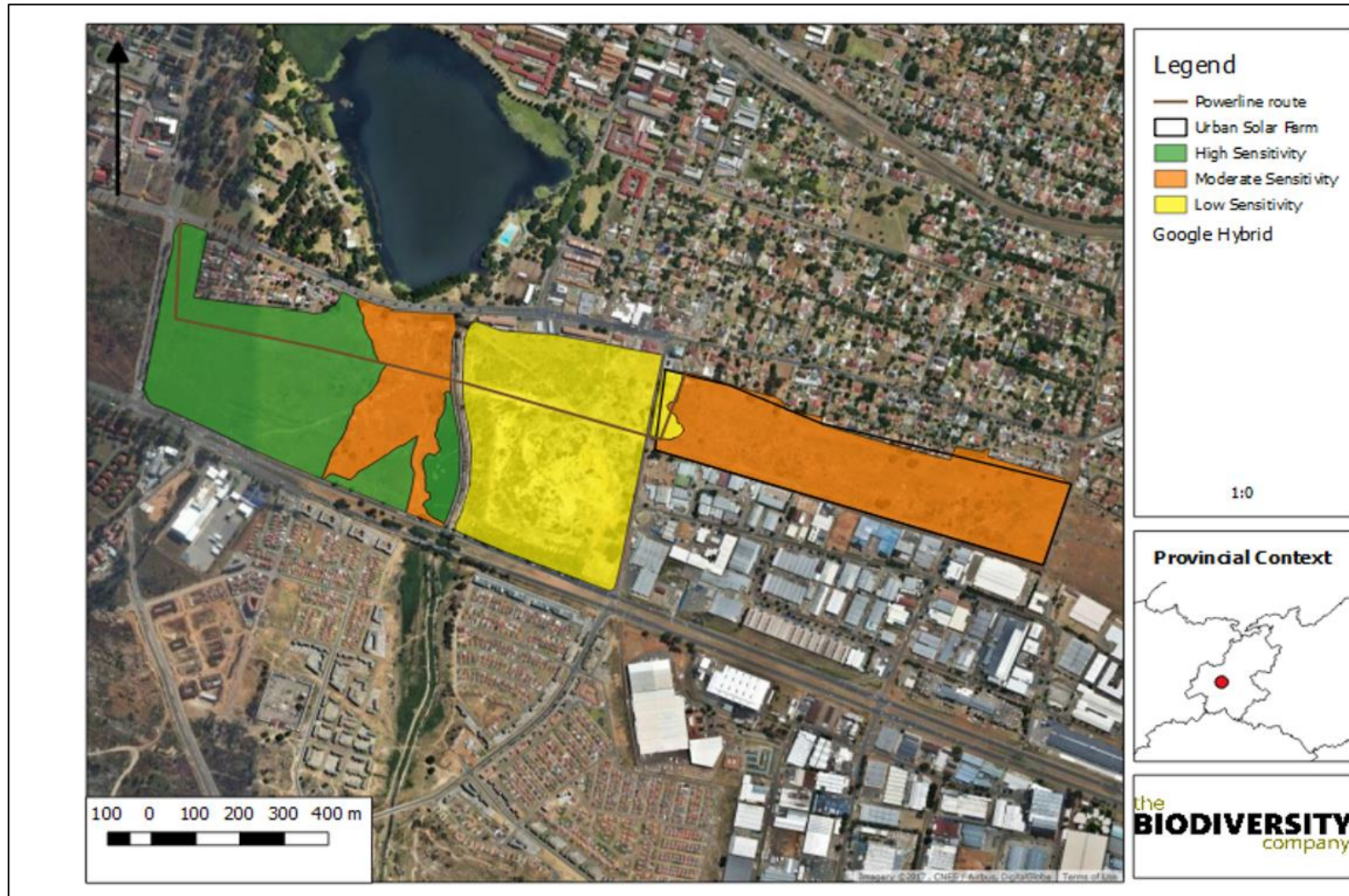


Figure 6: Dry season sensitivity map for the Vogelstruisfontein USF Project site



7 IMPACT ASSESSMENT

7.1 Methodology

Potential impacts were evaluated against the data captured during the fieldwork to identify relevance to the study area. The relevant impacts were then subjected to a prescribed impact assessment methodology which is described below.

Impacts were assessed in terms of the construction and operational phases. The operational phase refers to that phase of the project where the Vogelstruisfontein USF is operational. Due to the nature of this development, the operational phase is assessed as lasting indefinitely and there is no closure or post- closure phases in this scenario.

Mitigation measures were only applied to impacts deemed moderately or highly significant based on the impact analysis. The likelihood and consequence descriptors are presented in Table 7 and Table 8. The significance rating matrix is presented in Table 9.

Table 7: Likelihood descriptors

Probability of impact	Rating
Highly unlikely	1
Possible	2
Likely	3
Highly likely	4
Definite	5
Sensitivity of receiving environment	Rating
Ecology not sensitive/important	1
Ecology with limited sensitivity/importance	2
Ecology moderately sensitive/ /important	3
Ecology highly sensitive /important	4
Ecology critically sensitive /important	5

Table 8: Consequence Descriptors

Severity of impact	Rating
Insignificant / ecosystem structure and function unchanged	1
Small / ecosystem structure and function largely unchanged	2
Significant / ecosystem structure and function moderately altered	3
Great / harmful/ ecosystem structure and function largely altered	4
Disastrous / ecosystem structure and function seriously to critically altered	5
Spatial scope of impact	Rating



Activity specific/ < 5 ha impacted / Linear features affected < 100m	1
Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	2
Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	3
Regional within 5 km of the site boundary / < 2000ha impacted / Linear features affected < 3000m	4
Entire habitat unit / Entire system/ > 2000ha impacted / Linear features affected > 3000m	5
Duration of impact	Rating
One day to one month: Temporary	1
One month to one year: Short Term	2
One year to five years: Medium Term	3
Life of operation or less than 20 years: Long Term	4
Permanent	5

Table 9: Significance Rating Matrix

		CONSEQUENCE (Severity + Spatial Scope + Duration)														
		0	2	3	4	5	6	7	8	9	10	11	12	13	14	15
LIKELIHOOD (Frequency of activity + Frequency of Impact)	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	
	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	
	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	
	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	
	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105	
	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	
	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135	
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	

7.2 Identification of Potential Impacts

7.2.1 Construction Phase

The following construction phase impacts were considered on terrestrial vegetation communities:

- Loss destruction and/or eradication of plant species of conservation concern/ importance.

The following construction phase impacts on faunal communities were considered in this assessment:

- Loss and/or displacement of faunal species of conservation concern; and

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- Loss of diversity of indigenous faunal communities.

7.2.2 Operational Phase

The following potential operational phase impacts were considered on terrestrial vegetation communities:

- Continued encroachment and displacement of indigenous vegetation community by alien invasive plant species, particularly in previously disturbed areas;

Potential impacts on faunal communities include:

- Loss of habitat connectivity. The project area forms part of a green belt, linking untransformed areas to the east and west of the project area.

7.3 Assessment of Significance

7.3.1 Construction Phase

The significance of potential impacts on plant species of conservation concern was rated as highly significant prior to mitigation (Table 10). Although no plant species of conservation concern were recorded during the field, the expected plant species list includes 9 species that could potentially occur on the site, including 1 species which is listed as CE by SANBI (2017). As the survey was conducted during the dry season the presence or absence of plant species of conservation concern could not be determined with certainty and the precautionary principle was therefore applied. The significance of the impact was rated as high prior to implementation of mitigation (Table 10).

Potential mitigation measures would include the following:

- A wet season vegetation survey needs to be conducted prior to commencement of earth-clearing to confirm whether plant species of conservation concern are present on the site or not;
- If plant species of conservation concern are recorded on the site then the following mitigation measures would need to be implemented:
 - The entire area occupied by populations of Red List and Orange List plant species will need to be mapped and buffer zones provided to mitigate deleterious edge effects such as the effects of invasive plant and animal species, physical damage and soil compaction caused through trampling and harvesting, abiotic habitat alterations and pollution;
 - The 2014 GDARD Requirements for Biodiversity Assessments stipulates buffer zones of 200 m for Red List and Orange List plant populations occurring within urban areas; and
 - Certain plant species of conservation can be relocated locally on site without applying for a permit from GDARD, alternatively relocation of the plants to an alternative site would require a permit application.

Implementation of the recommended mitigation measures reduced the significance of the impact to moderate (Table 10).



The significance of the potential displacement of faunal species of conservation concern was rated as low prior to mitigation (Table 11). The low level of significance was attributed to the low likelihood of faunal species of conservation concern occurring on the site due to the disturbed nature of the site and the high human density in the surrounding areas. As the significance of the impact was rated as low prior to mitigation, no mitigation measures are deemed necessary and the impact was not reassessed after mitigation (Table 11).

7.3.2 Operations Phase

The impact of continued encroachment of alien invasive plant species on the indigenous vegetation community was rated as moderately significant prior to mitigation (Table 12). This was attributed to the confirmed presence of alien invasive plant species on the site during the baseline state, the sensitivity of the indigenous vegetation community and the high likelihood that earthworks during the construction phase will result in further encroachment during the operational phase unless mitigation & control measures are effectively implemented.

Potential mitigation measures include the following:

- Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent encroachment by alien invasive plant species;
- Quarterly monitoring of the site, by a botanist, for a period of 1 years after completion of construction;
- Compilation of, and implementation of an alien vegetation management plan for the site in compliance of section 75 of the National Environmental Management: Biodiversity Act (NEM/BA).

Implementation of the recommended mitigation measures reduced the significance of the impact from moderate to low (Table 12).

Although extensively disturbed, the project area forms part of a green belt that connects areas to the east and west of the site with each other. Despite having a low degree of ecological integrity, the area still provides some ecological functionality. The significance of this impact on faunal communities was therefore rated as moderately significant prior to mitigation (Table 13).

Potential mitigation measures include the following:

- Animals likely to remain in the area and utilise the corridor will be mostly small e.g. jackals, mongooses, hedgehogs, rodents etc. Placing small tunnels under fences to allow movement of animals through the site can mitigate the impact to some degree without compromising security. For small mammals, pipe culverts from 0.3 m – 1 m in diameter are preferable (Clevenger et al. 2001; McDonald & St Clair, 2004);
- Structures should be monitored for, and cleared of, obstructions such as detritus or silt blockages that impede movement. Small mammals, carnivores, and reptiles avoid crossing structures with significant detritus blockages; and
- Maintain indigenous vegetation community within the project footprint.

Implementation of the recommended mitigation measures reduced the significance of the impact from moderate to low (Table 13).



Table 10: Assessment of significance of construction phase impacts on plant species of conservation concern associated with the proposed USF plant

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Loss destruction and/or eradication of plant species of conservation concern/ importance	5	4	5	3	3		5	4	3	3	2	
	Permanent	Regional	Disastrous	Moderately sensitive	Likely	High	Permanent	Regional	Significant	Moderately sensitive	Possible	Moderate

Table 11: Assessment of significance of construction phase impacts on faunal communities associated with the proposed USF plant

Impact	Prior to mitigation							
	Duration of Impact	Spatial Scope	Sensitivity of Receiving Environment	Severity of Impact	Probability of Impact	Consequence	Likelihood	Significance
Loss and/or displacement of faunal species of conservation concern	5	3	2	2	2	10	4	
	Permanent	Local area	Ecology with limited sensitivity	Small	Possible			Low
	5	3	2	2	2	10	4	



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Loss of diversity of indigenous faunal communities	Permanent	Local area	Ecology with limited sensitivity	Small	Possible							Low
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Table 12: Assessment of significance of operational phase impacts on indigenous vegetation communities associated with the proposed USF plant

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Continued encroachment and displacement of indigenous vegetation community by alien invasive plant species, particularly in previously disturbed areas	3	2	3	3	4		2	2	2	3	3	
	Medium	Development specific	Significant	Moderately sensitive	Highly likely	Moderate	Short term	Development specific	Small	Moderately sensitive	Likely	Low



Table 13: Assessment of significance of operational phase impacts on faunal communities associated with the proposed USF plant

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Loss of habitat connectivity. The project area forms part of a green belt, linking areas of undeveloped land to the east and west of the project area	5	4	3	2	3		1	4	2	2	2	
	Permanent	Regional	Significant	Limited sensitivity	Likely	Moderate	Temporary	Regional	Small	Limited sensitivity	Possible	Low



8 CONCLUSIONS

The following conclusions were reached based on the results of this assessment:

- The Vogelstruisfontein USF Project area is situated in the Endangered (EN) Soweto Highveld Grassland vegetation community however most of the site was found to be degraded and encroached by alien invasive species. The extent of remaining grassland and therefore its conservation value can only be confirmed following a wet season survey;
- According to the Gauteng Conservation Plan (C-plan), the eastern boundary of the project area overlaps with a Critical Biodiversity Area (CBA): other Ecological Supporty Areas (ESA's) and CBAs occur within 500 m of the project boundary;
- The most significant anthropogenic impacts identified on site included:
 - Loss of habitat due to the encroaching developments;
 - Habitat fragmentation;
 - Dumping of rubble and waste; and
 - Encroachment of alien invasive plant species;
- Ten category 1b alien invasive plant species were recorded on the site and must therefore be removed by implementing an alien invasive plant management programme in compliance of section 75 of the National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEM/BA);
- Nine (9) potential plant species of conservation concern were identified that could occur on the site. Of these species:
 - One (1) is listed as Critically Endangered (CE). *Brachycorythis conica* subsp. *transvaalensis* (Albertina Sisulu orchid) is a severely threatened orchid species which is suffering ongoing habitat loss to urban expansion (SANBI, 2017). It occurs in short, open grassland and wooded grassland in Gauteng and Mpumalanga (SANBI, 2017). In Gauteng, it is only currently known from a single remaining subpopulation near to Krugersdorp. Although the likelihood of occurrence was rated as low, the possibility of this species occurring on the site cannot be excluded and will need to be verified during the flowing season (late summer) before the site can be cleared;
 - *Melolobium subspicatum* is listed as Vulnerable (VU) on the Red List of South African Plants (SANBI, 2017). It it only occurs in very small pockets of remaining habitat in the Gauteng Province and development is currently prohibited in any locations where it occurs (SANBI, 2017). It occurs in grassland communities including Carletonville Dolomite Grassland, Egoli Granite Grassland and Soweto Highveld Grassland such as which would historically have occurred in the project area. Although the likelihood of occurrence was rated as moderate the possibility of this species occurring on the site cannot be excluded and will need to be verified during the flowing season (summer) before the site can be cleared;



- Three (3) plants species are listed as Near Threatened (NT), of these the likelihood of occurrence was rated as good for 2 and moderate for 1 based on habitat preference;
- A further 4 plant species are listed as Least Concern (LC) but decreasing. These are plants that are decreasing in abundance due to excess harvesting for the medicinal plant trade;
- Of the 9 potential plant species of conservation concern 5 are listed as South African endemics, of these 2 have a high likelihood of occurrence on the site, 2 a moderate likelihood and 1 a low likelihood;
- Faunal diversity was low and the likelihood of faunal species of conservation concern occurring on the site was similarly rated as low;
- The significance of the potential loss of plant species of conservation concern was rated as high prior to implementation of mitigation measures. If an additional wet season survey is conducted and it confirmed that no plant species of conservation concern are present on the site the significance of this impact will be reduced to low; and
- The significance of potential impacts on faunal communities was rated as low due to the low expected and observed faunal diversity.

9 IMPACT STATEMENT

An impact statement is required as per the NEMA regulations with regards to the proposed development.

Considering the above-mentioned conclusions, it is the opinion of the specialist that approval can be granted for the development to proceed pending the completion of a wet season vegetation survey prior to site clearing.

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APPENDIX A: EXPECTED PLANT SPECIES

Species	Threat status	SA Endemic
<i>Abutilon piloso-cinereum</i> A.Meeuse	LC	No
<i>Abutilon sonneratianum</i> (Cav.) Sweet	LC	No
<i>Acacia cyclops</i> A.Cunn. ex G.Don	Not Evaluated	No
<i>Acacia dealbata</i> Link	Not Evaluated	No
<i>Acalypha angustata</i> Sond.	LC	No
<i>Acalypha caperonioides</i> Baill. var. <i>caperonioides</i>	DDT	No
<i>Acalypha glabrata</i> Thunb. var. <i>pilosa</i> Pax	LC	No
<i>Acalypha peduncularis</i> E.Mey. ex Meisn.	LC	No
<i>Acalypha villicaulis</i> Hochst.	LC	No
<i>Acanthospermum australe</i> (Loefl.) Kuntze	Not Evaluated	No
<i>Achyranthes aspera</i> L. var. <i>aspera</i>	Not Evaluated	No
<i>Acokanthera oppositifolia</i> (Lam.) Codd	LC	No
<i>Acrotome hispida</i> Benth.	LC	No
<i>Adenostemma caffrum</i> DC.sens.lat.	LC	No
<i>Adiantum capillus-veneris</i> L.	LC	No
<i>Aeollanthus buchnerianus</i> Briq.	LC	No
<i>Aerva leucura</i> Moq.	LC	No
<i>Afrocanthium gilfillanii</i> (N.E.Br.) Lantz	LC	No
<i>Afrocanthium mundianum</i> (Cham. & Schltld.) Lantz	LC	No
<i>Afroscidium magalismontanum</i> (Sond.) P.J.D.Winter	LC	No
<i>Agelanthus natalitius</i> (Meisn.) Polhill & Wiens subsp. <i>zeyheri</i> (Harv.) Polhill & Wiens	LC	No
<i>Agrimonia bracteata</i> E.Mey. ex C.A.Mey.	LC	No
<i>Agrimonia procera</i> Wallr.	LC	No
<i>Agrostis eriantha</i> Hack. var. <i>eriantha</i>	LC	No
<i>Agrostis lachnantha</i> Nees var. <i>lachnantha</i>	LC	No
<i>Albuca setosa</i> Jacq.	LC	No
<i>Alectra sessiliflora</i> (Vahl) Kuntze var. <i>sessiliflora</i>	LC	No
<i>Alisma plantago-aquatica</i> L.	Not Evaluated	No
<i>Alloteropsis semialata</i> (R.Br.) Hitchc. subsp. <i>eckloniana</i> (Nees) Gibbs Russ.	LC	No
<i>Aloe arborescens</i> Mill.	LC	No
<i>Aloe cryptopoda</i> Baker	LC	No



<i>Aloe greatheadii</i> Schönland var. <i>davyana</i> (Schönland) Glen & D.S.Hardy	LC	No
<i>Aloe verecunda</i> Pole-Evans	LC	No
<i>Alysicarpus rugosus</i> (Willd.) DC. subsp. <i>perennirufus</i> J.Léonard	LC	No
<i>Amaranthus hybridus</i> L. subsp. <i>hybridus</i> var. <i>hybridus</i>	Not Evaluated	No
<i>Anagallis arvensis</i> L. subsp. <i>arvensis</i>	Not Evaluated	No
<i>Anchusa riparia</i> A.DC.	LC	No
<i>Ancylobotrys capensis</i> (Oliv.) Pichon	LC	No
<i>Andropogon appendiculatus</i> Nees	LC	No
<i>Andropogon chinensis</i> (Nees) Merr.	LC	No
<i>Andropogon eucomus</i> Nees	LC	No
<i>Andropogon huillensis</i> Rendle	LC	No
<i>Anomobryum julaceum</i> (Schrad. ex P.Gaertn., B.Mey. & Schreb.) Schimp.	Not Evaluated	No
<i>Antheophora pubescens</i> Nees	LC	No
<i>Anthospermum hispidulum</i> E.Mey. ex Sond.	LC	No
<i>Anthospermum rigidum</i> Eckl. & Zeyh. subsp. <i>rigidum</i>	LC	No
<i>Apodytes dimidiata</i> E.Mey. ex Arn. subsp. <i>dimidiata</i>	LC	No
<i>Araujia sericifera</i> Brot.	Not Evaluated	No
<i>Argemone mexicana</i> L. forma <i>mexicana</i>	Not Evaluated	No
<i>Argemone ochroleuca</i> Sweet subsp. <i>ochroleuca</i>	Not Evaluated	No
<i>Argyrolobium speciosum</i> Eckl. & Zeyh.	LC	No
<i>Argyrolobium tuberosum</i> Eckl. & Zeyh.	LC	No
<i>Aristida adscensionis</i> L.	LC	No
<i>Aristida aequiglumis</i> Hack.	LC	No
<i>Aristida bipartita</i> (Nees) Trin. & Rupr.	LC	No
<i>Aristida canescens</i> Henrard subsp. <i>canescens</i>	LC	No
<i>Aristida congesta</i> Roem. & Schult. subsp. <i>barbicollis</i> (Trin. & Rupr.) De Winter	LC	No
<i>Aristida congesta</i> Roem. & Schult. subsp. <i>congesta</i>	LC	No
<i>Aristida diffusa</i> Trin. subsp. <i>burkei</i> (Stapf) Melderis	LC	No
<i>Aristida junciformis</i> Trin. & Rupr. subsp. <i>junciformis</i>	LC	No
<i>Aristida scabrivalvis</i> Hack. subsp. <i>scabrivalvis</i>	LC	No
<i>Aristida stipitata</i> Hack. subsp. <i>graciliflora</i> (Pilg.) Melderis	LC	No
<i>Aristida transvaalensis</i> Henrard	LC	No
<i>Artemisia afra</i> Jacq. ex Willd. var. <i>afra</i>	LC	No
<i>Arundinella nepalensis</i> Trin.	LC	No
<i>Arundo donax</i> L.	Not Evaluated	No



<i>Asclepias adscendens</i> (Schltr.) Schltr.	LC	No
<i>Asclepias albens</i> (E.Mey.) Schltr.	LC	No
<i>Asclepias aurea</i> (Schltr.) Schltr.	LC	No
<i>Asclepias brevipes</i> (Schltr.) Schltr.	LC	No
<i>Asclepias eminens</i> (Harv.) Schltr.	LC	No
<i>Asclepias fallax</i> (Schltr.) Schltr.	LC	No
<i>Asclepias stellifera</i> Schltr.	LC	No
<i>Asparagus africanus</i> Lam.	LC	No
<i>Asparagus angusticladius</i> (Jessop) J.-P.Lebrun & Stork	LC	No
<i>Asparagus asparagoides</i> (L.) Druce	LC	No
<i>Asparagus cooperi</i> Baker	LC	No
<i>Asparagus flavicaulis</i> (Oberm.) Fellingham & N.L.Mey. subsp. <i>flavicaulis</i>	LC	No
<i>Asparagus laricinus</i> Burch.	LC	No
<i>Asparagus suaveolens</i> Burch.	LC	No
<i>Asparagus virgatus</i> Baker	LC	No
<i>Aspidoglossum lamellatum</i> (Schltr.) Kupicha	LC	No
<i>Aspidoglossum ovalifolium</i> (Schltr.) Kupicha	LC	No
<i>Asplenium aethiopicum</i> (Burm.f.) Bech.	LC	No
<i>Asplenium capense</i> (Kunze) Bir, Fraser-Jenk. & Lovis	LC	No
<i>Aster harveyanus</i> Kuntze	LC	No
<i>Aster peglerae</i> Bolus	LC	No
<i>Aster squamatus</i> (Spreng.) Hieron.	Not Evaluated	No
<i>Asterella marginata</i> (Nees) S.W.Arnell	Not Evaluated	No
<i>Astragalus atopilosulus</i> (Hochst.) Bunge subsp. <i>burkeanus</i> (Harv.) J.B.Gillett var. <i>burkeanus</i>	LC	No
<i>Athrixia elata</i> Sond.	LC	No
<i>Avena fatua</i> L.	Not Evaluated	No
<i>Babiana bainesii</i> Baker	LC	No
<i>Barleria macrostegia</i> Nees	LC	No
<i>Barleria obtusa</i> Nees	LC	No
<i>Bergia decumbens</i> Planch. ex Harv.	LC	No
<i>Berkheya insignis</i> (Harv.) Thell.	LC	No
<i>Berkheya radula</i> (Harv.) De Wild.	LC	No
<i>Berkheya seminivea</i> Harv. & Sond.	LC	No
<i>Berkheya setifera</i> DC.	LC	No



<i>Berkheya speciosa</i> (DC.) O.Hoffm. subsp. <i>lanceolata</i> Roessler	LC	No
<i>Berkheya zeyheri</i> Oliv. & Hiern subsp. <i>zeyheri</i>	LC	No
<i>Bewsia biflora</i> (Hack.) Gooss.	LC	No
<i>Bidens bipinnata</i> L.	Not Evaluated	No
<i>Bidens pilosa</i> L.	Not Evaluated	No
<i>Blepharis innocua</i> C.B.Clarke	LC	No
<i>Blepharis squarrosa</i> (Nees) T.Anderson	LC	No
<i>Blepharis stainbankiae</i> C.B.Clarke	LC	No
<i>Bonatea antennifera</i> Rolfe	LC	No
<i>Boophone disticha</i> (L.f.) Herb.	Declining	No
<i>Bothriochloa bladhii</i> (Retz.) S.T.Blake	LC	No
<i>Brachiaria advena</i> Vickery	Not Evaluated	No
<i>Brachiaria brizantha</i> (A.Rich.) Stapf	LC	No
<i>Brachiaria eruciformis</i> (Sm.) Griseb.	LC	No
<i>Brachiaria serrata</i> (Thunb.) Stapf	LC	No
<i>Brachycorythis conica</i> (Summerh.) Summerh. subsp. <i>transvaalensis</i> Summerh.	EN	No
<i>Brachycorythis tenuior</i> Rchb.f.	LC	No
<i>Brachylaena rotundata</i> S.Moore	LC	No
<i>Brachystelma chloranthum</i> (Schltr.) Peckover	LC	No
<i>Brachystelma nanum</i> (Schltr.) N.E.Br.	LC	No
<i>Briza minor</i> L.	Not Evaluated	No
<i>Bryum alpinum</i> Huds. ex With.	Not Evaluated	No
<i>Bryum argenteum</i> Hedw.	Not Evaluated	No
<i>Bryum pycnophyllum</i> (Dixon) Mohamed	Not Evaluated	No
<i>Buchnera simplex</i> (Thunb.) Druce	LC	No
<i>Buddleja saligna</i> Willd.	LC	No
<i>Buddleja salviifolia</i> (L.) Lam.	LC	No
<i>Bulbine capitata</i> Poelln.	LC	No
<i>Bulbine favosa</i> (Thunb.) Schult. & Schult.f	LC	No
<i>Bulbostylis burchellii</i> (Ficalho & Hiern) C.B.Clarke	LC	No
<i>Bulbostylis contexta</i> (Nees) M.Bodard	LC	No
<i>Bulbostylis humilis</i> (Kunth) C.B.Clarke	LC	No
<i>Bulbostylis oritrephes</i> (Ridl.) C.B.Clarke	LC	No
<i>Bulbostylis schoenoides</i> (Kunth) C.B.Clarke	LC	No
<i>Callilepis leptophylla</i> Harv.	Declining	No



<i>Calodendrum capense</i> (L.f.) Thunb.	LC	No
<i>Campuloclinium macrocephalum</i> (Less.) DC.	Not Evaluated	No
<i>Campylopus introflexus</i> (Hedw.) Brid.	Not Evaluated	No
<i>Campylopus pyriformis</i> (F.W.Schultz) Brid.	Not Evaluated	No
<i>Canna indica</i> L.	Not Evaluated	No
<i>Carissa bispinosa</i> (L.) Desf. ex Brenan	LC	No
<i>Cassinopsis ilicifolia</i> (Hochst.) Kuntze	LC	No
<i>Celtis africana</i> Burm.f.	LC	No
<i>Centella asiatica</i> (L.) Urb.	LC	No
<i>Cephalaria zeyheriana</i> Szabó	LC	No
<i>Cerastium arabidis</i> E.Mey. ex Fenzl	LC	No
<i>Ceratodon purpureus</i> (Hedw.) Brid. subsp. <i>stenocarpus</i> (Bruch & Schimp. ex Müll.Hal.) Dixon	Not Evaluated	No
<i>Ceropegia rendallii</i> N.E.Br.	LC	No
<i>Cestrum aurantiacum</i> Lindl.	Not Evaluated	No
<i>Chaenostoma leve</i> (Hiern) Kornhall	LC	No
<i>Chaetacanthus costatus</i> Nees	LC	No
<i>Chamaecrista biensis</i> (Steyaert) Lock	LC	No
<i>Chamaecrista capensis</i> (Thunb.) E.Mey. var. <i>flavescens</i> (Thunb.) E.Mey.	LC	No
<i>Chamaecrista comosa</i> E.Mey. var. <i>capricornia</i> (Steyaert) Lock	LC	No
<i>Chamaecrista mimosoides</i> (L.) Greene	LC	No
<i>Cheilanthes contracta</i> (Kunze) Mett. ex Kuhn	LC	No
<i>Cheilanthes dolomiticola</i> (Schelpe) Schelpe & N.C.Anthony	LC	No
<i>Cheilanthes eckloniana</i> (Kunze) Mett.	LC	No
<i>Cheilanthes hirta</i> Sw. var. <i>brevipilosa</i> W. & N.Jacobsen	LC	No
<i>Cheilanthes hirta</i> Sw. var. <i>hirta</i>	LC	No
<i>Cheilanthes involuta</i> (Sw.) Schelpe & N.C.Anthony var. <i>involuta</i>	LC	No
<i>Cheilanthes involuta</i> (Sw.) Schelpe & N.C.Anthony var. <i>obscura</i> (N.C.Anthony) N.C.Anthony	LC	No
<i>Cheilanthes multifida</i> (Sw.) Sw. subsp. <i>lacerata</i> N.C.Anthony & Schelpe	LC	No
<i>Cheilanthes multifida</i> (Sw.) Sw. var. <i>multifida</i>	Not Evaluated	No
<i>Cheilanthes viridis</i> (Forssk.) Sw. var. <i>glauca</i> (Sim) Schelpe & N.C.Anthony	LC	No
<i>Cheilanthes viridis</i> (Forssk.) Sw. var. <i>viridis</i>	LC	No
<i>Chenopodium album</i> L.	Not Evaluated	No
<i>Chenopodium mucronatum</i> Thunb.	LC	No
<i>Chenopodium pumilio</i> R.Br.	Not Evaluated	No



<i>Chironia palustris</i> Burch. subsp. <i>transvaalensis</i> (Gilg) I. Verd.	LC	No
<i>Chironia purpurascens</i> (E.Mey.) Benth. & Hook.f. subsp. <i>humilis</i> (Gilg) I. Verd.	LC	No
<i>Chironia purpurascens</i> (E.Mey.) Benth. & Hook.f. subsp. <i>purpurascens</i>	LC	No
<i>Chloris pycnothrix</i> Trin.	LC	No
<i>Chloris virgata</i> Sw.	LC	No
<i>Chlorophytum bowkeri</i> Baker	LC	No
<i>Chlorophytum cooperi</i> (Baker) Nordal	LC	No
<i>Chlorophytum fasciculatum</i> (Baker) Kativu	LC	No
<i>Chlorophytum transvaalense</i> (Baker) Kativu	LC	No
<i>Chortolirion angolense</i> (Baker) A.Berger	LC	No
<i>Christella gueinziana</i> (Mett.) Holttum	LC	No
<i>Cichorium intybus</i> L. subsp. <i>intybus</i>	Not Evaluated	No
<i>Cineraria albicans</i> N.E.Br.	LC	No
<i>Cineraria austrotransvaalensis</i> Cron	NT	No
<i>Cineraria lobata</i> L'Hér. subsp. <i>lobata</i>	LC	No
<i>Cirsium vulgare</i> (Savi) Ten.	Not Evaluated	No
<i>Clematis brachiata</i> Thunb.	LC	No
<i>Cleome maculata</i> (Sond.) Szyszyl.	LC	No
<i>Cleome monophylla</i> L.	LC	No
<i>Cliffortia linearifolia</i> Eckl. & Zeyh.	LC	No
<i>Cliffortia nitidula</i> (Engl.) R.E. & T.C.E.Fr. subsp. <i>pilosa</i> Weim.	Not Evaluated	No
<i>Clutia natalensis</i> Bernh.	LC	No
<i>Clutia pulchella</i> L. var. <i>pulchella</i>	LC	No
<i>Coccinia adoensis</i> (A.Rich.) Cogn.	LC	No
<i>Combretum apiculatum</i> Sond. subsp. <i>apiculatum</i>	LC	No
<i>Combretum erythrophyllum</i> (Burch.) Sond.	LC	No
<i>Commelina africana</i> L. var. <i>africana</i>	LC	No
<i>Commelina africana</i> L. var. <i>krebsiana</i> (Kunth) C.B. Clarke	LC	No
<i>Commelina africana</i> L. var. <i>lancispatha</i> C.B. Clarke	LC	No
<i>Commelina benghalensis</i> L.	LC	No
<i>Commelina subulata</i> Roth	LC	No
<i>Convolvulus farinosus</i> L.	LC	No
<i>Convolvulus ocellatus</i> Hook.f. var. <i>ocellatus</i>	LC	No
<i>Convolvulus sagittatus</i> Thunb.	LC	No
<i>Convolvulus thunbergii</i> Roem. & Schult.	LC	No



<i>Conyza podocephala</i> DC.	LC	No
<i>Conyza scabrida</i> DC.	LC	No
<i>Cortaderia selloana</i> (Schult.) Asch. & Graebn.	Not Evaluated	No
<i>Cosmos bipinnatus</i> Cav.	Not Evaluated	No
<i>Cotoneaster franchetii</i> Boiss.	Not Evaluated	No
<i>Cotula hispida</i> (DC.) Harv.	LC	No
<i>Cotyledon orbiculata</i> L. var. <i>oblonga</i> (Haw.) DC.	LC	No
<i>Crassocephalum x picridifolium</i> (DC.) S.Moore	Not Evaluated	No
<i>Crassula alba</i> Forssk. var. <i>alba</i>	LC	No
<i>Crassula expansa</i> Dryand. subsp. <i>expansa</i>	LC	No
<i>Crassula setulosa</i> Harv. var. <i>jenkinsii</i> Schönland	LC	No
<i>Crassula setulosa</i> Harv. var. <i>setulosa forma setulosa</i>	Not Evaluated	No
<i>Crassula vaginata</i> Eckl. & Zeyh. subsp. <i>vaginata</i>	LC	No
<i>Crotalaria sphaerocarpa</i> Perr. ex DC. subsp. <i>sphaerocarpa</i>	LC	No
<i>Cryptolepis oblongifolia</i> (Meisn.) Schltr.	LC	No
<i>Cucumis hirsutus</i> Sond.	LC	No
<i>Cucumis zeyheri</i> Sond.	LC	No
<i>Cuscuta campestris</i> Yunck.	Not Evaluated	No
<i>Cussonia paniculata</i> Eckl. & Zeyh. subsp. <i>paniculata</i>	LC	No
<i>Cussonia paniculata</i> Eckl. & Zeyh. subsp. <i>sinuata</i> (Reyneke & Kok) De Winter	LC	No
<i>Cyanotis speciosa</i> (L.f.) Hassk.	LC	No
<i>Cyathula uncinulata</i> (Schrad.) Schinz	LC	No
<i>Cyclodictyon vallis-gratiae</i> (Hampe ex Müll.Hal.) Kuntze	Not Evaluated	No
<i>Cyclosperrum leptophyllum</i> (Pers.) Sprague ex Britton & P.Wilson	Not Evaluated	No
<i>Cynium tubulosum</i> (L.f.) Engl. subsp. <i>tubulosum</i>	LC	No
<i>Cymbopogon dieterlenii</i> Stapf ex E.Phillips	LC	No
<i>Cymbopogon nardus</i> (L.) Rendle	LC	No
<i>Cymbopogon prolixus</i> (Stapf) E.Phillips	LC	No
<i>Cynodon dactylon</i> (L.) Pers.	LC	No
<i>Cynodon hirsutus</i> Stent	LC	No
<i>Cynodon transvaalensis</i> Burt Davy	LC	No
<i>Cynoglossum lanceolatum</i> Forssk.	LC	No
<i>Cyperus albostratus</i> Schrad.	LC	No
<i>Cyperus congestus</i> Vahl	LC	No
<i>Cyperus eragrostis</i> Lam.	Not Evaluated	No



<i>Cyperus esculentus</i> L. var. <i>esculentus</i>	LC	No
<i>Cyperus leptocladus</i> Kunth	LC	No
<i>Cyperus longus</i> L. var. <i>tenuiflorus</i> (Rottb.) Boeck.	LC	No
<i>Cyperus margaritaceus</i> Vahl var. <i>margaritaceus</i>	LC	No
<i>Cyperus marginatus</i> Thunb.	LC	No
<i>Cyperus obtusiflorus</i> Vahl var. <i>flavissimus</i> (Schrad.) Boeck.	LC	No
<i>Cyperus obtusiflorus</i> Vahl var. <i>obtusiflorus</i>	LC	No
<i>Cyperus rupestris</i> Kunth var. <i>rupestris</i>	LC	No
<i>Cyperus semitrifidus</i> Schrad.	LC	No
<i>Cyperus sexangularis</i> Nees	LC	No
<i>Cyperus sphaerospermus</i> Schrad.	LC	No
<i>Cyperus uitenhagensis</i> (Steud.) C.Archer & Goetgh.	LC	No
<i>Cyphia stenopetala</i> Diels	LC	No
<i>Cyphostemma lanigerum</i> (Harv.) Desc. ex Wild & R.B.Drumm.	LC	No
<i>Dalechampia capensis</i> A.Spreng.	LC	No
<i>Datura ferox</i> L.	Not Evaluated	No
<i>Datura stramonium</i> L.	Not Evaluated	No
<i>Desmodium repandum</i> (Vahl) DC.	LC	No
<i>Dianthus mooiensis</i> F.N.Williams subsp. <i>kirkii</i> (Burt Davy) S.S.Hooper	Not Evaluated	No
<i>Dianthus mooiensis</i> F.N.Williams subsp. <i>mooiensis</i> var. <i>mooiensis</i>	Not Evaluated	No
<i>Dichilus lebeckioides</i> DC.	LC	No
<i>Dichilus pilosus</i> Conrath ex Schinz	LC	No
<i>Dichilus strictus</i> E.Mey.	LC	No
<i>Diclis rotundifolia</i> (Hiern) Hilliard & B.L.Burt	LC	No
<i>Dicoma anomala</i> Sond. subsp. <i>gerrardii</i> (Harv. ex F.C.Wilson) S.Ortiz & Rodr.Oubiña	LC	No
<i>Didymodon tophaceus</i> (Brid.) Lisa	Not Evaluated	No
<i>Didymodoxa caffra</i> (Thunb.) Friis & Wilmot-Dear	LC	No
<i>Digitaria diagonalis</i> (Nees) Stapf var. <i>diagonalis</i>	LC	No
<i>Digitaria eriantha</i> Steud.	LC	No
<i>Digitaria eylesii</i> C.E.Hubb.	LC	No
<i>Digitaria monodactyla</i> (Nees) Stapf	LC	No
<i>Digitaria ternata</i> (A.Rich.) Stapf	LC	No
<i>Digitaria velutina</i> (Forssk.) P.Beauv.	LC	No
<i>Diheteropogon amplexens</i> (Nees) Clayton var. <i>amplexens</i>	LC	No



<i>Dimorphotheca spectabilis</i> Schltr.	LC	No
<i>Dioscorea retusa</i> Mast.	LC	No
<i>Diospyros lycioides</i> Desf. subsp. <i>guerkei</i> (Kuntze) De Winter	LC	No
<i>Diospyros lycioides</i> Desf. subsp. <i>lycioides</i>	LC	No
<i>Diospyros whyteana</i> (Hiern) F.White	LC	No
<i>Disa patula</i> Sond. var. <i>transvaalensis</i> Summerh.	LC	No
<i>Disperis anthoceros</i> Rchb.f. var. <i>anthoceros</i>	LC	No
<i>Disperis micrantha</i> Lindl.	LC	No
<i>Ditrichum brachypodum</i> (Müll.Hal.) Broth.	Not Evaluated	No
<i>Dolichos angustifolius</i> Eckl. & Zeyh.	LC	No
<i>Dombeya rotundifolia</i> (Hochst.) Planch. var. <i>rotundifolia</i>	LC	No
<i>Dovyalis zeyheri</i> (Sond.) Warb.	LC	No
<i>Dracoscirpoides surculosa</i> Muasya, Reynders & Goetgh.	LC	No
<i>Drimia calcarata</i> (Baker) Stedje	LC	No
<i>Drimia depressa</i> (Baker) Jessop	LC	No
<i>Drimia intricata</i> (Baker) J.C.Manning & Goldblatt	LC	No
<i>Drimia multisetosa</i> (Baker) Jessop	LC	No
<i>Drimiopsis burkei</i> Baker subsp. <i>burkei</i>	LC	No
<i>Drosera collinsiae</i> N.E.Br. ex Burt Davy	LC	No
<i>Dryopteris athamantica</i> (Kunze) Kuntze	LC	No
<i>Echinochloa crus-galli</i> (L.) P.Beauv.	LC	No
<i>Echinochloa haploclada</i> (Stapf) Stapf	LC	No
<i>Ehretia rigida</i> (Thunb.) Druce subsp. <i>nervifolia</i> Retief & A.E.van Wyk	LC	No
<i>Ehrharta erecta</i> Lam. var. <i>erecta</i>	LC	No
<i>Eleocharis dregeana</i> Steud.	LC	No
<i>Elephantorrhiza burkei</i> Benth.	LC	No
<i>Elephantorrhiza elephantina</i> (Burch.) Skeels	LC	No
<i>Eleusine coracana</i> (L.) Gaertn. subsp. <i>africana</i> (Kenn.-O'Byrne) Hilu & de Wet	LC	No
<i>Elionurus muticus</i> (Spreng.) Kunth	LC	No
<i>Englerophytum magalimontanum</i> (Sond.) T.D.Penn.	LC	No
<i>Enneapogon pretoriensis</i> Stent	LC	No
<i>Enneapogon scoparius</i> Stapf	LC	No
<i>Epilobium salignum</i> Hausskn.	LC	No
<i>Eragrostis aspera</i> (Jacq.) Nees	LC	No
<i>Eragrostis capensis</i> (Thunb.) Trin.	LC	No



<i>Eragrostis chloromelas</i> Steud.	LC	No
<i>Eragrostis cilianensis</i> (All.) Vignolo ex Janch.	LC	No
<i>Eragrostis curvula</i> (Schrad.) Nees	LC	No
<i>Eragrostis gummiflua</i> Nees	LC	No
<i>Eragrostis heteromera</i> Stapf	LC	No
<i>Eragrostis lehmanniana</i> Nees var. <i>lehmanniana</i>	LC	No
<i>Eragrostis mexicana</i> (Hornem.) Link subsp. <i>virescens</i> (J.Presl.) S.D.Koch & Sánchez Vega	Not Evaluated	No
<i>Eragrostis patentipilosa</i> Hack.	LC	No
<i>Eragrostis plana</i> Nees	LC	No
<i>Eragrostis planiculmis</i> Nees	LC	No
<i>Eragrostis racemosa</i> (Thunb.) Steud.	LC	No
<i>Eragrostis sclerantha</i> Nees subsp. <i>sclerantha</i>	LC	No
<i>Eragrostis superba</i> Peyr.	LC	No
<i>Eragrostis tef</i> (Zuccagni) Trotter	Not Evaluated	No
<i>Erica alopecurus</i> Harv. var. <i>glabriflora</i> Bolus	LC	No
<i>Eriosema burkei</i> Benth. ex Harv. var. <i>burkei</i>	LC	No
<i>Eriosema cordatum</i> E.Mey.	LC	No
<i>Eriosema nutans</i> Schinz	LC	No
<i>Eriosema salignum</i> E.Mey.	LC	No
<i>Eriosema transvaalense</i> C.H.Stirt.	LC	No
<i>Eriospermum cooperi</i> Baker var. <i>cooperi</i>	LC	No
<i>Eriospermum flagelliforme</i> (Baker) J.C.Manning	LC	No
<i>Eriospermum porphyrium</i> Archibald	LC	No
<i>Eruca sativa</i> Mill.	Not Evaluated	No
<i>Erythrina lysistemon</i> Hutch.	LC	No
<i>Euclea crispa</i> (Thunb.) Gürke subsp. <i>crispa</i>	LC	No
<i>Euclea undulata</i> Thunb.	LC	No
<i>Eucomis autumnalis</i> (Mill.) Chitt. subsp. <i>clavata</i> (Baker) Reyneke	Not Evaluated	No
<i>Eucomis pallidiflora</i> Baker subsp. <i>pallidiflora</i>	LC	No
<i>Eulophia calanthoides</i> Schltr.	LC	No
<i>Eulophia hians</i> Spreng. var. <i>hians</i>	LC	No
<i>Eulophia hians</i> Spreng. var. <i>inaequalis</i> (Schltr.) S.Thomas	LC	No
<i>Eulophia leontoglossa</i> Rchb.f.	LC	No
<i>Eulophia ovalis</i> Lindl. var. <i>bainesii</i> (Rolfe) P.J.Cribb & la Croix	LC	No



<i>Eulophia tuberculata</i> Bolus	LC	No
<i>Eulophia welwitschii</i> (Rchb.f.) Rolfe	LC	No
<i>Euphorbia epicyparissias</i> E.Mey. ex Boiss.	LC	No
<i>Euphorbia hirta</i> L.	Not Evaluated	No
<i>Euphorbia inaequilatera</i> Sond. var. <i>inaequilatera</i>	LC	No
<i>Euphorbia pseudotuberosa</i> Pax	LC	No
<i>Euphorbia pubescens</i> Vahl	LC	No
<i>Euphorbia rhombifolia</i> Boiss.	LC	No
<i>Euphorbia striata</i> Thunb. var. <i>striata</i>	LC	No
<i>Euryops laxus</i> (Harv.) Burt Davy	LC	No
<i>Eustachys paspaloides</i> (Vahl) Lanza & Mattei	LC	No
<i>Evolvulus alsinoides</i> (L.) L.	LC	No
<i>Fallopia convolvulus</i> (L.) Holub	Not Evaluated	No
<i>Felicia fruticosa</i> (L.) G.Nicholson subsp. <i>brevipedunculata</i> (Hutch.) Grau	LC	No
<i>Felicia muricata</i> (Thunb.) Nees subsp. <i>muricata</i>	LC	No
<i>Ficinia stolonifera</i> Boeckeler	LC	No
<i>Ficus abutilifolia</i> (Miq.) Miq.	LC	No
<i>Ficus cordata</i> Thunb. subsp. <i>cordata</i>	LC	No
<i>Ficus ingens</i> (Miq.) Miq.	LC	No
<i>Ficus salicifolia</i> Vahl	LC	No
<i>Fimbristylis complanata</i> (Retz.) Link	LC	No
<i>Fissidens bryoides</i> Hedw.	Not Evaluated	No
<i>Foeniculum vulgare</i> Mill. var. <i>vulgare</i>	Not Evaluated	No
<i>Fuirena pubescens</i> (Poir.) Kunth var. <i>pubescens</i>	LC	No
<i>Fuirena stricta</i> Steud. var. <i>stricta</i>	LC	No
<i>Fumaria muralis</i> Sond. ex W.D.J.Koch subsp. <i>muralis</i>	Not Evaluated	No
<i>Galinsoga parviflora</i> Cav.	Not Evaluated	No
<i>Galium spurium</i> L. subsp. <i>africanum</i> Verdc.	LC	No
<i>Gazania krebsiana</i> Less. subsp. <i>serrulata</i> (DC.) Roessler	LC	No
<i>Geigeria burkei</i> Harv. subsp. <i>burkei</i> var. <i>intermedia</i> (S.Moore) Merxm.	LC	No
<i>Geigeria burkei</i> Harv. subsp. <i>burkei</i> var. <i>zeyheri</i> (Harv.) Merxm.	LC	No
<i>Gerbera ambigua</i> (Cass.) Sch.Bip.	LC	No
<i>Gerbera piloselloides</i> (L.) Cass.	LC	No
<i>Gladiolus antholyzoides</i> Baker	LC	No
<i>Gladiolus crassifolius</i> Baker	LC	No



<i>Gladiolus dalenii</i> Van Geel subsp. <i>dalenii</i>	LC	No
<i>Gladiolus longicollis</i> Baker subsp. <i>platypetalus</i> (Baker) Goldblatt & J.C.Manning	LC	No
<i>Gladiolus papilio</i> Hook.f.	LC	No
<i>Gladiolus permeabilis</i> D.Delaroche subsp. <i>edulis</i> (Burch. ex Ker Gawl.) Oberm.	LC	No
<i>Gladiolus woodii</i> Baker	LC	No
<i>Gnidia caffra</i> (Meisn.) Gilg	LC	No
<i>Gnidia canoargentea</i> (C.H.Wright) Gilg	LC	No
<i>Gnidia gymnostachya</i> (C.A.Mey.) Gilg	LC	No
<i>Gnidia kraussiana</i> Meisn. var. <i>kraussiana</i>	LC	No
<i>Gnidia microcephala</i> Meisn.	LC	No
<i>Gomphocarpus fruticosus</i> (L.) Aiton f. subsp. <i>decepiens</i> (N.E.Br.) Goyder & Nicholas	LC	No
<i>Gomphocarpus fruticosus</i> (L.) Aiton f. subsp. <i>fruticosus</i>	LC	No
<i>Gomphrena celosioides</i> Mart.	Not Evaluated	No
<i>Graderia subintegra</i> Mast.	LC	No
<i>Grewia occidentalis</i> L. var. <i>occidentalis</i>	LC	No
<i>Guilleminea densa</i> (Willd. ex Roem. & Schult.) Moq.	Not Evaluated	No
<i>Gymnosporia buxifolia</i> (L.) Szyszyl.	LC	No
<i>Gymnosporia polyacanthus</i> (Sond.) Szyszyl. subsp. <i>vaccinifolia</i> (P.Conrath) M.Jordaan	LC	No
<i>Habenaria barbertoni</i> Kraenzl. & Schltr.	NT	No
<i>Haemanthus humilis</i> Jacq. subsp. <i>hirsutus</i> (Baker) Snijman	LC	No
<i>Halleria lucida</i> L.	LC	No
<i>Haplocarpha scaposa</i> Harv.	LC	No
<i>Harpochloa falx</i> (L.f.) Kuntze	LC	No
<i>Harveya pumila</i> Schltr.	LC	No
<i>Hedychium gardnerianum</i> Ker Gawl.	Not Evaluated	No
<i>Helichrysum acutatum</i> DC.	LC	No
<i>Helichrysum athrixiifolium</i> (Kuntze) Moeser	LC	No
<i>Helichrysum aureonitens</i> Sch.Bip.	LC	No
<i>Helichrysum aureum</i> (Houtt.) Merr. var. <i>monocephalum</i> (DC.) Hilliard	LC	No
<i>Helichrysum caespititium</i> (DC.) Harv.	LC	No
<i>Helichrysum callicomum</i> Harv.	LC	No
<i>Helichrysum cephaloideum</i> DC.	LC	No
<i>Helichrysum cerastioides</i> DC. var. <i>cerastioides</i>	LC	No
<i>Helichrysum chionosphaerum</i> DC.	LC	No



<i>Helichrysum difficile</i> Hilliard	LC	No
<i>Helichrysum lepidissimum</i> S.Moore	LC	No
<i>Helichrysum mundtii</i> Harv.	LC	No
<i>Helichrysum nudifolium</i> (L.) Less. var. <i>nudifolium</i>	LC	No
<i>Helichrysum nudifolium</i> (L.) Less. var. <i>oxyphyllum</i> (DC.) Beentje	LC	No
<i>Helichrysum oreophilum</i> Klatt	LC	No
<i>Helichrysum paronychioides</i> DC.	LC	No
<i>Helichrysum polycladum</i> Klatt	LC	No
<i>Helichrysum rugulosum</i> Less.	LC	No
<i>Helichrysum setosum</i> Harv.	LC	No
<i>Helichrysum stenopterum</i> DC.	LC	No
<i>Helictotrichon turgidulum</i> (Stapf) Schweick.	LC	No
<i>Helinus integrifolius</i> (Lam.) Kuntze	LC	No
<i>Heliphila rigidiuscula</i> Sond.	LC	No
<i>Heliotropium nelsonii</i> C.H.Wright	LC	No
<i>Hemarthria altissima</i> (Poir.) Stapf & C.E.Hubb.	LC	No
<i>Hermannia cordata</i> (E.Mey. ex E.Phillips) De Winter	LC	No
<i>Hermannia depressa</i> N.E.Br.	LC	No
<i>Hermannia floribunda</i> Harv.	LC	No
<i>Hermannia lancifolia</i> Szyszyl.	LC	No
<i>Hermannia umbratica</i> I.Verd.	LC	No
<i>Hesperantha candida</i> Baker	LC	No
<i>Hesperantha coccinea</i> (Backh. & Harv.) Goldblatt & J.C.Manning	LC	No
<i>Hesperantha leucantha</i> Baker	LC	No
<i>Heteromorpha arborescens</i> (Spreng.) Cham. & Schldl. var. <i>abyssinica</i> (Hochst. ex A.Rich.) H.Wolff	LC	No
<i>Heteropogon contortus</i> (L.) Roem. & Schult.	LC	No
<i>Hibiscus aethiopicus</i> L. var. <i>ovatus</i> Harv.	LC	No
<i>Hibiscus engleri</i> K.Schum.	LC	No
<i>Hibiscus lunarifolius</i> Willd.	LC	No
<i>Hibiscus microcarpus</i> Garcke	LC	No
<i>Hibiscus subreniformis</i> Burttt Davy	LC	No
<i>Hibiscus trionum</i> L.	Not Evaluated	No
<i>Hilliardiella aristata</i> (DC.) H.Rob.	LC	No
<i>Hilliardiella hirsuta</i> (DC.) H.Rob.	LC	No



<i>Hydrocotyle verticillata</i> Thunb.	LC	No
<i>Hyparrhenia anamesa</i> Clayton	LC	No
<i>Hyparrhenia dregeana</i> (Nees) Stapf ex Stent	LC	No
<i>Hyparrhenia filipendula</i> (Hochst.) Stapf var. <i>pilosa</i> (Hochst.) Stapf	LC	No
<i>Hyparrhenia hirta</i> (L.) Stapf	LC	No
<i>Hyparrhenia tamba</i> (Steud.) Stapf	LC	No
<i>Hypericum aethiopicum</i> Thunb. subsp. <i>sonderi</i> (Bredell) N.Robson	LC	No
<i>Hypericum lalandii</i> Choisy	LC	No
<i>Hypericum revolutum</i> Vahl subsp. <i>revolutum</i>	LC	No
<i>Hypochaeris microcephala</i> (Sch.Bip.) Cabrera var. <i>albiflora</i> (Kuntze) Cabrera	Not Evaluated	No
<i>Hypochaeris radicata</i> L.	Not Evaluated	No
<i>Hypoestes forskalii</i> (Vahl) R.Br.	LC	No
<i>Hypoxis acuminata</i> Baker	LC	No
<i>Hypoxis argentea</i> Harv. ex Baker var. <i>argentea</i>	LC	No
<i>Hypoxis filiformis</i> Baker	LC	No
<i>Hypoxis galpinii</i> Baker	LC	No
<i>Hypoxis hemerocallidea</i> Fisch., C.A.Mey. & Avé-Lall.	Declining	No
<i>Hypoxis interjecta</i> Nel	LC	No
<i>Hypoxis iridifolia</i> Baker	LC	No
<i>Hypoxis rigidula</i> Baker var. <i>pilosissima</i> Baker	LC	No
<i>Hypoxis rigidula</i> Baker var. <i>rigidula</i>	LC	No
<i>Ilex mitis</i> (L.) Radlk. var. <i>mitis</i>	Declining	No
<i>Imperata cylindrica</i> (L.) Raeusch.	LC	No
<i>Indigostrum burkeanum</i> (Benth. ex Harv.) Schrire	LC	No
<i>Indigofera comosa</i> N.E.Br.	LC	No
<i>Indigofera confusa</i> Prain & Baker f.	LC	No
<i>Indigofera cryptantha</i> Benth. ex Harv. var. <i>cryptantha</i>	LC	No
<i>Indigofera dimidiata</i> Vogel ex Walp.	LC	No
<i>Indigofera frondosa</i> N.E.Br.	LC	No
<i>Indigofera hedyantha</i> Eckl. & Zeyh.	LC	No
<i>Indigofera hiliaris</i> Eckl. & Zeyh. var. <i>hiliaris</i>	LC	No
<i>Indigofera melanadenia</i> Benth. ex Harv.	LC	No
<i>Indigofera oxalidea</i> Welw. ex Baker	LC	No
<i>Indigofera oxytropis</i> Benth. ex Harv.	LC	No
<i>Indigofera zeyheri</i> Spreng. ex Eckl. & Zeyh.	LC	No



<i>Ipomoea alba</i> L.	Not Evaluated	No
<i>Ipomoea bathycolpos</i> Hallier f.	LC	No
<i>Ipomoea crassipes</i> Hook. var. <i>crassipes</i>	LC	No
<i>Ipomoea indica</i> (Burm.f.) Merr.	Not Evaluated	No
<i>Ipomoea obscura</i> (L.) Ker Gawl. var. <i>obscura</i>	LC	No
<i>Ipomoea ommanneyi</i> Rendle	LC	No
<i>Ipomoea purpurea</i> (L.) Roth	Not Evaluated	No
<i>Ipomoea simplex</i> Thunb.	LC	No
<i>Ischaemum fasciculatum</i> Brongn.	LC	No
<i>Isolepis costata</i> Hochst. ex A.Rich.	LC	No
<i>Jamesbrittenia aurantiaca</i> (Burch.) Hilliard	LC	No
<i>Jamesbrittenia burkeana</i> (Benth.) Hilliard	LC	No
<i>Juncus dregeanus</i> Kunth subsp. <i>dregeanus</i>	LC	No
<i>Juncus effusus</i> L.	LC	No
<i>Juncus exsertus</i> Buchenau	LC	No
<i>Juncus lomatophyllus</i> Spreng.	LC	No
<i>Juncus oxycarpus</i> E.Mey. ex Kunth	LC	No
<i>Kalanchoe paniculata</i> Harv.	LC	No
<i>Kalanchoe rotundifolia</i> (Haw.) Haw.	LC	No
<i>Kalanchoe thyrsiflora</i> Harv.	LC	No
<i>Khadia acutipetala</i> (N.E.Br.) N.E.Br.	LC	No
<i>Kiggelaria africana</i> L.	LC	No
<i>Kniphofia porphyrantha</i> Baker	LC	No
<i>Koeleria capensis</i> (Steud.) Nees	LC	No
<i>Kohautia amatymbica</i> Eckl. & Zeyh.	LC	No
<i>Kohautia caespitosa</i> Schnizl. subsp. <i>brachyloba</i> (Sond.) D.Mantell	LC	No
<i>Kohautia virgata</i> (Willd.) Bremek.	LC	No
<i>Kyllinga alata</i> Nees	LC	No
<i>Kyllinga erecta</i> Schumach. var. <i>erecta</i>	LC	No
<i>Kyllinga melanosperma</i> Nees	LC	No
<i>Lablab purpureus</i> (L.) Sweet subsp. <i>uncinatus</i> Verdc.	LC	No
<i>Lactuca inermis</i> Forssk.	LC	No
<i>Lagarosiphon muscoides</i> Harv.	LC	No
<i>Laggera crispata</i> (Vahl) Hepper & J.R.I.Wood	LC	No
<i>Lannea edulis</i> (Sond.) Engl. var. <i>edulis</i>	LC	No



<i>Lantana camara</i> L.	Not Evaluated	No
<i>Lantana rugosa</i> Thunb.	LC	No
<i>Laurembergia repens</i> (L.) P.J.Bergius subsp. <i>brachypoda</i> (Welw. ex Hiern) Oberm.	LC	No
<i>Lavatera arborea</i> L.	Not Evaluated	No
<i>Ledebouria burkei</i> (Baker) J.C.Manning & Goldblatt	LC	No
<i>Ledebouria cooperi</i> (Hook.f.) Jessop	LC	No
<i>Ledebouria luteola</i> Jessop	LC	No
<i>Ledebouria marginata</i> (Baker) Jessop	LC	No
<i>Ledebouria revoluta</i> (L.f.) Jessop	LC	No
<i>Leersia hexandra</i> Sw.	LC	No
<i>Leobordea eriantha</i> (Benth.) B.-E.van Wyk & Boatwr.	LC	No
<i>Leonotis nepetifolia</i> (L.) R.Br.	LC	No
<i>Leonotis ocymifolia</i> (Burm.f.) Iwarsson	LC	No
<i>Lepidium africanum</i> (Burm.f.) DC. subsp. <i>africanum</i>	LC	No
<i>Lepidium bonariense</i> L.	Not Evaluated	No
<i>Lepisorus schraderi</i> (Mett.) Ching	LC	No
<i>Leucaena leucocephala</i> (Lam.) de Wit subsp. <i>leucocephala</i>	Not Evaluated	No
<i>Leucas martinicensis</i> (Jacq.) R.Br.	LC	No
<i>Leucosidea sericea</i> Eckl. & Zeyh.	LC	No
<i>Linum thunbergii</i> Eckl. & Zeyh.	LC	No
<i>Lippia javanica</i> (Burm.f.) Spreng.	LC	No
<i>Lithospermum cinereum</i> A.DC.	LC	No
<i>Lobelia erinus</i> L.	LC	No
<i>Lolium multiflorum</i> Lam.	Not Evaluated	No
<i>Lolium perenne</i> L.	Not Evaluated	No
<i>Lophacme digitata</i> Stapf	LC	No
<i>Lopholaena coriifolia</i> (Sond.) E.Phillips & C.A.Sm.	LC	No
<i>Lotononis laxa</i> Eckl. & Zeyh.	LC	No
<i>Lotus discolor</i> E.Mey. subsp. <i>discolor</i>	LC	No
<i>Loudetia simplex</i> (Nees) C.E.Hubb.	LC	No
<i>Lunularia cruciata</i> (L.) Dumort. ex Lindb.	Not Evaluated	No
<i>Macledium zeyheri</i> (Sond.) S.Ortiz subsp. <i>zeyheri</i>	LC	No
<i>Maerua cafra</i> (DC.) Pax	LC	No
<i>Manulea paniculata</i> Benth.	LC	No
<i>Manulea parviflora</i> Benth. var. <i>parviflora</i>	LC	No



<i>Maytenus undata</i> (Thunb.) Blakelock	LC	No
<i>Melasma scabrum</i> P.J.Bergius var. <i>scabrum</i>	LC	No
<i>Melianthus comosus</i> Vahl	LC	No
<i>Melilotus albus</i> Medik.	Not Evaluated	No
<i>Melilotus indicus</i> (L.) All.	Not Evaluated	No
<i>Melinis nerviglumis</i> (Franch.) Zizka	LC	No
<i>Melinis repens</i> (Willd.) Zizka subsp. <i>repens</i>	LC	No
<i>Melolobium subspicatum</i> Conrath	VU	No
<i>Menodora africana</i> Hook.	LC	No
<i>Mentha aquatica</i> L.	LC	No
<i>Microchloa caffra</i> Nees	LC	No
<i>Mimulus gracilis</i> R.Br.	LC	No
<i>Mirabilis jalapa</i> L.	Not Evaluated	No
<i>Miscanthus junceus</i> (Stapf) Pilg.	LC	No
<i>Mohria vestita</i> Baker	LC	No
<i>Mollugo cerviana</i> (L.) Ser. ex DC. var. <i>cerviana</i>	LC	No
<i>Monocymbium cerasiiforme</i> (Nees) Stapf	LC	No
<i>Monopsis decipiens</i> (Sond.) Thulin	LC	No
<i>Monsonia angustifolia</i> E.Mey. ex A.Rich.	LC	No
<i>Monsonia attenuata</i> Harv.	LC	No
<i>Moraea pallida</i> (Baker) Goldblatt	LC	No
<i>Moraea stricta</i> Baker	LC	No
<i>Morella serrata</i> (Lam.) Killick	LC	No
<i>Mundulea sericea</i> (Willd.) A.Chev. subsp. <i>sericea</i>	LC	No
<i>Myriophyllum aquaticum</i> (Vell.) Verdc.	Not Evaluated	No
<i>Nasturtium officinale</i> R.Br.	Not Evaluated	No
<i>Nemesia fruticans</i> (Thunb.) Benth.	LC	No
<i>Nemesia rupicola</i> Hilliard	LC	No
<i>Nephrolepis exaltata</i> (L.) Schott	Not Evaluated	No
<i>Nerine angustifolia</i> (Baker) Baker	LC	No
<i>Nerium oleander</i> L.	Not Evaluated	No
<i>Nesaea sagittifolia</i> (Sond.) Koehne var. <i>sagittifolia</i>	LC	No
<i>Nesaea schinzii</i> Koehne	LC	No
<i>Nidorella anomala</i> Steetz	LC	No
<i>Nidorella hottentotica</i> DC.	LC	No



<i>Nolletia rarifolia</i> (Turcz.) Steetz	LC	No
<i>Nuxia congesta</i> R.Br. ex Fresen.	LC	No
<i>Nuxia glomerulata</i> (C.A.Sm.) I. Verd.	LC	No
<i>Ocimum obovatum</i> E.Mey. ex Benth. subsp. <i>obovatum</i> var. <i>obovatum</i>	LC	No
<i>Oenothera jamesii</i> Torr. & A.Gray	Not Evaluated	No
<i>Oenothera rosea</i> L'Hér. ex Aiton	Not Evaluated	No
<i>Oenothera stricta</i> Ledeb. ex Link subsp. <i>stricta</i>	Not Evaluated	No
<i>Oldenlandia herbacea</i> (L.) Roxb. var. <i>herbacea</i>	LC	No
<i>Oldenlandia rupicola</i> (Sond.) Kuntze var. <i>rupicola</i>	LC	No
<i>Oldenlandia tenella</i> (Hochst.) Kuntze	LC	No
<i>Olea europaea</i> L. subsp. <i>africana</i> (Mill.) P.S.Green	LC	No
<i>Olinia emarginata</i> Burt Davy	LC	No
<i>Orbea lutea</i> (N.E.Br.) Bruyns subsp. <i>lutea</i>	LC	No
<i>Ornithogalum juncifolium</i> Jacq. var. <i>juncifolium</i>	LC	No
<i>Ornithogalum tenuifolium</i> F.Delaroche subsp. <i>tenuifolium</i>	Not Evaluated	No
<i>Ornithoglossum vulgare</i> B.Nord.	LC	No
<i>Osmunda regalis</i> L.	LC	No
<i>Osteospermum muricatum</i> E.Mey. ex DC. subsp. <i>muricatum</i>	LC	No
<i>Osyris lanceolata</i> Hochst. & Steud.	LC	No
<i>Othonna natalensis</i> Sch.Bip.	LC	No
<i>Oxalis corniculata</i> L.	Not Evaluated	No
<i>Oxalis latifolia</i> Kunth	Not Evaluated	No
<i>Ozoroa paniculosa</i> (Sond.) R. & A.Fern. var. <i>paniculosa</i>	LC	No
<i>Pachycarpus schinzianus</i> (Schltr.) N.E.Br.	LC	No
<i>Pachystigma pygmaeum</i> (Schltr.) Robyns	LC	No
<i>Panicum coloratum</i> L. var. <i>coloratum</i>	LC	No
<i>Panicum maximum</i> Jacq.	LC	No
<i>Panicum natalense</i> Hochst.	LC	No
<i>Panicum schinzii</i> Hack.	LC	No
<i>Pappea capensis</i> Eckl. & Zeyh.	LC	No
<i>Parinari capensis</i> Harv. subsp. <i>capensis</i>	LC	No
<i>Paspalum dilatatum</i> Poir.	Not Evaluated	No
<i>Paspalum scrobiculatum</i> L.	LC	No
<i>Paspalum urvillei</i> Steud.	Not Evaluated	No
<i>Paspalum vaginatum</i> Sw.	LC	No



<i>Pavetta eylesii</i> S.Moore	LC	No
<i>Pavetta gardeniifolia</i> A.Rich. var. <i>subtomentosa</i> K.Schum.	LC	No
<i>Pavetta zeyheri</i> Sond. subsp. <i>zeyheri</i>	LC	No
<i>Pavonia burchellii</i> (DC.) R.A.Dyer	LC	No
<i>Pavonia columella</i> Cav.	LC	No
<i>Pearsonia aristata</i> (Schinz) Dummer	LC	No
<i>Pearsonia bracteata</i> (Benth.) Polhill	NT	No
<i>Pearsonia cajanifolia</i> (Harv.) Polhill subsp. <i>cajanifolia</i>	LC	No
<i>Pearsonia sessilifolia</i> (Harv.) Dummer subsp. <i>sessilifolia</i>	LC	No
<i>Pelargonium luridum</i> (Andrews) Sweet	LC	No
<i>Pellaea calomelanos</i> (Sw.) Link var. <i>calomelanos</i>	LC	No
<i>Peltophorum africanum</i> Sond.	LC	No
<i>Pennisetum thunbergii</i> Kunth	LC	No
<i>Pentanisia angustifolia</i> (Hochst.) Hochst.	LC	No
<i>Pentzia monocephala</i> S.Moore	LC	No
<i>Peponium caledonicum</i> (Sond.) Engl.	LC	No
<i>Persicaria attenuata</i> (R.Br.) Soják subsp. <i>africana</i> K.L.Wilson	LC	No
<i>Persicaria decipiens</i> (R.Br.) K.L.Wilson	LC	No
<i>Persicaria lapathifolia</i> (L.) Gray	Not Evaluated	No
<i>Persicaria limbata</i> (Meisn.) H.Hara	Not Evaluated	No
<i>Persicaria meisneriana</i> (Cham. & Schldl.) M.Gómez	LC	No
<i>Phalaris arundinacea</i> L.	Not Evaluated	No
<i>Philonotis falcata</i> (Hook.) Mitt.	Not Evaluated	No
<i>Philonotis hastata</i> (Duby) Wijk & Margad.	Not Evaluated	No
<i>Phragmites mauritianus</i> Kunth	LC	No
<i>Phylica paniculata</i> Willd.	LC	No
<i>Phyllanthus glaucophyllus</i> Sond.	LC	No
<i>Phyllanthus incurvus</i> Thunb.	LC	No
<i>Phymaspermum athanasioides</i> (S.Moore) Källersjö	LC	No
<i>Physalis angulata</i> L.	Not Evaluated	No
<i>Phytolacca dioica</i> L.	Not Evaluated	No
<i>Phytolacca octandra</i> L.	Not Evaluated	No
<i>Pinus patula</i> Schldl. & Cham. var. <i>patula</i>	Not Evaluated	No
<i>Pittosporum viridiflorum</i> Sims	LC	No
<i>Plagiochasma rupestre</i> (J.R. & G.Forst.) Steph. var. <i>rupestre</i>	Not Evaluated	No



<i>Plantago longissima</i> Decne.	LC	No
<i>Plantago major</i> L.	Not Evaluated	No
<i>Plectranthus cylindraceus</i> Hochst. ex Benth.	LC	No
<i>Plectranthus grallatus</i> Briq.	LC	No
<i>Plectranthus hereroensis</i> Engl.	LC	No
<i>Plumbago auriculata</i> Lam.	LC	No
<i>Plumbago zeylanica</i> L.	Not Evaluated	No
<i>Pogonarthria squarrosa</i> (Roem. & Schult.) Pilg.	LC	No
<i>Pogonatum capense</i> (Hampe) A.Jaeger	Not Evaluated	No
<i>Pohlia elongata</i> Hedw.	Not Evaluated	No
<i>Pollichia campestris</i> Aiton	LC	No
<i>Polygala gerrardii</i> Chodat	LC	No
<i>Polygala gracilentata</i> Burt Davy	LC	No
<i>Polygala hottentotta</i> C.Presl	LC	No
<i>Polygala ohlendorfiana</i> Eckl. & Zeyh.	LC	No
<i>Polygala rehmannii</i> Chodat	LC	No
<i>Polygala transvaalensis</i> Chodat subsp. <i>transvaalensis</i>	LC	No
<i>Polypogon monspeliensis</i> (L.) Desf.	Not Evaluated	No
<i>Polypogon viridis</i> (Gouan) Breistr.	Not Evaluated	No
<i>Polytrichum commune</i> Hedw.	Not Evaluated	No
<i>Populus deltoides</i> Bartram ex Marshall subsp. <i>deltoides</i> forma <i>deltoides</i>	Not Evaluated	No
<i>Potamogeton nodosus</i> Poir.	LC	No
<i>Potamogeton octandrus</i> Poir.	LC	No
<i>Priva cordifolia</i> (L.f.) Druce var. <i>abyssinica</i> (Jaub. & Spach) Moldenke	LC	No
<i>Protea caffra</i> Meisn. subsp. <i>caffra</i>	LC	No
<i>Protea roupelliae</i> Meisn. subsp. <i>roupelliae</i>	LC	No
<i>Protea welwitschii</i> Engl.	LC	No
<i>Psammotropha myriantha</i> Sond.	LC	No
<i>Pseudognaphalium luteo-album</i> (L.) Hilliard & B.L.Burt	LC	No
<i>Pseudognaphalium oligandrum</i> (DC.) Hilliard & B.L.Burt	LC	No
<i>Pteris cretica</i> L.	LC	No
<i>Pterocelastrus echinatus</i> N.E.Br.	LC	No
<i>Pulicaria scabra</i> (Thunb.) Druce	LC	No
<i>Pupalia lappacea</i> (L.) A.Juss. var. <i>lappacea</i>	LC	No
<i>Pycnostachys reticulata</i> (E.Mey.) Benth.	LC	No



<i>Pycreus macranthus</i> (Boeckeler) C.B.Clarke	LC	No
<i>Pycreus mundii</i> Nees	LC	No
<i>Pygmaeothamnus zeyheri</i> (Sond.) Robyns var. <i>zeyheri</i>	LC	No
<i>Pyracantha angustifolia</i> (Franch.) C.K.Schneid.	Not Evaluated	No
<i>Ranunculus meyeri</i> Harv.	LC	No
<i>Ranunculus multifidus</i> Forssk.	LC	No
<i>Raphionacme galpinii</i> Schltr.	LC	No
<i>Raphionacme hirsuta</i> (E.Mey.) R.A.Dyer	LC	No
<i>Rendlia altera</i> (Rendle) Chiov.	LC	No
<i>Rhamnus prinoides</i> L'Hér.	LC	No
<i>Rhoicissus tridentata</i> (L.f.) Wild & R.B.Drumm. subsp. <i>tridentata</i>	Not Evaluated	No
<i>Rhynchosia caribaea</i> (Jacq.) DC.	LC	No
<i>Rhynchosia monophylla</i> Schltr.	LC	No
<i>Rhynchosia nervosa</i> Benth. ex Harv. var. <i>nervosa</i>	LC	No
<i>Rhynchosia sordida</i> (E.Mey.) Schinz	LC	No
<i>Rhynchosia totta</i> (Thunb.) DC. var. <i>totta</i>	LC	No
<i>Rhynchosia venulosa</i> (Hiem) K.Schum.	Not Evaluated	No
<i>Rhynchospora brownii</i> Roem. & Schult.	LC	No
<i>Riccia atropurpurea</i> Sim	Not Evaluated	No
<i>Richardia brasiliensis</i> Gomes	Not Evaluated	No
<i>Riocreuxia polyantha</i> Schltr.	LC	No
<i>Robinia pseudoacacia</i> L.	Not Evaluated	No
<i>Rorippa fluviatilis</i> (E.Mey. ex Sond.) Thell. var. <i>fluviatilis</i>	LC	No
<i>Rorippa nudiuscula</i> Thell.	LC	No
<i>Rothea hirsuta</i> (Hochst.) R.Fern.	LC	No
<i>Rothmannia capensis</i> Thunb.	LC	No
<i>Rubia horrida</i> (Thunb.) Puff	LC	No
<i>Rubia petiolaris</i> DC.	LC	No
<i>Rubus rigidus</i> Sm.	LC	No
<i>Rubus x proteus</i> C.H.Stirt.	Not Evaluated	No
<i>Rumex acetosella</i> L. subsp. <i>angiocarpus</i> (Murb.) Murb.	Not Evaluated	No
<i>Rumex conglomeratus</i> Murb.	LC	No
<i>Rumex crispus</i> L.	Not Evaluated	No
<i>Rumex dregeanus</i> Meisn. subsp. <i>montanus</i> B.L.Burt	LC	No
<i>Rumex sagittatus</i> Thunb.	LC	No



<i>Salix babylonica</i> L. var. <i>babylonica</i>	Not Evaluated	No
<i>Salix mucronata</i> Thunb. subsp. <i>woodii</i> (Seemen) Immelman	LC	No
<i>Salvia radula</i> Benth.	LC	No
<i>Salvia runcinata</i> L.f.	LC	No
<i>Salvia tiliifolia</i> Vahl	Not Evaluated	No
<i>Satureja biflora</i> (Buch.-Ham. ex D.Don) Briq.	LC	No
<i>Satyrium cristatum</i> Sond. var. <i>cristatum</i>	LC	No
<i>Satyrium hallackii</i> Bolus subsp. <i>ocellatum</i> (Bolus) A.V.Hall	LC	No
<i>Scabiosa columbaria</i> L.	LC	No
<i>Scadoxus puniceus</i> (L.) Friis & Nordal	LC	No
<i>Schinus molle</i> L.	Not Evaluated	No
<i>Schistostephium crataegifolium</i> (DC.) Fenzl ex Harv.	LC	No
<i>Schistostephium heptalobum</i> (DC.) Oliv. & Hiern	LC	No
<i>Schizachyrium sanguineum</i> (Retz.) Alston	LC	No
<i>Schizocarphus nervosus</i> (Burch.) Van der Merwe	LC	No
<i>Schkuhria pinnata</i> (Lam.) Kuntze ex Thell.	Not Evaluated	No
<i>Schoenoplectus brachyceras</i> (Hochst. ex A.Rich.) Lye	LC	No
<i>Schoenoplectus corymbosus</i> (Roth ex Roem. & Schult.) J.Raynal	LC	No
<i>Schoenoplectus muricinux</i> (C.B.Clarke) J.Raynal	LC	No
<i>Schoenoxiphium sparteum</i> (Wahlenb.) C.B.Clarke	LC	No
<i>Scleria bulbifera</i> Hochst. ex A.Rich.	LC	No
<i>Scolopia zeyheri</i> (Nees) Harv.	LC	No
<i>Searsia dentata</i> (Thunb.) F.A.Barkley	LC	No
<i>Searsia discolor</i> (E.Mey. ex Sond.) Moffett	LC	No
<i>Searsia leptodictya</i> (Diels) T.S.Yi, A.J.Mill. & J.Wen forma <i>leptodictya</i>	Not Evaluated	No
<i>Searsia magalismontana</i> (Sond.) Moffett subsp. <i>magalismontana</i>	LC	No
<i>Searsia pyroides</i> (Burch.) Moffett var. <i>integrifolia</i> (Engl.) Moffett	LC	No
<i>Searsia pyroides</i> (Burch.) Moffett var. <i>pyroides</i>	LC	No
<i>Searsia rigida</i> (Mill.) F.A.Barkley var. <i>dentata</i> (Engl.) Moffett	LC	No
<i>Searsia rigida</i> (Mill.) F.A.Barkley var. <i>margaretae</i> (Burt Davy ex Moffett) Moffett	LC	No
<i>Searsia rigida</i> (Mill.) F.A.Barkley var. <i>rigida</i>	LC	No
<i>Searsia zeyheri</i> (Sond.) Moffett	LC	No
<i>Sebaea exigua</i> (Oliv.) Schinz	LC	No
<i>Sebaea junodii</i> Schinz	LC	No
<i>Secamone alpini</i> Schult.	LC	No



<i>Selaginella dregei</i> (C.Presl) Hieron.	LC	No
<i>Selago capitellata</i> Schltr.	LC	No
<i>Selago densiflora</i> Rolfe	LC	No
<i>Senecio affinis</i> DC.	LC	No
<i>Senecio consanguineus</i> DC.	LC	No
<i>Senecio coronatus</i> (Thunb.) Harv.	LC	No
<i>Senecio erubescens</i> Aiton var. <i>erubescens</i>	LC	No
<i>Senecio glanduloso-pilosus</i> Volkens & Muschl.	LC	No
<i>Senecio gregatus</i> Hilliard	LC	No
<i>Senecio harveianus</i> MacOwan	LC	No
<i>Senecio hieracioides</i> DC.	LC	No
<i>Senecio inaequidens</i> DC.	LC	No
<i>Senecio inornatus</i> DC.	LC	No
<i>Senecio isatideus</i> DC.	LC	No
<i>Senecio laevigatus</i> Thunb. var. <i>integrifolius</i> Harv.	LC	No
<i>Senecio laevigatus</i> Thunb. var. <i>laevigatus</i>	LC	No
<i>Senecio lydenburgensis</i> Hutch. & Burt Davy	LC	No
<i>Senecio oxyriifolius</i> DC. subsp. <i>oxyriifolius</i>	LC	No
<i>Senecio scitus</i> Hutch. & Burt Davy	LC	No
<i>Senecio venosus</i> Harv.	LC	No
<i>Senegalia ataxacantha</i> DC.	LC	No
<i>Senegalia caffra</i> (Thunb.) Willd.	LC	No
<i>Senna italica</i> Mill. subsp. <i>arachoides</i> (Burch.) Lock	LC	No
<i>Seriphium plumosum</i> L.	Not Evaluated	No
<i>Setaria lindenberiana</i> (Nees) Stapf	LC	No
<i>Setaria megaphylla</i> (Steud.) T.Durand & Schinz	LC	No
<i>Setaria nigrirostris</i> (Nees) T.Durand & Schinz	LC	No
<i>Setaria plicatilis</i> (Hochst.) Hack. ex Engl.	LC	No
<i>Setaria pumila</i> (Poir.) Roem. & Schult.	LC	No
<i>Setaria sphacelata</i> (Schumach.) Stapf & C.E.Hubb. ex M.B.Moss var. <i>sericea</i> (Stapf) Clayton	LC	No
<i>Setaria sphacelata</i> (Schumach.) Stapf & C.E.Hubb. ex M.B.Moss var. <i>sphacelata</i>	LC	No
<i>Setaria sphacelata</i> (Schumach.) Stapf & C.E.Hubb. ex M.B.Moss var. <i>torta</i> (Stapf) Clayton	LC	No
<i>Setaria verticillata</i> (L.) P.Beauv.	LC	No
<i>Sida alba</i> L.	LC	No



<i>Sida chrysantha</i> Ulbr.	LC	No
<i>Sida dregei</i> Burt Davy	LC	No
<i>Sida rhombifolia</i> L. subsp. <i>rhombifolia</i>	LC	No
<i>Sida ternata</i> L.f.	LC	No
<i>Silene burchellii</i> Otth var. <i>angustifolia</i> Sond.	Not Evaluated	No
<i>Silene gallica</i> L.	Not Evaluated	No
<i>Silene undulata</i> Aiton	LC	No
<i>Sisymbrium orientale</i> L.	Not Evaluated	No
<i>Sisyranthus randii</i> S.Moore	LC	No
<i>Solanum capense</i> L.	LC	No
<i>Solanum chenopodioides</i> Lam.	Not Evaluated	No
<i>Solanum giganteum</i> Jacq.	LC	No
<i>Solanum lichtensteinii</i> Willd.	LC	No
<i>Solanum mauritianum</i> Scop.	Not Evaluated	No
<i>Solanum pseudocapsicum</i> L.	Not Evaluated	No
<i>Solanum seforthianum</i> Andrews var. <i>disjunctum</i> O.E.Schulz	Not Evaluated	No
<i>Solanum sisymbriifolium</i> Lam.	Not Evaluated	No
<i>Solanum supinum</i> Dunal var. <i>supinum</i>	LC	No
<i>Sonchus dregeanus</i> DC.	LC	No
<i>Sonchus integrifolius</i> Harv. var. <i>integrifolius</i>	LC	No
<i>Sonchus oleraceus</i> L.	Not Evaluated	No
<i>Sorghum bicolor</i> (L.) Moench subsp. <i>drummondii</i> (Steud.) de Wet	LC	No
<i>Sphedamnocarpus pruriens</i> (A.Juss.) Szyszyl. subsp. <i>galphimifolius</i> (A.Juss.) P.D.de Villiers & D.J.Botha	LC	No
<i>Sphedamnocarpus pruriens</i> (A.Juss.) Szyszyl. subsp. <i>pruriens</i>	LC	No
<i>Sphenostylis angustifolia</i> Sond.	LC	No
<i>Sporobolus africanus</i> (Poir.) Robyns & Tournay	LC	No
<i>Sporobolus fimbriatus</i> (Trin.) Nees	LC	No
<i>Sporobolus pectinatus</i> Hack.	LC	No
<i>Sporobolus stapfianus</i> Gand.	LC	No
<i>Stachys natalensis</i> Hochst. var. <i>natalensis</i>	LC	No
<i>Stapelia gigantea</i> N.E.Br.	LC	No
<i>Stipa dregeana</i> Steud. var. <i>elongata</i> (Nees) Stapf	LC	No
<i>Striga bilabiata</i> (Thunb.) Kuntze subsp. <i>bilabiata</i>	LC	No
<i>Striga elegans</i> Benth.	LC	No



<i>Striga gesnerioides</i> (Willd.) Vatke	LC	No
<i>Strychnos pungens</i> Soler.	LC	No
<i>Sutherlandia frutescens</i> (L.) R.Br.	LC	No
<i>Symphogyna brasiliensis</i> Nees & Mont.	Not Evaluated	No
<i>Syncolostemon pretoriae</i> (Gürke) D.F.Otieno	LC	No
<i>Tagetes minuta</i> L.	Not Evaluated	No
<i>Tapinanthus rubromarginatus</i> (Engl.) Danser	LC	No
<i>Taraxacum officinale</i> Weber	Not Evaluated	No
<i>Tarchonanthus camphoratus</i> L.	LC	No
<i>Tarchonanthus parvicapitulatus</i> P.P.J.Herman	LC	No
<i>Tecoma stans</i> (L.) Juss. ex Kunth var. <i>stans</i>	Not Evaluated	No
<i>Tephrosia capensis</i> (Jacq.) Pers. var. <i>capensis</i>	LC	No
<i>Tephrosia elongata</i> E.Mey. var. <i>elongata</i>	LC	No
<i>Tephrosia longipes</i> Meisn. subsp. <i>longipes</i> var. <i>longipes</i>	LC	No
<i>Tephrosia multijuga</i> R.G.N.Young	LC	No
<i>Tephrosia semiglabra</i> Sond.	LC	No
<i>Teucrium trifidum</i> Retz.	LC	No
<i>Thelypteris confluens</i> (Thunb.) C.V.Morton	LC	No
<i>Themeda triandra</i> Forssk.	LC	No
<i>Thesium costatum</i> A.W.Hill var. <i>costatum</i>	LC	No
<i>Thesium deceptum</i> N.E.Br.	LC	No
<i>Thesium racemosum</i> Bernh.	LC	No
<i>Thesium translucens</i> A.W.Hill	LC	No
<i>Thesium transvaalense</i> Schltr.	LC	No
<i>Thesium utile</i> A.W.Hill	LC	No
<i>Tithonia diversifolia</i> (Hemsl.) A.Gray	Not Evaluated	No
<i>Tolpis capensis</i> (L.) Sch.Bip.	LC	No
<i>Trachyandra asperata</i> Kunth var. <i>swaziensis</i> Oberm.	LC	No
<i>Trachyandra saltii</i> (Baker) Oberm. var. <i>saltii</i>	LC	No
<i>Trachyphyllum gastrodes</i> (Welw. & Duby) A.Gepp	Not Evaluated	No
<i>Trachypogon spicatus</i> (L.f.) Kuntze	LC	No
<i>Tragia minor</i> Sond.	LC	No
<i>Tragia okanyua</i> Pax	LC	No
<i>Tragus berteronianus</i> Schult.	LC	No
<i>Tribulus terrestris</i> L.	LC	No



<i>Trichoneura grandiglumis</i> (Nees) Ekman	LC	No
<i>Triraphis andropogonoides</i> (Steud.) E.Phillips	LC	No
<i>Tristachya leucothrix</i> Trin. ex Nees	LC	No
<i>Tristachya rehmannii</i> Hack.	LC	No
<i>Tritonia nelsonii</i> Baker	LC	No
<i>Triumfetta sonderi</i> Ficalho & Hiern	LC	No
<i>Trochomeria macrocarpa</i> (Sond.) Hook.f. subsp. <i>macrocarpa</i>	LC	No
<i>Tulbaghia acutiloba</i> Harv.	LC	No
<i>Tulbaghia leucantha</i> Baker	LC	No
<i>Typha capensis</i> (Rohrb.) N.E.Br.	LC	No
<i>Urelytrum agropyroides</i> (Hack.) Hack.	LC	No
<i>Urochloa brachyura</i> (Hack.) Stapf	LC	No
<i>Urochloa panicoides</i> P.Beauv.	LC	No
<i>Ursinia nana</i> DC. subsp. <i>leptophylla</i> Prassler	LC	No
<i>Ursinia tenuiloba</i> DC.	LC	No
<i>Vachellia karroo</i> Hayne	LC	No
<i>Vahlia capensis</i> (L.f.) Thunb. subsp. <i>capensis</i>	LC	No
<i>Vangueria infausta</i> Burch. subsp. <i>infausta</i>	LC	No
<i>Vangueria parvifolia</i> Sond.	LC	No
<i>Verbena aristigera</i> S.Moore	Not Evaluated	No
<i>Verbena bonariensis</i> L.	Not Evaluated	No
<i>Verbena brasiliensis</i> Vell.	Not Evaluated	No
<i>Vernonia galpinii</i> Klatt	LC	No
<i>Vernonia staehelinoides</i> Harv.	LC	No
<i>Vernonia sutherlandii</i> Harv.	LC	No
<i>Veronica anagallis-aquatica</i> L.	LC	No
<i>Vigna vexillata</i> (L.) A.Rich. var. <i>davyi</i> (Bolos) B.J.Pienaar	LC	No
<i>Vigna vexillata</i> (L.) A.Rich. var. <i>vexillata</i>	LC	No
<i>Vinca major</i> L.	Not Evaluated	No
<i>Viscum rotundifolium</i> L.f.	LC	No
<i>Wahlenbergia lycopodioides</i> Schltr. & Brehmer	LC	No
<i>Wahlenbergia magaliesbergensis</i> Lammers	LC	No
<i>Wahlenbergia undulata</i> (L.f.) A.DC.	LC	No
<i>Wahlenbergia virgata</i> Engl.	LC	No
<i>Withania somnifera</i> (L.) Dunal	LC	No



<i>Xanthium strumarium</i> L.	Not Evaluated	No
<i>Xerophyta retinervis</i> Baker	LC	No
<i>Ximenia caffra</i> Sond. var. <i>caffra</i>	LC	No
<i>Xysmalobium undulatum</i> (L.) Aiton f. var. <i>undulatum</i>	LC	No
<i>Zaluzianskya katharinae</i> Hiern	LC	No
<i>Zanthoxylum capense</i> (Thunb.) Harv.	LC	No
<i>Zinnia peruviana</i> (L.) L.	Not Evaluated	No
<i>Ziziphus mucronata</i> Willd. subsp. <i>mucronata</i>	LC	No
<i>Ziziphus zeyheriana</i> Sond.	LC	No
<i>Zornia linearis</i> E.Mey.	LC	No



APPENDIX B: EXPECTED BIRD SPECIES

Species	Common Name	Conservation Satus	
		Regional (Birdlife, 2015)	Global (IUCN, 2017)
<i>Accipiter badius</i>	Shikra, Shikra	Unlisted	LC
<i>Accipiter melanoleucus</i>	Sparrowhawk, Black	Unlisted	LC
<i>Accipiter minullus</i>	Sparrowhawk, Little	Unlisted	LC
<i>Accipiter ovampensis</i>	Sparrowhawk, Ovambo	Unlisted	LC
<i>Acridotheres tristis</i>	Myna, Common	Unlisted	LC
<i>Acrocephalus arundinaceus</i>	Reed-warbler, Great	Unlisted	LC
<i>Acrocephalus baeticatus</i>	Reed-warbler, African	Unlisted	Unlisted
<i>Acrocephalus gracilirostris</i>	Swamp-warbler, Lesser	Unlisted	LC
<i>Acrocephalus palustris</i>	Warbler, Marsh	Unlisted	LC
<i>Acrocephalus schoenobaenus</i>	Warbler, Sedge	Unlisted	LC
<i>Actitis hypoleucos</i>	Sandpiper, Common	Unlisted	LC
<i>Actophilornis africanus</i>	Jacana, African	Unlisted	LC
<i>Afrotis afraoides</i>	Korhaan, Northern Black	Unlisted	LC
<i>Alcedo cristata</i>	Kingfisher, Malachite	Unlisted	Unlisted
<i>Alcedo semitorquata</i>	Kingfisher, Half-collared	NT	LC
<i>Alopochen aegyptiacus</i>	Goose, Egyptian	Unlisted	LC
<i>Amadina erythrocephala</i>	Finch, Red-headed	Unlisted	LC
<i>Amadina fasciata</i>	Finch, Cut-throat	Unlisted	LC
<i>Amandava subflava</i>	Waxbill, Orange-breasted	Unlisted	LC



<i>Amauornis flavirostris</i>	Crake, Black	Unlisted	LC
<i>Amblyospiza albifrons</i>	Weaver, Thick-billed	Unlisted	LC
<i>Anas capensis</i>	Teal, Cape	Unlisted	LC
<i>Anas erythrorhyncha</i>	Teal, Red-billed	Unlisted	LC
<i>Anas hybrid</i>	Duck, Hybrid Mallard	Unlisted	LC
<i>Anas platyrhynchos</i>	Duck, Domestic	Unlisted	LC
<i>Anas platyrhynchos</i>	Duck, Mallard	Unlisted	LC
<i>Anas smithii</i>	Shoveler, Cape	Unlisted	LC
<i>Anas sparsa</i>	Duck, African Black	Unlisted	LC
<i>Anas undulata</i>	Duck, Yellow-billed	Unlisted	LC
<i>Anhinga rufa</i>	Darter, African	Unlisted	LC
<i>Anomalospiza imberbis</i>	Finch, Cuckoo	Unlisted	LC
<i>Anser anser</i>	Goose, Domestic	Unlisted	LC
<i>Anthoscopus minutus</i>	Penduline-tit, Cape	Unlisted	LC
<i>Anthropoides paradiseus</i>	Crane, Blue	NT	VU
<i>Anthus caffer</i>	Pipit, Bushveld	Unlisted	LC
<i>Anthus cinnamomeus</i>	Pipit, African	Unlisted	LC
<i>Anthus leucophrys</i>	Pipit, Plain-backed	Unlisted	LC
<i>Anthus lineiventris</i>	Pipit, Striped	Unlisted	LC
<i>Anthus similis</i>	Pipit, Long-billed	Unlisted	LC



<i>Anthus vaalensis</i>	Pipit, Buffy	Unlisted	LC
<i>Apalis thoracica</i>	Apalis, Bar-throated	Unlisted	LC
<i>Apus affinis</i>	Swift, Little	Unlisted	LC
<i>Apus apus</i>	Swift, Common	Unlisted	LC
<i>Apus barbatus</i>	Swift, African Black	Unlisted	LC
<i>Apus caffer</i>	Swift, White-rumped	Unlisted	LC
<i>Apus horus</i>	Swift, Horus	Unlisted	LC
<i>Aquila pennatus</i>	Eagle, Booted	Unlisted	Unlisted
<i>Aquila verreauxii</i>	Eagle, Verreaux's	VU	LC
<i>Aquila wahlbergi</i>	Eagle, Wahlberg's	Unlisted	LC
<i>Ardea cinerea</i>	Heron, Grey	Unlisted	LC
<i>Ardea melanocephala</i>	Heron, Black-headed	Unlisted	LC
<i>Ardea purpurea</i>	Heron, Purple	Unlisted	LC
<i>Ardeola ralloides</i>	Heron, Squacco	Unlisted	LC
<i>Asio capensis</i>	Owl, Marsh	Unlisted	LC
<i>Batis molitor</i>	Batis, Chinspot	Unlisted	LC
<i>Bostrychia hagedash</i>	Ibis, Hageda	Unlisted	LC
<i>Bradornis mariquensis</i>	Flycatcher, Marico	Unlisted	LC
<i>Bradypterus baboecala</i>	Rush-warbler, Little	Unlisted	LC
<i>Bubo africanus</i>	Eagle-owl, Spotted	Unlisted	LC



<i>Bubulcus ibis</i>	Egret, Cattle	Unlisted	LC
<i>Burhinus capensis</i>	Thick-knee, Spotted	Unlisted	LC
<i>Buteo rufofuscus</i>	Buzzard, Jackal	Unlisted	LC
<i>Buteo vulpinus</i>	Buzzard, Steppe	Unlisted	Unlisted
<i>Butorides striata</i>	Heron, Green-backed	Unlisted	LC
<i>Cairina moschata</i>	Duck, Muscovy	Unlisted	LC
<i>Calamonastes fasciolatus</i>	Wren-warbler, Barred	Unlisted	LC
<i>Calandrella cinerea</i>	Lark, Red-capped	Unlisted	LC
<i>Calendulauda sabota</i>	Lark, Sabota	Unlisted	LC
<i>Calidris minuta</i>	Stint, Little	Unlisted	LC
<i>Campephaga flava</i>	Cuckoo-shrike, Black	Unlisted	LC
<i>Campethera abingoni</i>	Woodpecker, Golden-tailed	Unlisted	LC
<i>Caprimulgus pectoralis</i>	Nightjar, Fiery-necked	Unlisted	LC
<i>Caprimulgus rufigena</i>	Nightjar, Rufous-cheeked	Unlisted	LC
<i>Caprimulgus tristigma</i>	Nightjar, Freckled	Unlisted	LC
<i>Centropus burchellii</i>	Coucal, Burchell's	Unlisted	Unlisted
<i>Centropus superciliosus</i>	Coucal, White-browed	Unlisted	LC
<i>Cercomela familiaris</i>	Chat, Familiar	Unlisted	LC
<i>Cercotrichas leucophrys</i>	Scrub-robin, White-browed	Unlisted	LC
<i>Cercotrichas paena</i>	Scrub-robin, Kalahari	Unlisted	LC



<i>Certhilauda benguelensis</i>	Lark, Benguela Long-billed	Unlisted	Unlisted
<i>Certhilauda brevirostris</i>	Lark, Agulhas Long-billed	NT	Unlisted
<i>Certhilauda curvirostris</i>	Lark, Cape Long-billed	Unlisted	LC
<i>Certhilauda semitorquata</i>	Lark, Eastern Long-billed	Unlisted	LC
<i>Certhilauda subcoronata</i>	Lark, Karoo Long-billed	Unlisted	LC
<i>Ceryle rudis</i>	Kingfisher, Pied	Unlisted	LC
<i>Chalcomitra amethystina</i>	Sunbird, Amethyst	Unlisted	LC
<i>Charadrius hiaticula</i>	Plover, Common Ringed	Unlisted	LC
<i>Charadrius tricollaris</i>	Plover, Three-banded	Unlisted	LC
<i>Chersomanes albofasciata</i>	Lark, Spike-heeled	Unlisted	LC
<i>Chlidonias hybrida</i>	Tern, Whiskered	Unlisted	LC
<i>Chlidonias leucopterus</i>	Tern, White-winged	Unlisted	LC
<i>Chrysococcyx caprius</i>	Cuckoo, Diderick	Unlisted	LC
<i>Chrysococcyx klaas</i>	Cuckoo, Klaas's	Unlisted	LC
<i>Ciconia abdimii</i>	Stork, Abdim's	NT	LC
<i>Ciconia ciconia</i>	Stork, White	Unlisted	LC
<i>Cinnyricinclus leucogaster</i>	Starling, Violet-backed	Unlisted	LC
<i>Cinnyris afer</i>	Sunbird, Greater Double-collared	Unlisted	LC
<i>Cinnyris mariquensis</i>	Sunbird, Marico	Unlisted	LC
<i>Cinnyris talatala</i>	Sunbird, White-bellied	Unlisted	LC



<i>Circaetus pectoralis</i>	Snake-eagle, Black-chested	Unlisted	LC
<i>Cisticola aberrans</i>	Cisticola, Lazy	Unlisted	LC
<i>Cisticola aridulus</i>	Cisticola, Desert	Unlisted	LC
<i>Cisticola ayresii</i>	Cisticola, Wing-snapping	Unlisted	LC
<i>Cisticola chiniana</i>	Cisticola, Rattling	Unlisted	LC
<i>Cisticola fulvicapilla</i>	Neddicky, Neddicky	Unlisted	LC
<i>Cisticola juncidis</i>	Cisticola, Zitting	Unlisted	LC
<i>Cisticola lais</i>	Cisticola, Wailing	Unlisted	LC
<i>Cisticola textrix</i>	Cisticola, Cloud	Unlisted	LC
<i>Cisticola tinniens</i>	Cisticola, Levaillant's	Unlisted	LC
<i>Clamator jacobinus</i>	Cuckoo, Jacobin	Unlisted	LC
<i>Coccygia melanotis</i>	Waxbill, Swee	Unlisted	LC
<i>Colius colius</i>	Mousebird, White-backed	Unlisted	LC
<i>Colius striatus</i>	Mousebird, Speckled	Unlisted	LC
<i>Columba arquatrix</i>	Olive-pigeon, African	Unlisted	LC
<i>Columba guinea</i>	Pigeon, Speckled	Unlisted	LC
<i>Columba livia</i>	Dove, Rock	Unlisted	LC
<i>Coracias caudatus</i>	Roller, Lilac-breasted	Unlisted	LC
<i>Coracias garrulus</i>	Roller, European	NT	LC
<i>Corvinella melanoleuca</i>	Shrike, Magpie	Unlisted	LC
<i>Corvus albus</i>	Crow, Pied	Unlisted	LC



<i>Corvus capensis</i>	Crow, Cape	Unlisted	LC
<i>Corythaixoides concolor</i>	Go-away-bird, Grey	Unlisted	LC
<i>Cossypha caffra</i>	Robin-chat, Cape	Unlisted	LC
<i>Cossypha humeralis</i>	Robin-chat, White-throated	Unlisted	LC
<i>Coturnix coturnix</i>	Quail, Common	Unlisted	LC
<i>Creotophora cinerea</i>	Starling, Wattled	Unlisted	LC
<i>Crithagra atrogularis</i>	Canary, Black-throated	Unlisted	LC
<i>Crithagra flaviventris</i>	Canary, Yellow	Unlisted	LC
<i>Crithagra gularis</i>	Seedeater, Streaky-headed	Unlisted	LC
<i>Crithagra mozambicus</i>	Canary, Yellow-fronted	Unlisted	LC
<i>Cuculus clamosus</i>	Cuckoo, Black	Unlisted	LC
<i>Cuculus gularis</i>	Cuckoo, African	Unlisted	LC
<i>Cuculus solitarius</i>	Cuckoo, Red-chested	Unlisted	LC
<i>Cursorius temminckii</i>	Cursorer, Temminck's	Unlisted	LC
<i>Cygnus olor</i>	Swan, Mute	Unlisted	LC
<i>Cypsiurus parvus</i>	Palm-swift, African	Unlisted	LC
<i>Delichon urbicum</i>	House-martin, Common	Unlisted	LC
<i>Dendrocygna viduata</i>	Duck, White-faced	Unlisted	LC
<i>Dendropicos fuscescens</i>	Woodpecker, Cardinal	Unlisted	LC
<i>Dendropicos namaquus</i>	Woodpecker, Bearded	Unlisted	LC
<i>Dicrurus adsimilis</i>	Drongo, Fork-tailed	Unlisted	LC



<i>Dryoscopus cubla</i>	Puffback, Black-backed	Unlisted	LC
<i>Egretta alba</i>	Egret, Great	Unlisted	LC
<i>Egretta ardesiaca</i>	Heron, Black	Unlisted	LC
<i>Egretta garzetta</i>	Egret, Little	Unlisted	LC
<i>Egretta intermedia</i>	Egret, Yellow-billed	Unlisted	Unlisted
<i>Elanus caeruleus</i>	Kite, Black-shouldered	Unlisted	LC
<i>Emberiza capensis</i>	Bunting, Cape	Unlisted	LC
<i>Emberiza flaviventris</i>	Bunting, Golden-breasted	Unlisted	LC
<i>Emberiza tahapisi</i>	Bunting, Cinnamon-breasted	Unlisted	LC
<i>Estrilda astrild</i>	Waxbill, Common	Unlisted	LC
<i>Estrilda erythronotos</i>	Waxbill, Black-faced	Unlisted	LC
<i>Euplectes afer</i>	Bishop, Yellow-crowned	Unlisted	LC
<i>Euplectes albonotatus</i>	Widowbird, White-winged	Unlisted	LC
<i>Euplectes ardens</i>	Widowbird, Red-collared	Unlisted	LC
<i>Euplectes capensis</i>	Bishop, Yellow	Unlisted	LC
<i>Euplectes orix</i>	Bishop, Southern Red	Unlisted	LC
<i>Euplectes progne</i>	Widowbird, Long-tailed	Unlisted	LC
<i>Eupodotis senegalensis</i>	Korhaan, White-bellied	VU	LC
<i>Falco amurensis</i>	Falcon, Amur	Unlisted	LC
<i>Falco biarmicus</i>	Falcon, Lanner	VU	LC
<i>Falco peregrinus</i>	Falcon, Peregrine	Unlisted	LC



<i>Falco rupicoloides</i>	Kestrel, Greater	Unlisted	LC
<i>Falco rupicolus</i>	Kestrel, Rock	Unlisted	Unlisted
<i>Fulica cristata</i>	Coot, Red-knobbed	Unlisted	LC
<i>Gallinago nigripennis</i>	Snipe, African	Unlisted	LC
<i>Gallinula chloropus</i>	Moorhen, Common	Unlisted	LC
<i>Glareola nordmanni</i>	Pratincole, Black-winged	NT	NT
<i>Gyps coprotheres</i>	Vulture, Cape	EN	EN
<i>Halcyon albiventris</i>	Kingfisher, Brown-hooded	Unlisted	LC
<i>Halcyon senegalensis</i>	Kingfisher, Woodland	Unlisted	LC
<i>Haliaeetus vocifer</i>	Fish-eagle, African	Unlisted	LC
<i>Himantopus himantopus</i>	Stilt, Black-winged	Unlisted	LC
<i>Hippolais icterina</i>	Warbler, Icterine	Unlisted	LC
<i>Hirundo abyssinica</i>	Swallow, Lesser Striped	Unlisted	LC
<i>Hirundo albigularis</i>	Swallow, White-throated	Unlisted	LC
<i>Hirundo cucullata</i>	Swallow, Greater Striped	Unlisted	LC
<i>Hirundo dimidiata</i>	Swallow, Pearl-breasted	Unlisted	LC
<i>Hirundo fuligula</i>	Martin, Rock	Unlisted	Unlisted
<i>Hirundo rustica</i>	Swallow, Barn	Unlisted	LC
<i>Hirundo semirufa</i>	Swallow, Red-breasted	Unlisted	LC
<i>Hirundo spilodera</i>	Cliff-swallow, South African	Unlisted	LC



<i>Indicator indicator</i>	Honeyguide, Greater	Unlisted	LC
<i>Indicator minor</i>	Honeyguide, Lesser	Unlisted	LC
<i>Ixobrychus minutus</i>	Bittern, Little	Unlisted	LC
<i>Jynx ruficollis</i>	Wryneck, Red-throated	Unlisted	LC
<i>Lagonosticta rhodopareia</i>	Firefinch, Jameson's	Unlisted	LC
<i>Lagonosticta rubricata</i>	Firefinch, African	Unlisted	LC
<i>Lagonosticta senegala</i>	Firefinch, Red-billed	Unlisted	LC
<i>Lamprotornis nitens</i>	Starling, Cape Glossy	Unlisted	LC
<i>Laniarius atrococcineus</i>	Shrike, Crimson-breasted	Unlisted	LC
<i>Laniarius ferrugineus</i>	Boubou, Southern	Unlisted	LC
<i>Lanius collaris</i>	Fiscal, Common (Southern)	Unlisted	LC
<i>Lanius collurio</i>	Shrike, Red-backed	Unlisted	LC
<i>Lanius minor</i>	Shrike, Lesser Grey	Unlisted	LC
<i>Larus cirrocephalus</i>	Gull, Grey-headed	Unlisted	LC
<i>Lybius torquatus</i>	Barbet, Black-collared	Unlisted	LC
<i>Macronyx capensis</i>	Longclaw, Cape	Unlisted	LC
<i>Megaceryle maximus</i>	Kingfisher, Giant	Unlisted	Unlisted
<i>Melaenornis pammelaina</i>	Flycatcher, Southern Black	Unlisted	LC



<i>Melierax gabar</i>	Goshawk, Gabar	Unlisted	LC
<i>Merops apiaster</i>	Bee-eater, European	Unlisted	LC
<i>Merops bullockoides</i>	Bee-eater, White-fronted	Unlisted	LC
<i>Merops pusillus</i>	Bee-eater, Little	Unlisted	LC
<i>Microcarbo africanus</i>	Cormorant, Reed	Unlisted	LC
<i>Milvus aegyptius</i>	Kite, Yellow-billed	Unlisted	Unlisted
<i>Milvus migrans</i>	Kite, Black	Unlisted	LC
<i>Milvus migrans</i>	Kite, Black	Unlisted	LC
<i>Mirafra africana</i>	Lark, Rufous-naped	Unlisted	LC
<i>Mirafra apiata</i>	Lark, Cape Clapper	Unlisted	LC
<i>Mirafra cheniana</i>	Lark, Melodious	LC	NT
<i>Mirafra fasciolata</i>	Lark, Eastern Clapper	Unlisted	LC
<i>Mirafra marjoriae</i>	Lark, Agulhas Clapper	Unlisted	Unlisted
<i>Monticola brevipes</i>	Rock-thrush, Short-toed	Unlisted	LC
<i>Monticola explorator</i>	Rock-thrush, Sentinel	Unlisted	LC
<i>Monticola rupestris</i>	Rock-thrush, Cape	Unlisted	LC
<i>Motacilla aguimp</i>	Wagtail, African Pied	Unlisted	LC
<i>Motacilla capensis</i>	Wagtail, Cape	Unlisted	LC
<i>Muscicapa striata</i>	Flycatcher, Spotted	Unlisted	LC
<i>Mycteria ibis</i>	Stork, Yellow-billed	EN	LC
<i>Myrmecocichla formicivora</i>	Chat, Anteating	Unlisted	LC



<i>Nectarinia famosa</i>	Sunbird, Malachite	Unlisted	LC
<i>Netta erythrophthalma</i>	Pochard, Southern	Unlisted	LC
<i>Nilaus afer</i>	Brubru, Brubru	Unlisted	LC
<i>Numida meleagris</i>	Guineafowl, Helmeted	Unlisted	LC
<i>Nycticorax nycticorax</i>	Night-Heron, Black-crowned	Unlisted	LC
<i>Oena capensis</i>	Dove, Namaqua	Unlisted	LC
<i>Oenanthe monticola</i>	Wheatear, Mountain	Unlisted	LC
<i>Oenanthe pileata</i>	Wheatear, Capped	Unlisted	LC
<i>Onychognathus morio</i>	Starling, Red-winged	Unlisted	LC
<i>Oriolus larvatus</i>	Oriole, Black-headed	Unlisted	LC
<i>Oriolus oriolus</i>	Oriole, Eurasian Golden	Unlisted	LC
<i>Ortygospiza atricollis</i>	Quailfinch, African	Unlisted	LC
<i>Oxyura maccoa</i>	Duck, Maccoa	NT	NT
<i>Pandion haliaetus</i>	Osprey, Osprey	Unlisted	LC
<i>Parisoma subcaeruleum</i>	Tit-babbler, Chestnut-vented	Unlisted	LC
<i>Parus cinerascens</i>	Tit, Ashy	Unlisted	LC
<i>Parus niger</i>	Tit, Southern Black	Unlisted	Unlisted
<i>Passer diffusus</i>	Sparrow, Southern Grey-headed	Unlisted	LC
<i>Passer domesticus</i>	Sparrow, House	Unlisted	LC



<i>Passer griseus</i>	Sparrow, Northern Grey-headed	Unlisted	LC
<i>Passer melanurus</i>	Sparrow, Cape	Unlisted	LC
<i>Peliperdix coqui</i>	Francolin, Coqui	Unlisted	LC
<i>Petronia superciliaris</i>	Petronia, Yellow-throated	Unlisted	LC
<i>Phalacrocorax carbo</i>	Cormorant, White-breasted	Unlisted	LC
<i>Philomachus pugnax</i>	Ruff, Ruff	Unlisted	LC
<i>Phoenicopterus ruber</i>	Flamingo, Greater	Unlisted	LC
<i>Phoeniculus purpureus</i>	Wood-hoopoe, Green	Unlisted	LC
<i>Phylloscopus trochilus</i>	Warbler, Willow	Unlisted	LC
<i>Platalea alba</i>	Spoonbill, African	Unlisted	LC
<i>Plectropterus gambensis</i>	Goose, Spur-winged	Unlisted	LC
<i>Plegadis falcinellus</i>	Ibis, Glossy	Unlisted	LC
<i>Plocepasser mahali</i>	Sparrow-weaver, White-browed	Unlisted	LC
<i>Ploceus capensis</i>	Weaver, Cape	Unlisted	LC
<i>Ploceus cucullatus</i>	Weaver, Village	Unlisted	LC
<i>Ploceus velatus</i>	Masked-weaver, Southern	Unlisted	LC
<i>Podica senegalensis</i>	Finfoot, African	VU	LC
<i>Podiceps cristatus</i>	Grebe, Great Crested	Unlisted	LC
<i>Podiceps nigricollis</i>	Grebe, Black-necked	Unlisted	LC



<i>Pogoniulus chrysoconus</i>	Tinkerbird, Yellow-fronted	Unlisted	LC
<i>Polemaetus bellicosus</i>	Eagle, Martial	EN	VU
<i>Polyboroides typus</i>	Harrier-Hawk, African	Unlisted	LC
<i>Porphyrio madagascariensis</i>	Swamphen, African Purple	Unlisted	Unlisted
<i>Prinia flavicans</i>	Prinia, Black-chested	Unlisted	LC
<i>Prinia subflava</i>	Prinia, Tawny-flanked	Unlisted	LC
<i>Prodotiscus regulus</i>	Honeybird, Brown-backed	Unlisted	LC
<i>Psittacula krameri</i>	Parakeet, Rose-ringed	Unlisted	LC
<i>Psophocichla litsipsirupa</i>	Thrush, Groundscraper	Unlisted	Unlisted
<i>Pternistis natalensis</i>	Spurfowl, Natal	Unlisted	LC
<i>Pternistis swainsonii</i>	Spurfowl, Swainson's	Unlisted	LC
<i>Pycnonotus nigricans</i>	Bulbul, African Red-eyed	Unlisted	LC
<i>Pycnonotus tricolor</i>	Bulbul, Dark-capped	Unlisted	Unlisted
<i>Quelea quelea</i>	Quelea, Red-billed	Unlisted	Unlisted
<i>Rallus caerulescens</i>	Rail, African	Unlisted	LC
<i>Recurvirostra avosetta</i>	Avocet, Pied	Unlisted	LC
<i>Rhinopomastus cyanomelas</i>	Scimitarbill, Common	Unlisted	LC
<i>Riparia cincta</i>	Martin, Banded	Unlisted	LC
<i>Riparia paludicola</i>	Martin, Brown-throated	Unlisted	LC
<i>Riparia riparia</i>	Martin, Sand	Unlisted	LC



<i>Rostratula benghalensis</i>	Painted-snipe, Greater	VU	LC
<i>Sagittarius serpentarius</i>	Secretarybird	VU	VU
<i>Sarkidiornis melanotos</i>	Duck, Comb	Unlisted	LC
<i>Saxicola torquatus</i>	Stonechat, African	Unlisted	LC
<i>Scleroptila levaillantii</i>	Francolin, Red-winged	Unlisted	LC
<i>Scleroptila levaillantoides</i>	Francolin, Orange River	Unlisted	Unlisted
<i>Scleroptila shelleyi</i>	Francolin, Shelley's	Unlisted	LC
<i>Scopus umbretta</i>	Hamerkop, Hamerkop	Unlisted	LC
<i>Serinus canicollis</i>	Canary, Cape	Unlisted	LC
<i>Sigelus silens</i>	Flycatcher, Fiscal	Unlisted	LC
<i>Spermestes cucullatus</i>	Mannikin, Bronze	Unlisted	Unlisted
<i>Sphenoeacus afer</i>	Grassbird, Cape	Unlisted	LC
<i>Spizocorys conirostris</i>	Lark, Pink-billed	Unlisted	LC
<i>Sporopipes squamifrons</i>	Finch, Scaly-feathered	Unlisted	LC
<i>Spreo bicolor</i>	Starling, Pied	Unlisted	LC
<i>Stenostira scita</i>	Flycatcher, Fairy	Unlisted	LC
<i>Streptopelia capicola</i>	Turtle-dove, Cape	Unlisted	LC
<i>Streptopelia semitorquata</i>	Dove, Red-eyed	Unlisted	LC
<i>Streptopelia senegalensis</i>	Dove, Laughing	Unlisted	LC
<i>Struthio camelus</i>	Ostrich, Common	Unlisted	LC
<i>Sylvia borin</i>	Warbler, Garden	Unlisted	LC



<i>Sylvietta rufescens</i>	Crombec, Long-billed	Unlisted	LC
<i>Tachybaptus ruficollis</i>	Grebe, Little	Unlisted	LC
<i>Tachymarptis melba</i>	Swift, Alpine	Unlisted	LC
<i>Tadorna cana</i>	Shelduck, South African	Unlisted	LC
<i>Tchagra australis</i>	Tchagra, Brown-crowned	Unlisted	LC
<i>Tchagra senegalus</i>	Tchagra, Black-crowned	Unlisted	LC
<i>Telophorus sulfureopectus</i>	Bush-shrike, Orange-breasted	Unlisted	LC
<i>Telophorus zeylonus</i>	Bokmakierie, Bokmakierie	Unlisted	LC
<i>Terpsiphone viridis</i>	Paradise-flycatcher, African	Unlisted	LC
<i>Thalassornis leuconotus</i>	Duck, White-backed	Unlisted	LC
<i>Thamnolaea cinnamomeiventris</i>	Cliff-chat, Mocking	Unlisted	LC
<i>Threskiornis aethiopicus</i>	Ibis, African Sacred	Unlisted	LC
<i>Tockus leucomelas</i>	Hornbill, Southern Yellow-billed	Unlisted	LC
<i>Tockus nasutus</i>	Hornbill, African Grey	Unlisted	LC
<i>Trachyphonus vaillantii</i>	Barbet, Crested	Unlisted	LC
<i>Treron calvus</i>	Green-pigeon, African	Unlisted	LC
<i>Tricholaema leucomelas</i>	Barbet, Acacia Pied	Unlisted	LC
<i>Tringa glareola</i>	Sandpiper, Wood	Unlisted	LC



<i>Tringa nebularia</i>	Greenshank, Common	Unlisted	LC
<i>Tringa ochropus</i>	Sandpiper, Green	Unlisted	LC
<i>Tringa stagnatilis</i>	Sandpiper, Marsh	Unlisted	LC
<i>Turdoides jardineii</i>	Babbler, Arrow-marked	Unlisted	LC
<i>Turdus libonyanus</i>	Thrush, Kurrichane	Unlisted	Unlisted
<i>Turdus olivaceus</i>	Thrush, Olive	Unlisted	LC
<i>Turdus smithi</i>	Thrush, Karoo	Unlisted	LC
<i>Turnix sylvaticus</i>	Buttonquail, Kurrichane	Unlisted	LC
<i>Tyto alba</i>	Owl, Barn	Unlisted	LC
<i>Tyto capensis</i>	Grass-owl, African	VU	LC
<i>Upupa africana</i>	Hoopoe, African	Unlisted	Unlisted
<i>Uraeginthus angolensis</i>	Waxbill, Blue	Unlisted	LC
<i>Urocolius indicus</i>	Mousebird, Red-faced	Unlisted	LC
<i>Vanellus armatus</i>	Lapwing, Blacksmith	Unlisted	LC
<i>Vanellus coronatus</i>	Lapwing, Crowned	Unlisted	LC
<i>Vanellus senegallus</i>	Lapwing, African Wattled	Unlisted	LC
<i>Vidua chalybeata</i>	Indigobird, Village	Unlisted	LC
<i>Vidua funerea</i>	Indigobird, Dusky	Unlisted	LC
<i>Vidua macroura</i>	Whydah, Pin-tailed	Unlisted	LC
<i>Vidua paradisaea</i>	Paradise-whydah, Long-tailed	Unlisted	LC
<i>Zosterops pallidus</i>	White-eye, Orange River	Unlisted	LC
<i>Zosterops virens</i>	White-eye, Cape	Unlisted	LC



APPENDIX C: EXPECTED MAMMAL SPECIES

Species	Common name	Presence	Origin	Seasonal	Conservation Status	
					Regional (SANBI, 2016)	IUCN (2017)
<i>Aethomys ineptus</i>	Tete Veld Rat	1	1	1	LC	LC
<i>Aethomys namaquensis</i>	Namaqua Rock Rat	1	1	1	Unlisted	LC
<i>Aonyx capensis</i>	Cape Clawless Otter	1	1	1	NT	NT
<i>Atelerix frontalis</i>	South African Hedgehog	1	1	1	NT	LC
<i>Atilax paludinosus</i>	Water Mongoose	1	1	1	LC	LC
<i>Canis mesomelas</i>	Black-backed Jackal	1	1	1	LC	LC
<i>Caracal caracal</i>	Caracal	1	1	1	LC	LC
<i>Chlorocebus pygerythrus</i>	Vervet Monkey				LC	LC
<i>Crociodura cyanea</i>	Reddish-grey Musk Shrew	1	1	1	LC	LC
<i>Crociodura maquassiensis</i>	Maquassie Musk Shrew	1	1	1	VU	LC
<i>Crociodura silacea</i>	Lesser Grey-brown Musk Shrew	1	1	1	LC	LC
<i>Cryptomys hottentotus</i>	Common Mole-rat	1	1	1	LC	LC
<i>Cynictis penicillata</i>	Yellow Mongoose	1	1	1	LC	LC
<i>Desmodillus auricularis</i>	Short-tailed Gerbil	1	1	1	LC	LC
<i>Eidolon helvum</i>	African Straw-coloured Fruit Bat	1	1	1	LC	NT
<i>Elephantulus brachyrhynchus</i>	Short-snouted Sengi	1	1	1	LC	LC
<i>Elephantulus myurus</i>	Eastern Rock Sengi	1	1	1	LC	LC
<i>Epomophorus wahlbergi</i>	Wahlberg's Epauletted Fruit Bat	1	1	1	LC	LC
<i>Eptesicus hottentotus</i>	Long-tailed Serotine Bat	1	1	1	LC	LC
<i>Felis nigripes</i>	Black-footed Cat	1	1	1	VU	VU
<i>Felis silvestris</i>	African Wildcat	1	1	1	LC	LC
<i>Genetta genetta</i>	Small-spotted Genet	1	1	1	LC	LC
<i>Genetta maculata</i>	Common Large-spotted Genet				Unlisted	LC
<i>Gerbilliscus brantsii</i>	Highveld Gerbil	1	1	1	LC	LC
<i>Gerbilliscus leucogaster</i>	Bushveld Gerbil	1	1	1	LC	LC
<i>Herpestes sanguineus</i>	Slender Mongoose	1	1	1	LC	LC



<i>Hydricteis maculicollis</i>	Spotted-necked Otter	1	1	1	VU	NT
<i>Hystrix africaeaustralis</i>	Cape Porcupine	1	1	1	LC	LC
<i>Ichneumia albicauda</i>	White-tailed Mongoose	1	1	1	LC	LC
<i>Ictonyx striatus</i>	Striped Polecat	1	1	1	LC	LC
<i>Leptailurus serval</i>	Serval	1	1	1	NT	LC
<i>Lepus saxatilis</i>	Scrub Hare	1	1	1	LC	LC
<i>Lepus victoriae</i>	African Savanna Hare	1	1	1	LC	LC
<i>Hydricteis maculicollis</i>	Spotted-necked Otter				VU	NT
<i>Mastomys coucha</i>	Multimammate Mouse	1	1	1	LC	LC
<i>Mellivora capensis</i>	Honey Badger	1	1	1	LC	LC
<i>Mungos mungo</i>	Banded Mongoose	1	1	1	LC	LC
<i>Myotis tricolor</i>	Temninck's Hairy Bat	1	1	1	LC	LC
<i>Myotis welwitschii</i>	Welwitsch's Hairy Bat	1	1	1	LC	LC
<i>Mystromys albicaudatus</i>	White-tailed Rat	1	1	1	VU	EN
<i>Neoromicia capensis</i>	Cape Serotine Bat	1	1	1	LC	LC
<i>Neoromicia zuluensis</i>	Aloe Bat	1	1	1	LC	LC
<i>Nycteris thebaica</i>	Egyptian Slit-faced Bat	1	1	1	LC	LC
<i>Orycteropus afer</i>	Aardvark	1	1	1	LC	LC
<i>Otomys angoniensis</i>	Angoni Vlei Rat	1	1	1	LC	LC
<i>Otomys irroratus</i>	Vlei Rat	1	1	1	LC	LC
<i>Parahyaena brunnea</i>	Brown Hyaena	1	1	1	NT	NT
<i>Pedetes capensis</i>	Springhare	1	1	1	LC	LC
<i>Pelea capreolus</i>	Grey Rhebok	1	1	1	NT	LC
<i>Phacochoerus africanus</i>	Common Warthog	1	1	1	LC	LC
<i>Poecilogale albinucha</i>	African Stripped Weasel	1	1	1	NT	LC
<i>Procavia capensis</i>	Rock Hyrax	1	1	1	LC	LC
<i>Pronolagus randensis</i>	Jameson's Red Rock Rabbit	1	1	1	LC	LC
<i>Proteles cristata</i>	Aardwolf	1	1	1	LC	LC
<i>Raphicerus campestris</i>	Steenbok	1	1	1	LC	LC
<i>Rattus rattus</i>	House Rat	1	1	1	Unlisted	LC
<i>Redunca fulvorufula</i>	Mountain Reedbuck	1	1	1	EN	LC
<i>Rhabdomys pumilio</i>	Xeric Four-striped Mouse	1	1	1	LC	LC
<i>Rhinolophus clivosus</i>	Geoffroy's Horseshoe Bat	1	1	1	LC	LC



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<i>Rhinolophus darlingi</i>	Darling's Horseshoe Bat	1	1	1	LC	LC
<i>Saccostomus campestris</i>	Pouched Mouse	1	1	1	LC	LC
<i>Sauromys petrophilus</i>	Flat-headed Free-tail Bat	1	1	1	LC	LC
<i>Scotophilus dinganii</i>	Yellow House Bat	1	1	1	LC	LC
<i>Steatomys krebsii</i>	Krebs's Fat Mouse	1	1	1	LC	LC
<i>Steatomys pratensis</i>	Fat Mouse	1	1	1	LC	LC
<i>Suncus infinitesimus</i>	Least Dwarf Shrew				LC	LC
<i>Suncus varilla</i>	Lesser Dwarf Shrew	1	1	1	LC	LC
<i>Suricata suricatta</i>	Suricate	1	1	1	LC	LC
<i>Sylvicapra grimmia</i>	Common Duiker	1	1	1	LC	LC
<i>Tadarida aegyptiaca</i>	Egyptian Free-tailed Bat	1	1	1	LC	LC
<i>Taphozous mauritanus</i>	Mauritian Tomb Rat	1	1	1	LC	LC
<i>Vulpes chama</i>	Cape Fox	1	1	1	LC	LC



APPENDIX D: EXPECTED REPTILE SPECIES

Species	Common name	Conservation Status	
		Regional (Bates et al., 2014)	Global (IUCN, 2017)
<i>Acontias gracilicauda</i>	Thin-tailed Legless Skink	Unlisted	LC
<i>Afroedura nivaria</i>	Drakensberg Flat Gecko	Unlisted	LC
<i>Afrotrophlops bibronii</i>	Bibron's Blind Snake	Unlisted	LC
<i>Agama aculeata distanti</i>	Eastern Ground Agama	Unlisted	LC
<i>Agama atra</i>	Southern Rock Agama	Unlisted	LC
<i>Aparallactus capensis</i>	Black-headed Centipede-eater	LC	LC
<i>Bitis arietans</i>	Puff Adder	LC	Unlisted
<i>Boaedon capensis</i>	Common House Snake	LC	Unlisted
<i>Causus rhombeatus</i>	Rhombic Night Adder	LC	Unlisted
<i>Chamaeleo dilepis</i>	Common Flap-neck Chameleon	LC	LC
<i>Crotaphopeltis hotamboeia</i>	Red-lipped Snake	LC	Unlisted
<i>Dasypeltis scabra</i>	Rhombic Egg-eater	LC	LC
<i>Gerrhosaurus flavigularis</i>	Yellow-throated Plated Lizard	LC	Unlisted
<i>Hemachatus haemachatus</i>	Rinkhals	Unlisted	LC
<i>Kinixys lobatsiana</i>	Lobatse Hinged Tortoise	Unlisted	LC
<i>Lamprophis aurora</i>	Aurora House Snake	Unlisted	LC
<i>Lygodactylus capensis</i>	Common Dwarf Gecko	LC	Unlisted
<i>Pachydactylus affinis</i>	Transvaal Gecko	Unlisted	LC
<i>Pachydactylus capensis</i>	Cape Gecko	LC	LC
<i>Panaspis wahlbergi</i>	Wahlberg's Snake-eyed Skink	Unlisted	Unlisted
<i>Prosymna ambigua</i>	East African Shovel-Snout	Unlisted	LC
<i>Psammophis brevirostris</i>	Short-snouted Grass Snake	Unlisted	LC
<i>Psammophis subtaeniatus</i>	Western Yellow-bellied Sand Snake	LC	LC
<i>Psammophylax rhombeatus</i>	Spotted Grass Snake	LC	Unlisted
<i>Psammophylax tritaeniatus</i>	Striped Grass Snake	LC	LC
<i>Python natalensis</i>	Southern African Python	LC	Unlisted
<i>Stigmochelys pardalis</i>	Leopard Tortoise	Unlisted	LC
<i>Trachylepis punctatissima</i>	Speckled Rock Skink	LC	LC
<i>Trachylepis varia</i>	Variable Skink	LC	Unlisted



APPENDIX E: EXPECTED AMPHIBIAN SPECIES

Species	Common name	Conservation Status	
		Regional (Bates et al., 2014)	IUCN (2017)
<i>Amietia angolensis</i>	Common River Frog	LC	LC
<i>Amietia delalandii</i>	Delalande's River Frog	Unlisted	Unlisted
<i>Amietia fuscigula</i>	Cape River Frog	LC	LC
<i>Breviceps adspersus</i>	Bushveld Rain Frog	LC	LC
<i>Cacosternum boettgeri</i>	Boettger's Caco	LC	LC
<i>Kassina senegalensis</i>	Bubbling Kassina	LC	LC
<i>Phrynobatrachus natalensis</i>	Snoring Puddle Frog	LC	LC
<i>Ptychadena anchietae</i>	Plain Grass Frog	LC	LC
<i>Pyxicephalus adspersus</i>	Giant Bullfrog	NT	LC
<i>Schismaderma carens</i>	Red Toad	LC	LC
<i>Sclerophrys capensis</i>	Raucous Toad	Unlisted	LC
<i>Sclerophrys garmani</i>	Eastern Olive Toad	LC	LC
<i>Sclerophrys gutturalis</i>	Guttural Toad	LC	LC
<i>Sclerophrys poweri</i>	Western Olive Toad	LC	LC
<i>Semnodactylus wealii</i>	Rattling Frog	LC	LC
<i>Strongylopus fasciatus</i>	Striped Stream Frog	LC	LC
<i>Tomopterna cryptotis</i>	Tremolo Sand Frog	LC	LC
<i>Tomopterna natalensis</i>	Natal Sand Frog	LC	LC
<i>Tomopterna tandyi</i>	Tandy's Sand Frog	LC	LC
<i>Xenopus laevis</i>	Common Platanna	LC	LC



19 Appendix H: Avifauna Assessment

Vogelstruisfontein Solar Photovoltaic Facility

Avifaunal review

29 August 2017

1. Introduction

This proposed project consists of a Solar Photovoltaic facility in Florida east of Roodepoort. This project is starting with a Basic Assessment currently. SOLARRESERVE appointed WildSkies Ecological Services to review the work done to date and avifaunal risks at the site. SOLARRESERVE informed WildSkies that the solar power generation proposed does not trigger a listed activity in the EIA Regulations as it is below the generation capacity threshold. Our understanding is that this conclusion was made on the basis that the proposed generation capacity is <10MW and although >1ha it consists of PV panels and is in an urban area (EIA Regulations amendment April 2017 -listed Activities)

We received the following information from SOLARRESERVE:

1. KMZ file of site outline "Vogelstruisfontein – site outline"
2. Biodiversity Assessment (The Biodiversity Company, 2017)
3. Pdf file of proposed layout
4. Jpeg map of site outline and grid connection (Figure 1)
5. Vogelstruisfontein Project Description



Figure 1. Site outline and route of grid connection.

The project will consist of the following:

- The Vogelstruisfontein site is proposed to include several arrays of PV solar panels (27,600) as well as utility scale integrated flow batteries with a combined export capacity limit of 9.9 MWac.
- The project will be constructed on a smaller, 16.616ha portion “leased area” cut out of the Vogelstruisfontein Farm portion 4
- The Vogelstruisfontein Project will have a contracted capacity of 9.9MW AC. The site identified for the PV Solar with integrated storage project is proposed to accommodate both the solar PV panels, utility scale vanadium flow batteries as well as the associated infrastructure required for such a facility including, but not limited to:
 - PV array comprising of the photovoltaic modules/panels, mounting structures and associated balance of system (tracking/fix hardware, protection systems i.e. masts and electronica);
 - Vanadium flow batteries housed in 40 ft. containers consisting of cell stacks and vanadium electrolyte contained in tanks with all associated balance of plant (piping, pumps, and control equipment).
 - Inverters, transformers and switchgear with battery storage;
 - An on-site substation consisting of a 40ft container split with Project and City Power equipment in each respective section of the substation. 33KV Power line buried from City Power (USF on-site) substation to option a) Florida substation or option b) Sentraal substation connecting into City Power’s 33KV;
 - Cabling between the project components;
 - Prefabricated housing for administration offices, security and guard houses, maintenance and storage;
- Temporary man-camp; Temporary laydown areas; Raw water tank;
- Project primary and/or secondary access road/s, associated access point/s, internal distribution roads and crossings; and
- Fencing and perimeter security system around the project development footprint, and all other necessary related infrastructure.

2. Methods

We reviewed the available documentation to assess the risk to avifauna at the site. In addition to the information supplied by SOLARRESERVE we consulted; the First and Second Southern African Bird Atlas Projects data for the area (www.mybirdpatch.adu.org.za); the Important Bird & Biodiversity Area data (Marnewick *et al*, 2015); Google Earth imagery; the “GDARD requirements for Biodiversity Assessments Version 3”; and the 2017 “Birds & Solar Energy: Guidelines for assessing and

monitoring the impact of solar power generating facilities on birds in southern Africa” by BirdLife South Africa.

3. Findings

Key findings of the Biodiversity Assessment (The Biodiversity Company 2017) relevant to avifauna are:

- Site falls in the Endangered Soweto Highveld Grassland vegetation type.
- However site is highly degraded and encroached by alien invasive species.
- The extent and conservation value of grassland can only be determined following a wet season survey.
- The eastern boundary overlaps with a CBA, other CBA and ESA exist within 500m. (Gauteng Conservation Plan ‘C-Plan’ v3.3 -2014). ESAs are required to be maintained in an ecologically functional state to support Critical Biodiversity Areas and/or Protected Areas.
- The likelihood of faunal species of conservation concern occurring on site was low.
- The significance of potential impacts on faunal communities was rated as low.
- Avifauna was considered by this assessment. Seventeen bird species, none of any conservation concern, were recorded on site by the field assessment. Although not recorded by the assessment, 4 Red List bird species were identified as having moderate likelihood of occurrence on site: White-bellied Korhaan *Eupodotis senegalensis*, Abdim’s Stork *Ciconia abdimii*, Black-winged Pratincole *Glareola nordmanii* and Lanner Falcon *Falco biarmicus*.

Our own desktop findings are as follows:

- The proposed site is not in an Important Bird & Biodiversity Area (Marnewick *et al*, 2015), the closest being approximately 15km north of site.
- Approximately 344 bird species have been recorded in the broader area within which this site is located by the First and Second Southern African Bird Atlas Project (www.mybirdpatch.adu.org.za). Of these 18 species are Red Listed. This does not mean that all these species utilise the proposed site, but they could possibly occur there if conditions are right.
- The site is almost entirely surrounded by residential and industrial development.
- Our own judgement is that none of the above described Red Listed species are likely to occur on the site. The site appears to be highly impacted and degraded.
- Although this report is not a full specialist study we feel it important for the project to comply with the “GDARD requirements for Biodiversity Assessments Version 3” which state:
 - “The SOC (Specialist Ornithological Consultant) must determine whether the proposed development site falls within the known or expected distribution of any of

the following Red List bird species prioritized by GDARD:- Cape Vulture, Blue Crane, Lesser Kestrel, African Grass-Owl, African Marsh-Harrier, White-backed Night-Heron, White-bellied Korhaan, Martial Eagle, African Finfoot, Lesser Flamingo, Secretarybird, Black Stork, Half-collared Kingfisher and Greater Flamingo.

- The SOC must determine whether suitable habitat occurs on the proposed development site or neighbouring properties for the priority Red List species whose distribution overlaps with the proposed development site.
- Where distribution and habitat availability suggest a high probability of one or more priority Red List bird species occurring on site, the SOC must map suitable habitat (see *Sensitivity Mapping rules for Biodiversity Assessments* (spatial rules for birds) and indicate the number of individuals/pairs that could potentially be supported, given that it is unlikely that all birds will be located during a limited survey.
- Given that we believe there is no likelihood of any of these priority species occurring on site we recommend that there is no need for a full avifaunal specialist study to be conducted.
- The BirdLife SA Guidelines state: "These guidelines are aimed at all SEFs that require environmental authorisation for electricity generation. These guidelines are not intended for small-scale, distributed solar facilities." Reading this in conjunction with the conclusion in Section 1 that environmental authorisation for the proposed solar generation is not needed, we conclude that this project does not need to comply with the BirdLife Guidelines.

4. Conclusion

We conclude that the proposed site is severely degraded and does not offer suitable habitat to any Red Listed or otherwise priority bird species. We do not believe it necessary to conduct a full avifaunal impact assessment for this site.



5. References

GDARD. 2014. GDARD Requirements for Biodiversity Assessments Version 3.

GDARD. 2014. Technical Report for the Gauteng Conservation Plan (Gauteng C-Plan v3.3). Gauteng Department of Agriculture and Rural Development: Nature Conservation Directorate. 60 pages.

Jenkins, A.R., Ralston-Paton, S., & Smit-Robinson, H. 2017. Best Practice Guidelines: Birds and Solar Energy: Guidelines for assessing and monitoring the impact of solar power generating facilities on birds in southern Africa.

Marnewick MD, Retief EF, Theron NT, Wright DR, Anderson TA. 2015. Important Bird and Biodiversity Areas of South Africa. Johannesburg: BirdLife South Africa.

The Biodiversity Company. 2017. Biodiversity Assessment for the proposed Vogelstruisfontein Photovoltaic PV Plant. Unpublished report submitted to Mott MacDonald.

www.mybirdpatch.adu.org.za).

