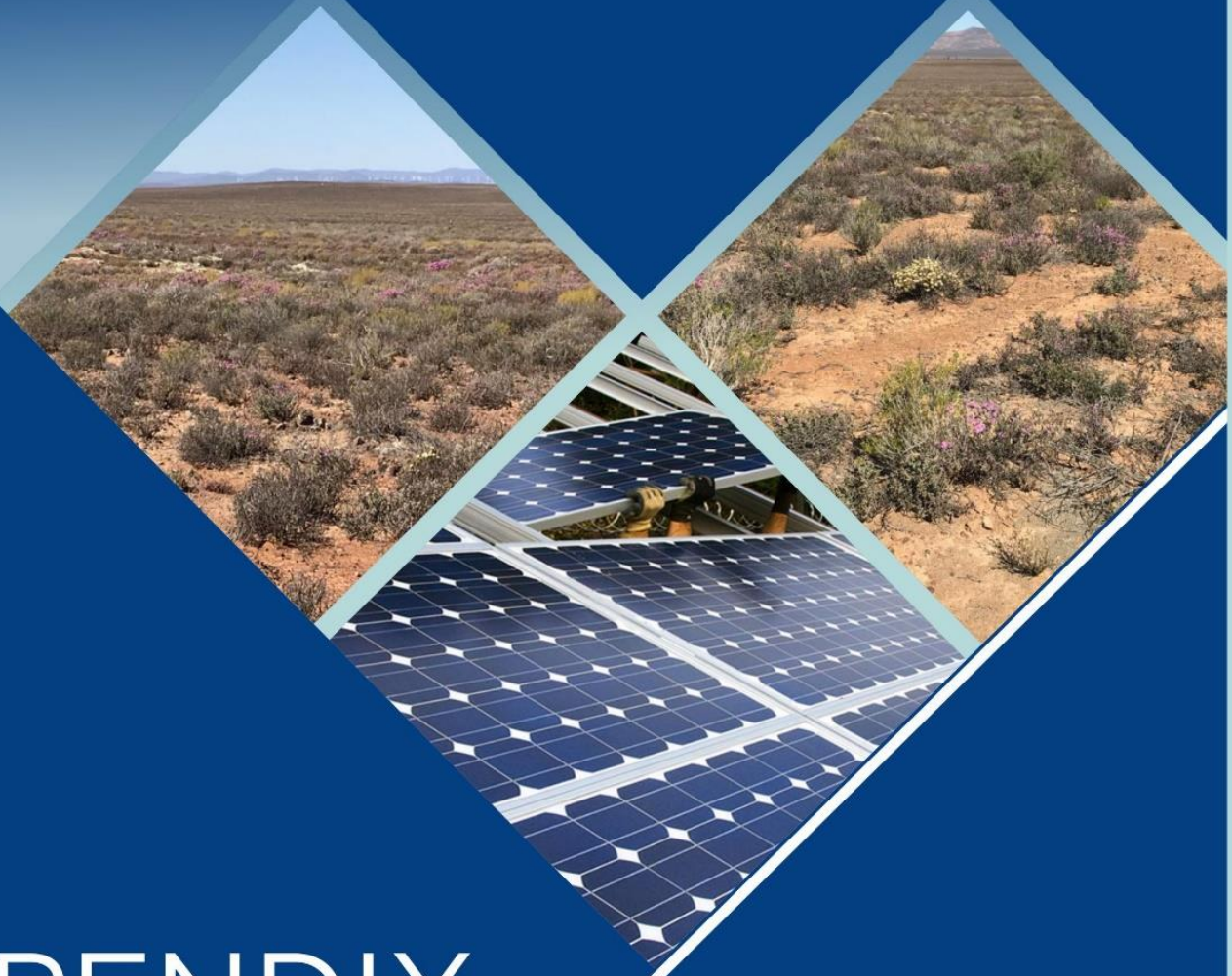
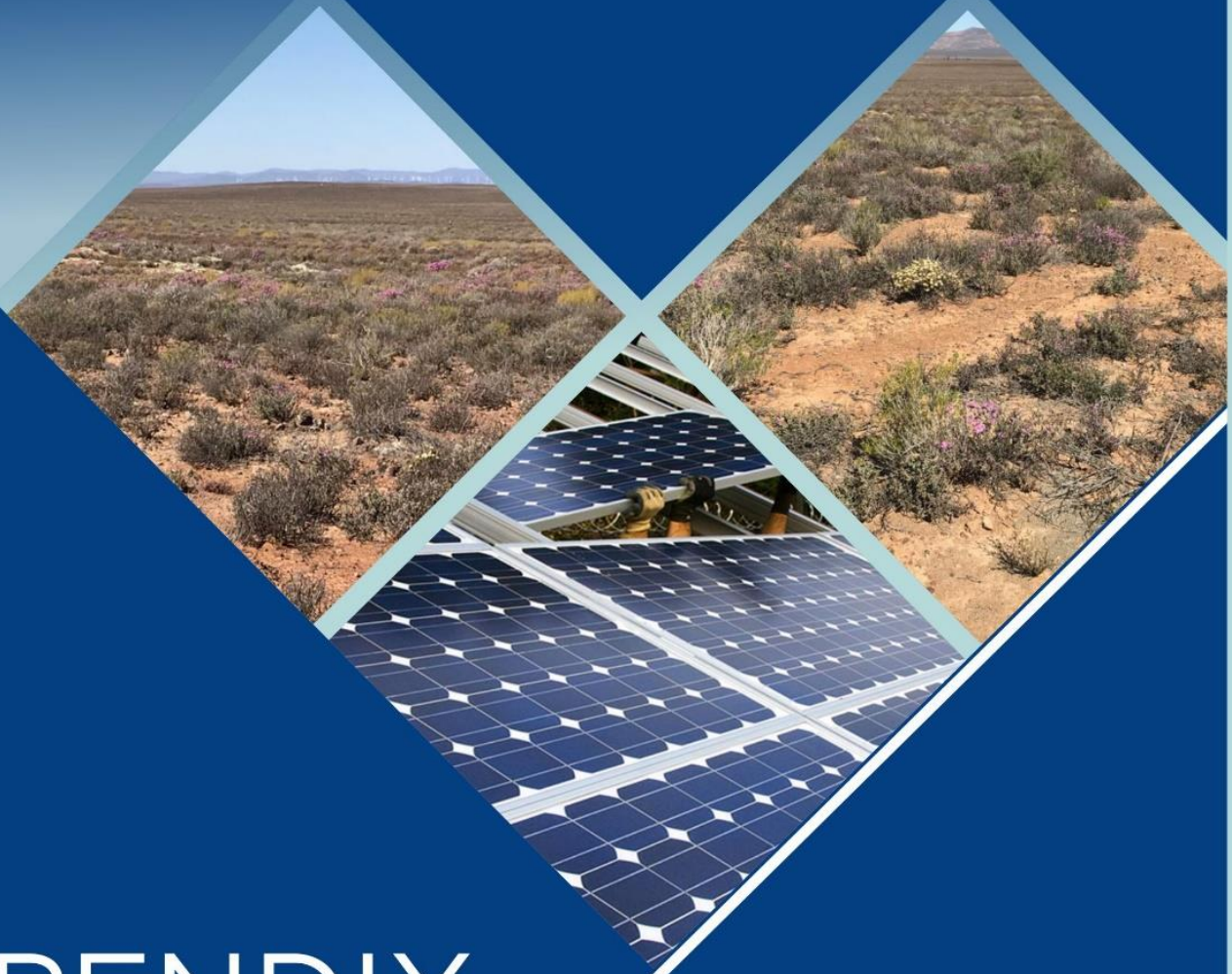
Basic Assessment for the Proposed Development of three 175 MW Solar Photovoltaic Facilities and associated Infrastructure (i.e. Grootfontein PV 1, Grootfontein PV 2, and Grootfontein PV 3), near Touws River, Western Cape



APPENDIX G

Environmental Management Programme (EMPr)

Basic Assessment for the Proposed Development of three 175 MW Solar Photovoltaic Facilities and associated Infrastructure (i.e. Grootfontein PV 1, Grootfontein PV 2, and Grootfontein PV 3), near Touws River, Western Cape



APPENDIX G.1

Environmental Management Programme (EMPr) for Grootfontein PV 1, Grootfontein PV 2, and Grootfontein PV 3 Projects

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1 INTRODUCTION

The Project Developer, Veroniva (PTY) Ltd, is proposing to develop nine 175 MW (9 X 175 MW) Solar Photovoltaic (PV) power generation facilities and associated infrastructure, north-east of Ceres and north of Touws River, in the Western Cape Province. The associated infrastructure includes various structures, buildings and electrical grid infrastructure (EGI) such as, but not limited to, nine 132 kV power lines, nine on-site substations, and nine Lithium Ion Battery Energy Storage Systems (BESS). The proposed nine Solar PV facilities will connect to the national grid at the existing Eskom Kappa Substation. The proposed projects are located within the Witzenberg Local Municipality, which falls within the Cape Winelands District Municipality, and are situated approximately 90 km from Ceres and 70 km from Touws River. Each proposed project will be developed by a separate Project Applicant. The Project Names, Project Applicants, and respective farm portions affected by the proposed PV facilities, EGI and associated infrastructure are shown in Table 1 below. The bold and italicized font in Table 1 indicates the projects that are the subject of this Environmental Management Programme (EMPr).

Table 1: Project Names, Applicants and Affected Farm Portions.

Project Name	Project Applicant	Affected Farm Portions (PV Facility and Associated Infrastructure)	Affected Farm Portions (Power Lines)
Witte Wall PV 1	Witte Wall PV 1 (PTY) LTD	▪ Witte Wall RE/171	▪ Witte Wall RE/171 ▪ Die Brak RE/241 ▪ Platfontein RE/240
Witte Wall PV 2	Witte Wall PV 2 (PTY) LTD		
Grootfontein PV 1	***Grootfontein PV 1 (PTY) LTD***	▪ ***Grootfontein RE/149*** ▪ ***Grootfontein 5/149***	▪ ***Grootfontein RE/149*** ▪ ***Grootfontein 5/149*** ▪ ***Hoek Doornen 1/172*** ▪ ***Witte Wall RE/171*** ▪ ***Die Brak RE/241*** ▪ ***Platfontein RE/240***
Grootfontein PV 2	***Grootfontein PV 2 (PTY) LTD***		
Grootfontein PV 3	***Grootfontein PV 3 (PTY) LTD***		
Hoek Doornen PV 1	Hoek Doornen PV 1 (PTY) LTD	▪ Hoek Doornen 1/172	▪ Hoek Doornen 1/172 ▪ Witte Wall RE/171 ▪ Die Brak RE/241 ▪ Platfontein RE/240
Hoek Doornen PV 2	Hoek Doornen PV 2 (PTY) LTD		
Hoek Doornen PV 3	Hoek Doornen PV 3 (PTY) LTD		
Hoek Doornen PV 4	Hoek Doornen PV 4 (PTY) LTD		

The proposed projects are located entirely within the Komsberg Renewable Energy Development Zone (REDZ 2), one of the eight REDZs formally gazetted in South Africa for the purpose of developing solar and wind energy generation facilities (Government Notice (GN) 114; 16 February 2018). In line with the gazetted process for projects located within a REDZ, the proposed projects are subject to a Basic Assessment (BA) process instead of a full Scoping and Environmental Impact Assessment (EIA) process and a reduced decision making period of 57 days, in terms of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) and the 2014 NEMA EIA Regulations (as amended) promulgated in Government Gazette 40772; in GN R326, R327, R325 and R324 on 7 April 2017.

Approval has been granted by the DEFF to submit combined Applications for Environmental Authorisation (EA) in terms of Regulation 11 (4) of the 2014 NEMA EIA Regulations (as amended), and the issuing of multiple EAs (should they be granted) in terms of Regulation 25 (1) and (2) of the 2014 NEMA EIA Regulations (as amended). Therefore, four separate BA Reports have been compiled, as indicated in Table 2 below, and it is proposed that nine separate EAs will be issued for each PV Facility and associated infrastructure, as well as nine separate EAs for the power lines and associated EGI that are required to support the nine PV Facilities (should they be granted):

Table 2: BA Reporting Structure and Components

	Report 1: Witte Wall Farm	Report 2: Grootfontein Farm	Report 3: Hoek Doornen Farm	Report 4: EGI
BA Reports	Group 1: Witte Wall Farm: 1 BA Report that covers the 2 PV Facilities (i.e. Witte Wall PV 1 and PV 2), 2 on-site substations, 2 Lithium Ion BESS's and all associated infrastructure.	Group 2: Grootfontein Farm: 1 BA Report that covers the 3 PV Facilities (i.e. Grootfontein PV 1, PV 2 and PV 3), 3 on-site substations, 3 Lithium Ion BESS's and all associated infrastructure.	Group 3: Hoek Doornen Farm: 1 BA Report that covers the 4 PV Facilities (i.e. Hoek Doornen PV 1, PV 2, PV 3 and PV 4), 4 on-site substations, 4 Lithium Ion BESS's and all associated infrastructure.	Group 4: EGI to support the PV Facilities: 1 BA Report that covers all the power lines and associated EGI that are required to support the 9 PV Facilities (i.e. 9 Power Lines).

This EMPr has been prepared as part of the requirements of the 2014 NEMA EIA Regulations (as amended) and is being submitted to the National Department of Environment, Forestry and Fisheries (DEFF) as part of the Application for EA for the proposed projects. **As indicated in Table 2, this EMPr covers the proposed Grootfontein PV 1, Grootfontein PV 2 and Grootfontein PV 3 projects only** i.e. the 3 PV Facilities (i.e. Grootfontein PV 1, Grootfontein PV 2 and Grootfontein PV 3), 3 on-site substations, 3 Lithium Ion BESS's and all associated infrastructure**.** Figure 1 shows the overall locality of the proposed Grootfontein PV 1, Grootfontein PV 2 and Grootfontein PV 3 projects.

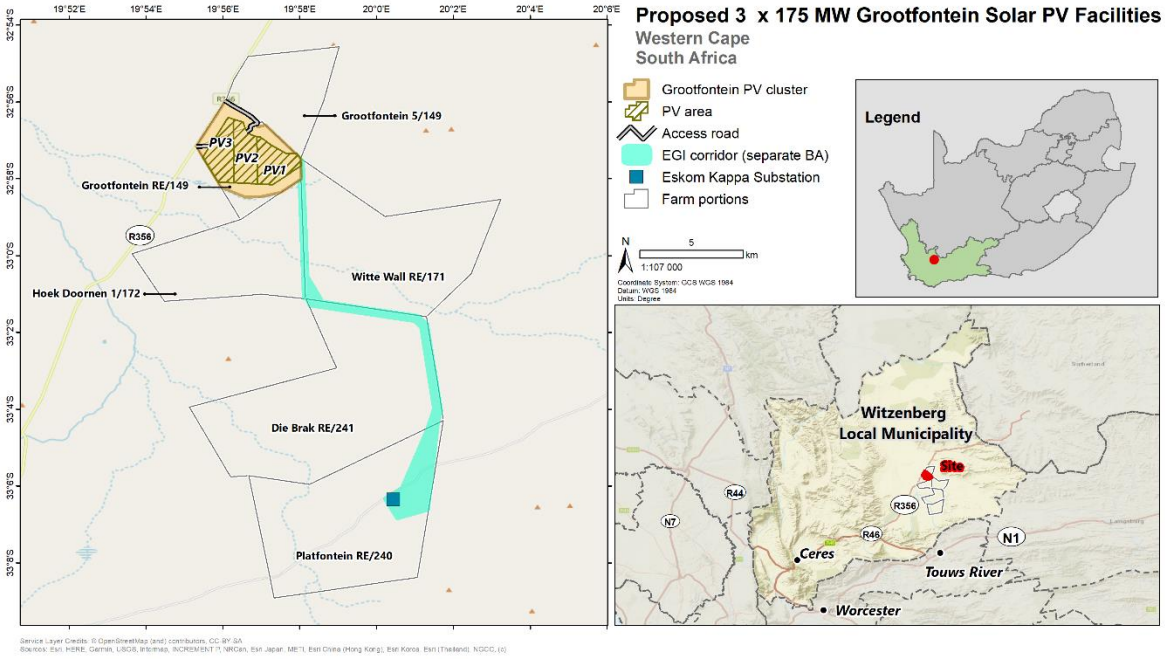


Figure 1: Locality of the Grootfontein PV 1, Grootfontein PV 2 and Grootfontein PV 3 Facilities and associated infrastructure

This EMPr is being made available to Interested and Affected Parties (I&APs), stakeholders and Organs of State, as part of the BA Report, for a 30-day review period. Comments received from stakeholders during this aforementioned review period will be incorporated into this EMPr, where applicable. Following the incorporation of comments from I&APs, stakeholders and Organs of State, this EMPr is intended as a "living" document and should continue to be updated regularly, as needed.

1.1 AUTHORS OF THE EMPr

This EMPr has been compiled by the Environmental Assessment Practitioners (Paul Lochner and Rohaida Abed) and the various specialists on the team (as indicated in Table 3). The details and expertise of the Environmental Assessment Practitioners and the specialists are provided in Appendix C and Appendix E of the BA Report. The Curriculum Vitae of Paul Lochner is also included in Appendix A of this EMPr.

Paul Lochner has more than 26 years of experience in environmental assessment and management studies, primarily in the leadership and integration functions. This has included Strategic Environmental Assessments (SEA), EIAs and Environmental Management Plans. Paul is a Registered EAP (2019/745) with the Environmental Assessment Practitioners Association of South Africa (EAPASA). Paul has extensive experience in conducting environmental assessment and management processes throughout South Africa.

Rohaida Abed has a Masters degree in Environmental Science and is a registered Professional Natural Scientist (Registration Number: 400247/14) with the South African Council for Natural Scientific Professions (SACNASP). She has experience in conducting BAs and Scoping and EIAs for various sectors, including Port infrastructure and Bulk Liquid Storage facilities, and has been involved in various transport infrastructure related projects as an Environmental Control Officer.

Table 3: Details of the BA Team

Name	Organisation	Role/ Specialist Study
CSIR Project Team		
Paul Lochner (*Registered EAP (2019/745)*)	CSIR	EAP and Project Leader
Rohaida Abed (*Pr.Sci.Nat.*)	CSIR	Project Manager
Dhiveshni Moodley (*Cand.Sci.Nat.*)	CSIR	Project Officer
Luanita Snyman-van der Walt (*Pr.Sci.Nat.*)	CSIR	Project Mapping
Lizande Kellerman (*Pr.Sci.Nat.*)	CSIR	Project Specialist
Specialists		
Johann Lanz (*Pr.Sci.Nat.*)	Private	Agricultural Compliance Statement
Quinton Lawson	Quinton Lawson Architect (QARC)	Visual Impact Assessment
Bernard Oberholzer	Bernard Oberholzer Landscape Architect (BOLA)	
Dr. Jayson Orton	ASHA Consulting	Heritage Impact Assessment (Archaeology, Cultural Landscape and Palaeontology)
Dr. John Almond	Natura Viva cc	
Simon Bundy (*Pr.Sci.Nat.*), Luke Maingard and Alex Whitehead (*Pr.Sci.Nat.*)	Sustainable Development Projects cc	Terrestrial Biodiversity and Species Impact Assessment

Name	Organisation	Role/ Specialist Study
Simon Todd (*Pr.Sci.Nat.*)	3Foxes Biodiversity Solutions	Riverine Rabbit
Simon Bundy (*Pr.Sci.Nat.*), Luke Maingard and Alex Whitehead (*Pr.Sci.Nat.*)	Sustainable Development Projects cc	Aquatic Biodiversity and Species Impact Assessment
Chris van Rooyen and Albert Froneman (*Pr.Sci.Nat.*)	Chris van Rooyen Consulting	Avifauna Impact Assessment
Sandra Hill	Private	Socio-Economic Impact Assessment
Charl Muller	GEOSS South Africa (PTY) Ltd	Geohydrology Assessment
Lizande Kellerman (*Pr.Sci.Nat.*), Rohaida Abed (*Pr.Sci.Nat.*), Luanita Snyman-van der Walt (*Pr.Sci.Nat.*)	CSIR	Civil Aviation Site Sensitivity Verification
Lizande Kellerman (*Pr.Sci.Nat.*), Rohaida Abed (*Pr.Sci.Nat.*), Luanita Snyman-van der Walt (*Pr.Sci.Nat.*)	CSIR	Defence Site Sensitivity Verification
Technical Input		
Annebet Krige *Pr Eng*	Sturgeon Consulting	Traffic Impact Statement

1.2 PROJECT DESCRIPTION

It is important to point out at the outset that the exact specifications of the proposed project components will be determined during the detailed engineering phase (subsequent to the issuing of EAs, should they be granted for the proposed projects).

The proposed three 175 MW Solar PV facilities (i.e. Grootfontein PV 1, Grootfontein PV 2 and Grootfontein PV 3) will each cover an approximate area of 250 hectares (ha). This excludes access roads leading to the site. The specialists assessed larger areas on the affected farm portions in order to avoid environmental constraints and sensitivities (highlighted by the specialists), during the siting and final design of the facilities and associated infrastructure.

The proposed projects will make use of PV technology to generate electricity from solar energy. Once a Power Purchase Agreement (PPA) is awarded, the proposed facility will generate electricity for a minimum period of 20 years. The construction phase for each proposed project is expected to extend 12 to 14 months. The proposed solar facilities will **each** consist of the following components (i.e. the project components are the same for Grootfontein PV 1, Grootfontein PV 2 and Grootfontein PV 3, except where specified):

- Solar Field, comprising Solar Arrays with a maximum height of 10 m and maximum footprint of 250 hectares, including the following:
    - PV Modules;
    - Single Axis Tracking structures (aligned north-south), Fixed Axis Tracking (aligned east-west), Dual Axis Tracking (aligned east-west and north-south), Fixed Tilt Mounting Structure or Bifacial Solar Modules;
    - Solar module mounting structures comprised of galvanised steel and aluminium; and
    - Foundations which will likely be drilled and concreted into the ground.
- Building Infrastructure:
    - Offices (maximum height 7 m and footprint of 1000 m^2);

  - Operational and maintenance control centre (maximum height 7 m and footprint 500 m^2);
  - Warehouse/workshop (maximum height 7 m and footprint 500 m^2);
  - Ablution facilities (maximum height 7 m and footprint 50 m^2);
  - Converter/inverter stations (height from 2.5 m to 7 m (maximum) and footprint 2500 m^2);
  - **On-site substation and/or a switching substation (footprint 20 000 m^2); and**
  - Guard Houses (height 3 m, footprint 40 m^2).
- Associated Infrastructure:
  - **On-site substation and/or a switching substation (the relevant section that will be maintained by the Independent Power Producer);**
  - Internal 33 kV power lines/underground cables (either underground to a maximum depth of 1.6 m or above ground with a height of 9 m);
  - Lithium Ion BESS that will cover an area of up to 8 hectares (within the laydown area) and a height of up to 5 – 10 m;
  - Underground low voltage cables or cable trays (underground to maximum depth of 1.4 m);
  - Access roads ranging between 4 - 8 m wide.
  - Internal gravel roads (width of 4 - 5 m);
  - Fencing (between 2 – 3 m high) around the PV Facilities;
  - Game fencing around each PV Facility;
  - Panel maintenance and cleaning area;
  - Storm water channels; and
  - Construction work area (i.e. laydown area of maximum 13 ha).

The on-site substation and/or switching substation has two sections, as follows:

- High voltage infrastructure leading up to the Point of Connection (i.e. the Project Applicant's section of the proposed on-site substations, planned to be 33 kV) which is covered in the BA Processes for the PV Facilities; and
- High voltage infrastructure extending from the Point of Connection (i.e. Eskom's section of the proposed on-site substations, planned to be 132 kV) up to the line bay at the Eskom Kappa Substation, which is covered in the separate BA Process for the EGI.

Based on the above, the following EMPRs are provided in the package of BA Reports for the PV and EGI:

- EMPR for the PV facility and associated infrastructure, including the 33 kV underground power lines that connects the PV array to the on-site substation. **<u>This EMPr is in Appendix G.1 of this BA Report (i.e. this report).</u>**

  - EMPr for the high voltage infrastructure at the on-site substation leading up to the Point of Connection (i.e. the Project Applicant's section of the proposed on-site substations and/or a switching substations) to be located at the proposed Grootfontein PV 1, Grootfontein PV 2 and Grootfontein PV 3 facilities. **This EMPr is included in Appendix G.2 of the BA Report (i.e. Report 2 for the Grootfontein Farm, as indicated in Table 2), and it**

complies with the Generic EMPr published for substation development (Government Gazette 42323, GN 435, dated 22 March 2019).

- EMPr for the high voltage infrastructure at the on-site substation extending from the Point of Connection (i.e. Eskom's section of the proposed on-site substations and/or a switching substations) to be located at the proposed Grootfontein PV 1, Grootfontein PV 2 and Grootfontein PV 3 facilities. **This EMPr is included in Appendix H of the separate BA Report for the EGI (i.e. Report 4 for the EGI, as indicated in Table 2), and it complies with the Generic EMPr published for substation development (Government Gazette 42323, GN 435, dated 22 March 2019).**

- EMPr for the power lines (planned to be 132 kV) that will enable the nine proposed PV Facilities to connect to the Eskom Kappa Substation, including upgrades and associated infrastructure at the Kappa Substation (as required). **This EMPr is included in Appendix G of the separate BA Report for the EGI (i.e. Report 4 for the EGI, as indicated in Table 2), and it complies with the Generic EMPr published for power line development (Government Gazette 42323, GN 435, dated 22 March 2019).**

The proposed project can be divided into the following three main phases:

- Construction Phase;
- Operational Phase; and
- Decommissioning Phase.

Each activity undertaken as part of the above phases may have environmental impacts and, where applicable, has been assessed in the specialist studies (included in Appendix C of this BA Report). Management and mitigation measures required to address all the impacts are included within this EMPr.

The construction phase will take place subsequent to the issuing of the EAs from the DEFF and a successful BID in terms of the Renewable Energy Independent Power Producer Programme (REIPPPP) (i.e. the issuing of a PPA).

The main activities that will form part of the construction phase per project are:

- Removal of vegetation for the proposed infrastructure, where necessary;
- Excavations for infrastructure and associated infrastructure;
- Establishment of a laydown area for equipment;
- Stockpiling of topsoil and cleared vegetation, where necessary;
- Creation of employment opportunities;
- Transportation of material and equipment to site, and personnel to and from site; and
- Construction of the solar field, and additional infrastructure.

The following activities will occur during the operational phase per PV project:

- The generation of electricity from the proposed solar facility; and
- Maintenance of the solar field and associated infrastructure.

During the life span of the proposed projects (approximately 20 years each), on-going maintenance will be required on a scheduled basis.

Should it be decided not to extend the operational lifespan of the project beyond 20 years, the project will be decommissioned. The main aim of decommissioning is to return the land to its original, pre-construction condition. Should the unlikely need for decommissioning arise (i.e. if the facility becomes outdated or the land needs to be used for other purposes), the decommissioning procedure will involve removing the solar panels and associated infrastructures, and covering the concrete footings with soil to a depth sufficient for the re-growth of natural vegetation. Whether all components of the solar facility will be removed still needs to be agreed upon with the landowner (some components may be useful for the landowner and therefore it could be decided that those remain on site). Any other supporting infrastructure no longer in use will be removed from the site and either disposed of at a registered disposal facility or recycled if possible.

It should be noted that a detailed project description (based on the conceptual design) is provided in Section A of the BA Report.

1.3 ENVIRONMENTAL SENSITIVITIES

Section D of the BA Report provides a description of the environmental features and sensitive areas that were identified by the specialists for consideration in the layout and location of the proposed project. Refer to the specialist studies in Appendix C of the BA Report for details on the environmental sensitivities identified.

The preferred site for the proposed Grootfontein PV 1, Grootfontein PV 2 and Grootfontein PV 3 projects include approximately 1230 ha of land (as shown in Figure 1), however the proposed solar facilities and associated infrastructure each require a development area of approximately 250 ha only. The larger 1230 ha area was considered and assessed by the specialists in order to ensure that any development constraints or environmental sensitivities can be avoided in the final siting and location of the proposed facility.

Based on the findings of the specialist studies, an environmental sensitivity map has been produced. This map shows the sensitivities on site (e.g. terrestrial, aquatic, avifaunal, visual, agricultural, and heritage features) within the larger assessed area that was identified. Based on this map, the preferred location for the Grootfontein PV 1, Grootfontein PV 2 and Grootfontein PV 3 facilities, avoids the sensitive features that were identified by the specialists. Based on the boundaries of the assessed area and the constraints of the environmental sensitivities, a site layout has also been preliminarily determined for this project (Appendix E of this EMPr).

Appendix F of this EMPr includes the environmental sensitivity map which indicates the environmental sensitive areas and features identified during the BA Process (as described above), which is combined with the site layout.

1.4 IMPACTS IDENTIFIED DURING THE BA PROCESS

Based on the specialist studies (as shown in Table 3), the following main direct potential impacts, as indicated in Table 4, were identified and appropriate management and mitigation measures included within the EMPr (where required) to ensure the potential impacts are suitably addressed and managed during all phases of the project. Indirect and cumulative impacts are noted in Sections 4 to 10 of this EMPr.

It should be noted that other impacts for which specialist studies were not undertaken but where mitigation or management actions may be required, are also included in the EMPr.

Table 4: Impacts identified in the BA Process

KEY IMPACT	IMPACTS IDENTIFIED
Agriculture	▪ Loss of agricultural land use ▪ Soil degradation
Visual	**Construction Phase** ▪ Impact 1: Potential effect of dust and noise from trucks and construction machinery during the construction period, and the effect of this on residents and visitors to the area, particularly users of the main arterial route (R356), to the site. ▪ Impact 2: Potential visual effect of haul roads, access roads, stockpiles and construction camps in the exposed landscape. **Operational Phase** ▪ Impact 1: Potential visual intrusion of solar arrays and related infrastructure and the impact on receptors, including residents and visitors, as well as game farms in the area. ▪ Impact 2: Potential visual impact of an industrial type activity on the rural or wilderness character of the area. **Decommissioning Phase** ▪ Impact 1: Potential visual effect of any remaining structures, platforms and disused roads on the landscape.
Heritage and Cultural Landscape	**Construction Phase** ▪ Potential impacts to archaeological resources and graves ▪ Potential impacts to the cultural landscape **Operational and Decommissioning Phase** ▪ Potential impacts to the cultural landscape
Palaeontology	**Construction Phase** ▪ Disturbance, damage or destruction of fossils within the development footprint due to excavations and surface clearance
Terrestrial Biodiversity and Species	**Construction Phase** ▪ Impact 1: Alteration of habitat structure and composition ▪ Impact 2: Ousting (and recruitment) of various fauna ▪ Impact 3: Changes in the geomorphological state of drainage patterns ▪ Impact 4: Increased Electrical Light Pollution (ELP) ▪ Impact 5: Exclusion or entrapment of (in particular) large fauna ▪ Impact 6: Changes in edaphics (soils) due to excavation and import of soils, leading to the alteration of plant communities and fossorial species in and around these points ▪ Impact 7: Changes in subsurface water resources arising from alteration of percolation and recharge at points ▪ Impact 8: Changes in water resources and surface water in terms of water quality ▪ Impact 9: Exotic weed invasion ▪ Impact 10: Clearance of vegetation to establish roadways and other infrastructure ▪ Impact 11: Dust – according to movement of traffic and other construction related factors will affect factors such as palatability of vegetation

KEY IMPACT	IMPACTS IDENTIFIED
	▪ Impact 12: Incidental pollution events, including the loss of solid waste, spillage of liquids such as hydrocarbons and other fuels as well as possible sewerage and other waste is likely to alter select points within the subject site, possibly affecting habitat form and other factors ▪ Impact 13: General disturbance on account of pedestrian movement and activities on site **Operational Phase** ▪ Impact 14: Continued alteration of habitat structure and composition on account of continuing low level anthropogenic impacts, such as "shading of vegetation" from arrays ▪ Impact 15: Ousting (and recruitment) of various fauna on account of long-term changes in the surrounding habitat/environment ▪ Impact 16: Changes in the geomorphological state of the subject site on account of long-term climatic changes and the concomitant change in the nature of the catchment arising from the land use change ▪ Impact 17: Changes in water resources and water quality (i.e. impact on water chemistry) as a result of operational activities ▪ Impact 18: Exotic weed invasion as a consequence of regular and continued disturbance of site **Decommissioning Phase** ▪ Impact 19: A reversion to an early seral stage ▪ Impact 20: A reversion to present faunal population states within the study area, with some variation to these populations being possible ▪ Impact 21: Changes in the geomorphological state of drainage lines as hydraulic changes arise within the catchment ▪ Impact 22: Exotic weed invasion as a consequence of abandonment of site and cessation of weed control measures
Aquatic Biodiversity and Species	**Construction Phase** ▪ Impact 1: Changes in the geomorphological state of drainage patterns ▪ Impact 2: Increased ELP ▪ Impact 3: Changes in water resources and surface water in terms of water quality **Operational Phase** ▪ Impact 4: Changes in the geomorphological state of the subject site on account of long-term climatic changes and the concomitant change in the nature of the catchment arising from the land use change ▪ Impact 5: Changes in water resources and water quality (i.e. impact on water chemistry) as a result of operational activities **Decommissioning Phase** ▪ Impact 6: A reversion to present faunal population states within the study area, with some variation to these populations being possible ▪ Impact 7: Changes in the geomorphological state of drainage lines as hydraulic changes arise within the catchment
Riverine Rabbit	**Construction Phase** ▪ Impact on Riverine Rabbits due to construction phase activities (i.e. Habitat loss and disturbance) **Operational Phase** ▪ Impact on Riverine Rabbits due to operational phase activities (i.e. Disturbance and vehicle collisions)
Avifauna Assessment	**Construction Phase** ▪ Impact 1: Displacement due to disturbance associated with the construction of the solar PV plants and associated infrastructure **Operational Phase** ▪ Impact 1: Total or partial displacement of avifauna due to habitat transformation associated with the presence of the solar PV plants and associated infrastructure ▪ Impact 2: Mortality through collisions with the solar panels ▪ Impact 3: Entrapment of medium and large terrestrial birds between the perimeter fences, leading to mortality. ▪ Impact 4: Electrocution of priority species on the internal 33kV power lines

KEY IMPACT	IMPACTS IDENTIFIED
	Decommissioning Phase ▪ Impact 1: The noise and movement associated with the activities at the study area will be a source of disturbance which would lead to the displacement of avifauna from the area
Socio-Economic	**Construction Phase** ▪ Impact 1: Disruption of local social structures ▪ Impact 2: Increased social ills and risky behaviours ▪ Impact 3: Increased burden on existing social and bulk services ▪ Impact 4: Increased road use and road traffic related accidents and/or damage ▪ Impact 5: Unrealistic expectations regarding local job creation ▪ Impact 6: Creation of temporary employment ▪ Impact 7: Increased household income attainment and standard of living ▪ Impact 8: Potential increase in crime ▪ Impact 9: Potential decrease in local tourism ▪ Impact 10: Potential marginalisation of local residents ▪ Impact 11: Development and/or growth of locally-owned industries **Operational Phase** ▪ Impact 1: Creation of long-term employment ▪ Impact 2: Development and/or growth of locally-owned industries ▪ Impact 3: Human development via the Economic Development Plan (EDP) **Decommissioning Phase** ▪ Impact 1: Job losses ▪ Impact 2: Local economy stimulation
Geohydrology	**Construction Phase** ▪ Lowering of groundwater levels as a result of over-abstraction ▪ Potential impact on groundwater quality as a result of accidental oil spillages or fuel leakages **Operational Phase** ▪ Lowering of groundwater levels as a result of over-abstraction ▪ Potential impact on groundwater quality as a result of using cleaning agents
Traffic[1]	**Construction and Decommissioning Phases** ▪ Potential congestion and delays on the surrounding road network ▪ Potential impact on traffic safety and increase in accidents with other vehicles or animals ▪ Deterioration in the quality of the surface condition of the roads ▪ Potential dust pollution as a result of the construction and decommissioning phase vehicles ▪ Potential noise pollution as a result of the construction and decommissioning phase vehicles

[1] The Traffic Impact Statement is not a specialist study in terms of Appendix 6 of the EIA Regulations; however, it provides a general description of the potential traffic impacts.

2 APPROACH TO PREPARING THE EMPr

2.1 COMPLIANCE WITH RELEVANT LEGISLATION

In terms of legal requirements, a crucial objective of the EMPr is to satisfy the requirements of Appendix 4 of the 2014 NEMA EIA Regulations (as amended i.e. GN R326 dated 7 April 2017), and Section 24N of the NEMA. These regulations regulate and prescribe the content of the EMPr and specify the type of supporting information that must accompany the submission of the report to the authorities. An overview of where the requirements are addressed in this EMPr is presented in Tables 5 and 6.

Table 5: Compliance with Section 24N of NEMA

Requirements of Section 24N of NEMA	Where it is included in this EMPr?
2) The environmental management programme must contain- a) information on any proposed management, mitigation, protection or remedial measures that will be undertaken to address the environmental impacts that have been identified in a report contemplated in subsection 24(1A), including environmental impacts or objectives in respect of: (i) planning and design; (ii) pre-construction and construction activities; (iii) the operation or undertaking of the activity in question; (iv) the rehabilitation of the environment; and (v) closure, if applicable;	Columns detailing the impact description, mitigation and management objectives, and mitigation and management actions in Sections 4 to 10 of this EMPr.
b) details of- (i) the person who prepared the environmental management programme; and (ii) the expertise of that person to prepare an environmental management programme;	Section 1.1 and Appendix A of this EMPr. In addition, Appendix E of the BA Report
c) a detailed description of the aspects of the activity that are covered by the environmental management programme;	Section 1 and Section 1.2
d) information identifying the persons who will be responsible for the implementation of the measures contemplated in paragraph (a);	Columns in Section 4 to 10 of the EMPr regarding the monitoring responsibility, including the requirements for monitoring and reporting on compliance and the responsible parties noted in Section 3.
e) information in respect of the mechanisms proposed for monitoring compliance with the environmental management programme and for reporting on the compliance;	The columns detailing the mitigation and management actions, and the monitoring methodology, frequency and responsibility in Sections 4 to 10 of this EMPr.
f) as far as is reasonably practicable, measures to rehabilitate the environment affected by the undertaking of any listed activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development; and	Sections 4 to 10 of this EMPr, as applicable to the post-construction, rehabilitation phase and the decommissioning phase.
g) a description of the manner in which it intends to- (i) modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) remedy the cause of pollution or degradation and migration of pollutants; and (iii) comply with any prescribed environmental management standards or practices.	The columns detailing the mitigation and management objectives, mitigation and management actions, and the monitoring methodology, frequency and responsibility in Sections 4 to 10 of this EMPr.
3) The environmental management programme must, where appropriate- a) set out time periods within which the measures contemplated in the environmental management programme must be implemented; b) contain measures regulating responsibilities for any environmental damage, pollution, pumping and treatment of polluted or extraneous	The columns detailing the mitigation and management actions, and the monitoring methodology, frequency and responsibility in Sections 4 to 10 of this EMPr. Section 9 of this EMPr includes an Environmental Awareness Plan.

Requirements of Section 24N of NEMA	Where it is included in this EMPr?
water or ecological degradation which may occur inside and outside the boundaries of the operations in question; and c) develop an environmental awareness plan describing the manner in which- (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment.	
5) The Minister, the Minister responsible for mineral resources or an MEC may call for additional information and may direct that the environmental management programme in question must be adjusted in such a way as the Minister, the Minister responsible for mineral resources or the MEC may require.	Not applicable at this stage.
6) The Minister, the Minister responsible for mineral resources or an MEC may at any time after he or she has approved an application for an environmental authorisation approve an amended environmental management programme.	Not applicable at this stage.
7) The holder and any person issued with an environmental authorisation- a) must at all times give effect to the general objectives of integrated environmental management laid down in section 23; b) must consider, investigate, assess and communicate the impact of his or her prospecting or mining on the environment; c) must manage all environmental impacts (i) in accordance with his or her approved environmental management programme, where appropriate; and (ii) as an integral part of the prospecting or mining, exploration or production operation, unless the Minister responsible for mineral resources directs otherwise; d) must monitor and audit compliance with the requirements of the environmental management programme; e) must, as far as is reasonably practicable, rehabilitate the environment affected by the prospecting or mining operations to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development; and f) is responsible for any environmental damage, pollution, pumping and treatment of polluted or extraneous water or ecological degradation as a result of his or her operations to which such right, permit or environmental authorisation relates.	Throughout the EMPr
8) Notwithstanding the Companies Act, 2008 (Act No. 71 of 2008), or the Close Corporations Act, 1984 (Act No. 69 of 1984), the directors of a company or members of a close corporation are jointly and severally liable for any negative impact on the environment, whether advertently or inadvertently caused by the company or close corporation which they represent, including damage, degradation or pollution.	Section 3 and Appendix B of this EMPr details the responsibility of the Project Applicant.

Table 6: Compliance with Appendix 4 of the 2014 NEMA EIA Regulations (as amended)

Requirements of Appendix 4 of the 2014 NEMA EIA Regulations (as amended on 7 April 2017 in GN R326)	Where it is included in this EMPr?
1. (1) An EMPr must comply with section 24N of the Act and include: a) details of: (i) the EAP who prepared the EMPr; and (ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae;	Section 1.2 and Appendix A of this EMPr, and Appendix E of the **BA Report**. Appendix C of the **BA Report** includes the Curriculum Vitae of the specialists as well.
b) a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Section 1.2
c) a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;	Appendix F of this EMPr

Requirements of Appendix 4 of the 2014 NEMA EIA Regulations (as amended on 7 April 2017 in GN R326)	**Where it is included in this EMPr?**
d) a description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including: (i) planning and design; (ii) pre-construction activities; (iii) construction activities; (iv) rehabilitation of the environment after construction and where applicable post closure; and (v) where relevant, operation activities;	Columns detailing the impact description, mitigation and management objectives, and mitigation and management actions in Sections 4 to 10 of this EMPr.
f) a description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraphs (d) will be achieved, and must, where applicable, include actions to: (i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) comply with any prescribed environmental management standards or practices; (iii) comply with any applicable provisions of the Act regarding closure, where applicable; and (iv) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;	The columns detailing the mitigation and management actions in Sections 4 to 10 of this EMPr.
g) the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	The columns detailing the monitoring methodology in Sections 4 to 10 of this EMPr.
h) the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	The columns detailing the monitoring frequency in Sections 4 to 10 of this EMPr.
i) an indication of the persons who will be responsible for the implementation of the impact management actions;	The columns detailing the monitoring responsibility in Sections 4 to 10 of this EMPr.
j) the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	The columns detailing the mitigation and management actions, and the monitoring methodology and frequency in Sections 4 to 10 of this EMPr.
k) the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	The columns detailing the mitigation and management actions, and the monitoring methodology, frequency and responsibility in Sections 4 to 10 of this EMPr.
l) a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Sections 4 to 10 of the EMPr, including the requirements for monitoring and reporting on compliance and the responsible parties noted in Section 3 and Appendix B.
m) an environmental awareness plan describing the manner in which: (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and	Section 9 of this EMPr.
n) any specific information that may be required by the competent authority.	Not applicable at this stage
(2) Where a government notice *gazetted* by the Minister provides for a generic EMPr, such generic EMPr as indicated in such notice will apply.	Government Notice 435 includes two gazetted generic EMPrs for power lines and substation infrastructure. Separate EMPRs have been compiled in order to comply with Government Notice 435 for the power line and substation components of the proposed projects.

2.2 STRUCTURE AND CONTENTS OF THE EMPr

As noted above, separate EMPRs have been compiled for the power lines and on-site substations, which comply with the Generic EMPr for power line and substation development published in GN 435.

This EMPr covers all infrastructure of the proposed Grootfontein PV 1, Grootfontein PV 2 and Grootfontein PV 3 projects but excludes the management actions for the 132 kV power lines and substation developments.

Where applicable, each section of the EMPr is divided into the following four phases of the project cycle:

- Planning and Design Phase;
- Construction Phase;
- Operational Phase; and
- Decommissioning Phase.

The EMPr includes the findings and recommendations of the BA Process and specialist studies. However, the EMPr is considered a “living” document and must be updated with additional information or actions during the design, construction, operational and decommissioning phases if applicable.

The EMPr follows an approach of identifying an over-arching goal and objectives, accompanied by management actions that are aimed at achieving these objectives (the outcomes). The management actions are presented in a table format in order to show the links between the goal and associated objectives, actions, responsibilities, and monitoring requirements and targets.

The management plans for the design, construction, operational and decommissioning phases consist of the following components:

- **Impact:** The potential positive or negative impact of the development that needs to be enhanced, mitigated or eliminated.
- **Objectives:** The objectives necessary in order to meet the goal; these take into account the findings of the specialist studies.
- **Mitigation/Management Actions**: The actions needed to achieve the objectives of enhancing positive benefits and mitigating or eliminating negative impacts; taking into consideration factors such as responsibility, methods, frequency, resources required and prioritisation.
- **Monitoring**: The key monitoring actions required to check whether the objectives are being achieved, taking into consideration methodology, frequency and responsibility.

In this EMPr, the following spatial parameters apply to the management actions, unless where specified differently:

- The study area is referred to as the larger assessed area (i.e. 1230 ha and greater);
- The site as the footprint of the PV Facility (i.e. approximately 250 ha).

2.3 GOAL FOR ENVIRONMENTAL MANAGEMENT

The overall goal for environmental management for the Grootfontein PV 1, Grootfontein PV 2 and Grootfontein PV 3 projects is to plan, design, construct and operate the project in a manner that:

- Minimises the ecological footprint of the project on the local environment;
- Minimises impacts on fauna, flora and freshwater ecosystems;
- Facilitates harmonious co-existence between the project and other land uses in the area;
- Enhances the socio-economic benefits in the local area; and
- Contributes to the environmental baseline and understanding of environmental impacts of solar energy facility in a South African context.

3 ROLES AND RESPONSIBILITIES

Since the Generic EMPrs are applicable for the on-site substations and power lines, it is best to adopt the definitions of the roles and responsibilities as captured in in the gazetted EMPrs of GN 435. This will allow consistency of the management of the project from an environmental perspective and will avoid any contradiction in terms of the roles and responsibilities.

The generic roles and responsibilities required for key role players are those of the:

- Project Developer / Developer's Project Manager (DPM);
- Developer Site Supervisor (DSS)
- Environmental Control Officer (ECO);
- Developer's Environmental Officer (DEO);
- Contractor; and
- Contractor's Environmental Officer (CEO).

The definitions of the roles and responsibilities are included in Appendix B of this EMPr.

4 ALIEN INVASIVE VEGETATION MANAGEMENT PLAN

Impact	Mitigation/ Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
A. PLANNING AND DESIGN PHASE					
4.1. Impacts due to establishment of alien invasive plants as a result of the project	Ensure the appropriate removal of alien invasive vegetation from the proposed project area and prevent the establishment and spread of alien invasive plants due to the project activities.	4.1.1. Compile an alien vegetation baseline and prepare an alien invasive vegetation management plan. Take into account the relevant legislation, including, but not limited to, the Alien and Invasive Species Regulations under the National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEM: BA)).	▪ Appoint a suitable specialist to compile an alien invasive vegetation management plan. Ensure that this is taken into consideration during the planning and design phase by reviewing signed minutes of meetings or signed reports.	▪ Once-off during the planning and design phase.	▪ ECO
B. CONSTRUCTION PHASE					
4.2. Impacts due to the establishment of and increased spread of alien invasive plants as a result of the project	Avoid establishment and reduce the spread of alien invasive plants due to the project activities.	4.2.1. Appoint a specialist or contractor to undertake a sweep and survey of the final development footprint site. 4.2.2. Establish an ongoing monitoring programme for the construction phase to detect and quantify any alien species that may become established as a result of the project activities and identify the problem species (as per Conservation of Agricultural Resources Act (Act 43 of 1983) (CARA) and NEM: BA).	▪ Appoint a suitable vegetation contractor to inspect the site and document the extent of invasive alien vegetation, which will serve as a baseline. ▪ Prepare a monitoring programme for alien invasive species on the site (i.e. the 250 ha footprint), including mapping of alien invasive species. The results should be interpreted in terms of the risk posed to sensitive habitats within and surrounding the project area.	▪ Prior to the commencement of construction ▪ Once-off	▪ Project Developer, ECO and Specialist Contractor ▪ ECO and Contractor

Impact	Mitigation/ Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		4.2.3. Ensure proper management of soil stockpiles. Do not import soil stockpiles from areas with alien plants to ensure proper management of stockpiles.	▪ Monitor the presence of alien invasive plants during the construction phase via visual inspections and take action to remove and control these species.	▪ On-going	▪ ECO and Contractor
		4.2.4. Undertake rehabilitation of disturbed areas as soon as possible after construction. Stockpile the shallow topsoil layer separately from the subsoil layers. Reinstate the topsoil layers (containing seed and vegetative material) when construction is complete to allow the plants to rapidly re-colonise the bare soil areas.	▪ Rehabilitate disturbed areas and monitor the presence of alien invasive species on site.	▪ On-going	▪ ECO and Contractor
		4.2.5. Keep clearance and disturbance of indigenous vegetation to a minimum.	▪ Monitor and manage vegetation clearing by undertaking visual inspections to ensure minimal disturbance and to restrict activities to the demarcated project footprint.	▪ On-going	▪ ECO and Contractor
		4.2.6. Ensure that the footprint required for the proposed project activities (such as temporary stockpiling, earthworks, storage areas, site establishment etc.) is clearly demarcated and kept at a minimum.	▪ Verify that the proposed project area is determined and demarcated prior to the commencement of the construction phase by undertaking visual inspections.	▪ Once-off prior to construction and as required during the construction process.	▪ ECO and Contractor
		4.2.7. Ensure that the spread of alien invasive vegetation within the project footprint, is immediately controlled and removed promptly, in a scheduled manner throughout the construction phase. The removal of alien vegetation on site during the construction phase should use registered control methods and take into consideration the Alien and Invasive Species Regulations published in terms of Section 97(1) of the NEM: BA, if applicable.	▪ Monitor the presence of alien invasive plants during the construction phase via visual inspections and take action to remove and control these species. Map the distribution of any alien invasive species. The results should be interpreted in terms of the risk posed to sensitive habitats within and surrounding the project area.	▪ On-going	▪ ECO and Contractor

Impact	Mitigation/ Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		4.2.8. The removed alien invasive vegetation should be immediately disposed at a suitable waste disposal facility and should not be kept on site for prolonged periods of time, as this will enhance the spread of these species.	▪ Monitor the removal of the alien vegetation found on site via visual inspections.	▪ As necessary during the construction phase.	▪ ECO
		4.2.9. All construction machinery and plant equipment delivered to site for use during the construction phase should be cleaned in order to limit the introduction of alien species.	▪ Clean machinery and equipment prior to the construction phase. ▪ ECO to conduct visual inspections to verify that machinery and equipment are cleaned, and report any non-compliance.	▪ Prior to the commencement of construction. ▪ As necessary during the construction phase.	▪ ECO and Contractor
C. OPERATIONAL PHASE					
4.3. Impacts due to establishment of alien invasive plants. Exotic weed invasion may result in the ousting of natural vegetation and alteration of ecological processes on site, with incremental impacts on the adjacent veld types.	Reduce the establishment and spread of alien invasive plants. To remove exotic weeds as and when they may arise and thereby prevent alteration of local and adjacent habitat forms.	4.3.1. Continue with on-going monitoring programme to detect and quantify any alien species that may become established and identify the highly invasive species during the operational phase.	▪ Annual audit of project area and immediate surroundings. Map the distribution of any alien invasive species. The results should be interpreted in terms of the risk posed to sensitive habitats within and surrounding the project area.	▪ Annual	▪ Developer's Project Manager
D. DECOMMISSIONING PHASE					
4.4. Exotic weed invasion of the decommissioned site resulting in ecological change Exotic weed invasion.	To reduce the spread of exotic weeds on disturbed lands that formed a portion of the PV facility.	4.4.1. All natural areas must be rehabilitated with species indigenous to the area. Re-seed with locally-sourced seed of indigenous grass species that were recorded on site pre-construction.	▪ Final external audit of area to confirm that area is rehabilitated to an acceptable level.	▪ Once off	▪ Contractor with advice from specialist
		4.4.2. Exotic weed control measures to be instituted through alien invasive vegetation management programme. Regular redress of alien invasive vegetation through the use of herbicide and manual removal.	▪ Compile alien invasive vegetation management programme for a period of 12 months after the decommissioning exercise.	▪ Alien invasive vegetation management programme to be undertaken every 6 months for a period of 12 months	▪ Project Developer ▪ Project Developer ▪ Project Developer and Specialist/ Contractor

Impact	Mitigation/ Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
			▪ Appoint contractor to undertake the alien invasive vegetation management programme. ▪ Monitor newly disturbed areas where infrastructure has been removed to detect and quantify any aliens that may become established after decommissioning and rehabilitation. ▪ Post bi-yearly monitoring of the project footprint to hinder proliferation of exotic species as a result of the development. Final external audit of the project footprint to confirm that area is free of alien invasive plants after 5 years.	following decommissioning. ▪ Prior to the commencement of the decommissioning phase. ▪ Once-off ▪ Once-off	▪ Project Developer and Specialist/ Contractor

5 TRAFFIC MANAGEMENT PLAN INCLUDING TRANSPORTATION PLAN

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
A. PLANNING AND DESIGN PHASE					
5.1. Increased traffic generation	Manage impact that additional traffic generation will have on road network	5.5.1. If abnormal loads need to be transported by road to the site, a permit will need to be applied for in terms of Section 81 of the National Road Traffic Act and authorisation needs to be obtained from the relevant road authorities to modify the road reserve to accommodate turning movements at intersections (if necessary).	▪ Ensure that the permits are applied for and obtained prior to commencement. ▪ Verify that this has been undertaken by reviewing approved permits.	▪ Once-off during the planning and design phase ▪ Once-off during the planning and design phase.	▪ Contractor ▪ ECO
		5.5.2. The route to the sites should be further investigated to ensure that abnormal loads are not obstructed at any point by geometric, height and width limitations along the route.	▪ Ensure that this is taken into consideration during the planning and design phase by reviewing signed minutes of meetings or signed reports.	▪ Once-off during the planning and design phase.	▪ Project Developer and Traffic Specialist
		5.5.3. Discussions must be held with the relevant landowners on which the internal gravel access farm road leading to the sites is located, prior to commencement to confirm requirements and details of the agreement.	▪ Ensure that this is taken into consideration during the planning and design phase by reviewing signed minutes of meetings or signed reports.	▪ Once-off during the planning and design phase.	▪ Project Developer and ECO
		5.5.4. Ensure that the requirements for use of the gravel access farm road leading to the sites are addressed and considered in the design, as and where applicable.	▪ Ensure that this is taken into consideration during the planning and design phase by reviewing signed minutes of meetings or signed reports.	▪ Once-off during the planning and design phase.	▪ Project Developer and ECO
		5.5.5. Provide a Transport Traffic Plan to the Provincial and Municipal Road Department (if required).	▪ Ensure that the plan is compiled and submitted prior to commencement. ▪ Verify that this has been undertaken by reviewing approved plans.	▪ Once-off during the planning and design phase ▪ Once-off during the planning and design phase.	▪ Contractor ▪ ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
5.2. Accelerated degradation of road structure due to construction, operational and decommissioning phase traffic.	Limit the deterioration of the road condition due to construction, operational and decommissioning phase traffic.	5.2.1. A Road Maintenance Plan should be developed for the gravel external access roads and the internal gravel access farm road that will be used. The plan should address requirements such as, but not limited to, grading, dust suppressant mechanisms, drainage (where required), signage, and speed limits. The Road Maintenance Plan must ensure regular maintenance of the gravel external access roads, as well as the upgrading of and regular maintenance of the internal farm access road.	▪ Ensure that the plan is compiled and submitted prior to commencement. ▪ Verify that this has been undertaken by reviewing approved plans.	▪ Once-off during the planning and design phase ▪ Once-off during the planning and design phase.	▪ Project Developer, Traffic Specialist and Contractor ▪ ECO
B. CONSTRUCTION PHASE					
5.3. Increased traffic generation during the construction phase resulting in a reduction of road based level of service and potential congestion and delays on the surrounding road network.	Plan the project to spread and reduce the amount of road based traffic and avoid local congestion periods during the construction phase.	5.3.1. Plan and stagger delivery trips so that they occur during the day and minimize construction vehicle movement and delivery trips through the towns of Ceres and Touws River and on the regional road during peak traffic periods (06:00-9:00 and 16:00-18:00).	▪ Monitor and management of traffic generated and when trips are made.	▪ During construction	▪ Contractor and ECO
		5.3.2. Suitable parking areas should be designated for construction trucks and vehicles at the construction site camp in order to promote order and improve safety.	▪ Monitor the placement of the designated parking area for trucks and vehicles via visual inspections and record and report any non-compliance.	▪ Once-off prior to construction and as required during the construction phase.	▪ Project Developer and ECO
		5.3.3. The use of public transport (buses and/or minibus taxis) to convey construction personnel to the site should be encouraged.	▪ Contractor should record the arrival and departure times as well as the number of workers using public transport.	▪ Once a month on a randomly selected day.	▪ Appointed Contractor
5.4. Increased level of road accidents (involving pedestrians, animals, other motorists on the surrounding tarred/ gravel road network)	Minimise the impact of the construction activities on the local traffic and avoid accidents with pedestrians, animals and other drivers on the surrounding roads.	5.4.1. Well maintained vehicles should be used together with well-trained drivers during the construction phase. Vehicle maintenance and driver competency should be monitored. Proof of driver competency as well as the vehicle checks should be verified and undertaken to ensure that vehicles are	▪ Carry out random checks of driver licenses and conduct random visual inspections of construction vehicles for roadworthiness.	▪ Random visual inspection of vehicles weekly.	▪ Contractor

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
due to increased traffic during construction.	Reduce number of road accidents due to increased traffic during construction.	roadworthy and hence, do not pose a safety risk. The Contractors must ensure that construction vehicles are roadworthy, properly serviced and maintained, and respect the vehicle safety standards implemented by the Project Developer.			
		5.4.2. To ensure reduced speeds along the roads, implement speed control mechanisms on site by means of a stop and go system, implement speed limits and placement of road signage for the speed limits.	▪ Implement speed control mechanisms prior to commencement of construction. ▪ Carry out random inspections to verify whether proper speed control is being implemented.	▪ On-going ▪ Random during the construction phase	▪ Contractor and ECO ▪ ECO
		5.4.3. Adhere to all speed limits applicable to all roads used.	▪ Ensure that speed limits are adhered to. ▪ Carry out random visual inspections to verify speed limits and general awareness of vehicle drivers.	▪ Daily ▪ Random during the construction phase	▪ Contractor and ECO ▪ ECO
		5.4.4. Road kill monitoring programme (inclusive of wildlife collisions record keeping) should be established.	▪ Appropriate monitoring should be undertaken.	▪ Weekly	▪ Contractor and ECO
		5.4.5. Implement clear and visible signage and signals indicating movement of vehicles at intersections and in the vicinity of the nearby farm steads. The farm steads should be treated as a no-go area.	▪ Implement clear signalisation. ▪ Carry out random inspections to verify whether proper construction signage is being implemented.	▪ On-going ▪ Random during the construction phase	▪ Contractor and ECO ▪ ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
5.5. Deterioration in the surface condition of the roads and accelerated degradation of road structure due to construction traffic.	Limit the deterioration of the road condition due to construction traffic.	5.5.1. Ensure that there is regular maintenance of the gravel external access roads by the contractor during the construction phase in line with the agreed and approved maintenance plan. 5.5.2. Ensure that the upgrading of the internal farm access road is undertaken to suitable standards as specified by the civil engineer and in accordance with the approved maintenance plan. 5.5.3. Ensure regular maintenance of the access roads in line with the approved maintenance plan. Ensure that the access roads are restored to its original pre-construction road condition or an improved condition at the end of the construction phase.	▪ Carry out visual inspections to verify if regular maintenance is being undertaken. ▪ Ensure that the internal farm access road to site is upgraded through photographic surveys and monitoring.	▪ Bi-monthly ▪ Ongoing	▪ Contractor and ECO ▪ Project Developer, Contractor and ECO
		5.5.4. Construction activities will have a higher impact than the normal road activity and therefore the main access roads to site should be inspected on a weekly basis for structural damage.	▪ Ensure that the main access road to site maintains current condition through photographic surveys and monitoring.	▪ Weekly	▪ Contractor and ECO
		5.5.5. Implement management strategies for dust generation e.g. apply dust suppressant on the gravel roads on site, exposed areas and stockpiles.	▪ Ensure dust management measures are in place to adequately decrease the generation of dust.	▪ On-going	▪ Contractor and ECO
		5.5.6. Vehicles must not be overloaded during the construction phase in order to reduce impacts on the road structures, particularly the access roads leading to the site. Random visual inspection of vehicles should be undertaken in order to monitor for overloading. The inspections should also verify if the trucks are covered with appropriate material (such as tarpaulin) if and where possible.	▪ Perform visual inspection of vehicles during the construction phase.	▪ Random visual inspection of vehicles weekly.	▪ Appointed Contractor

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
5.6. Impact on air quality due to dust generation, noise and exhaust emissions from construction vehicles and equipment.	Limit the release of noise, pollutants and dust emissions	5.6.1. Implement management strategies for dust generation e.g. apply dust suppressant on the gravel roads on site, exposed areas and stockpiles.	▪ Ensure dust management measures are in place to adequately decrease the generation of dust.	▪ On-going	▪ Contractor and ECO
		5.6.2. Postpone or reduce dust-generating activities during periods with strong wind. Earthworks may need to be rescheduled or the frequency of application of dust control/suppressant increased.	▪ Ensure dust management measures are in place to decrease the dust generated.	▪ On-going	▪ Contractor and ECO
		5.6.3. Avoid using old and unmaintained construction equipment (which generate high sound levels and greater exhaust emissions) and ensure equipment is well maintained.	▪ Manage noise levels and air pollutants from construction vehicles through checking the condition of vehicles.	▪ On-going	▪ Contractor and ECO
C. OPERATIONAL PHASE					
5.7. Increased level of road accidents (involving pedestrians, animals, other motorists on the surrounding tarred/ gravel road network) due to increased (but limited) traffic during the operational phase.	Minimise the impact of the operational activities on the local traffic and avoid accidents with pedestrians, animals and other drivers on the surrounding tarred/ gravel roads. Reduce number of road accidents due to increased traffic during the operational phase.	5.7.1. Well maintained vehicles should be used together with well-trained drivers during the operational phase, as required. Vehicle maintenance and driver competency should be monitored. Proof of driver competency as well as the vehicle checks should be verified and undertaken to ensure that vehicles are roadworthy and hence, do not pose a safety risk. Vehicles must be roadworthy, properly serviced and maintained.	▪ Carry out random checks of driver licenses and conduct random visual inspections of vehicles for roadworthiness.	▪ Random visual inspection of vehicles weekly.	▪ Project Developer
		5.7.2. Adhere to all speed limits applicable to all roads used.	▪ Ensure that speed limits are adhered to. ▪ Carry out random visual inspections to verify speed limits and general awareness of vehicle drivers.	▪ Daily ▪ Random during the operational phase	▪ Project Developer
		5.7.3. Implement clear and visible signage and signals indicating movement of vehicles at intersections and in the vicinity of the nearby farm steads. The farm steads should be treated as a no-go area.	▪ Implement clear signalisation. ▪ Carry out random inspections to verify whether proper signage is being implemented.	▪ Ongoing ▪ Random during the operational phase	▪ Project Developer

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		5.7.4. The use of public transport (buses and/or minibus taxis) or carpooling to convey operational personnel to the site should be encouraged.	▪ Monitor the requirements	▪ On-going	▪ Project Developer
		5.7.5. Limit access to the site to personnel.	▪ Maintain a register of visitors and staff that enter site and restrict access to personnel.	▪ On-going	▪ Project Developer
5.8. Accelerated degradation of road structure due to operational traffic.	Limit the deterioration of the road condition due to operational phase traffic.	5.8.1. The main access roads to site should be inspected on a weekly basis for structural damage.	▪ Ensure that the main access road to site maintains current condition through photographic surveys and monitoring.	▪ Weekly	▪ Project Developer
		5.8.2. Ensure that there is regular maintenance of the gravel external access roads and internal farm access road by the operator during the operational phase in line with the agreed and approved maintenance plan.	▪ Carry out visual inspections to verify if regular maintenance is being undertaken. ▪ Ensure that the internal farm access road to site is upgraded through photographic surveys and monitoring.	▪ Weekly	▪ Project Developer
		5.8.3. Implement management strategies for dust generation e.g. apply dust suppressant on gravel roads on site, exposed areas and stockpiles.	▪ Ensure dust management measures are in place to adequately decrease the generation of dust.	▪ On-going	▪ Project Developer
		5.8.4. Vehicles must not be overloaded during the operational phase (where applicable) in order to reduce impacts on the road structures, particularly the access roads leading to the site. Random visual inspection of vehicles should be undertaken in order to monitor for overloading (where applicable).	▪ Perform visual inspection of vehicles.	▪ Random visual inspection of vehicles weekly.	▪ Project Developer
D. DECOMMISSIONING PHASE					
5.9. Ensure that the construction mitigation and management measures are adhered to during the decommissioning phase.					

6 STORM WATER MANAGEMENT PLAN

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
A. PLANNING AND DESIGN PHASE					
6.1. Impact of the project if a detailed storm water management plan is not correctly prepared.	To limit the effect of uncontrolled storm water run-off from developed areas onto natural areas	6.1.1. Prepare a detailed stormwater management plan outlining appropriate treatment measures to address runoff from disturbed portions of the site	▪ Check compliance with specified conditions. ▪ Ensure that this is taken into consideration during the planning and design phase by reviewing signed minutes of meetings or signed reports.	▪ Once-off during design followed by regular control ▪ During the planning and design phase	▪ Contractor ▪ ECO
B. CONSTRUCTION PHASE					
6.2. Diversion and impedance of surface water flows – Changes to the hydrological regime and increased potential for erosion. Diversion and increased velocity of surface water flows – reduction in permeable surfaces	Prevent interference with natural run-off patterns, diverting flows and increasing the velocity of surface water flows.	6.2.1. The appointed Contractor should compile a Method Statement for Stormwater Management during the construction phase.	▪ Compile a Method Statement for Stormwater Management during the construction phase. ▪ Inspect and verify if a Method Statement for Stormwater Management has been compiled by the Contractor via audits prior to the commencement of the construction phase.	▪ Prior to the construction phase. ▪ Once-off prior to the commencement of the construction phase.	▪ Contractor ▪ ECO
		6.2.2. Erosion and sedimentation into water bodies must be minimised through the effective stabilisation (gabions and Reno mattresses or similar) and the re-vegetation of any disturbed riverbanks.	▪ Check compliance with specified conditions of the Stormwater Management Plan and Method Statement.	▪ Weekly or Bi-weekly	▪ ECO
		6.2.3. Reinforce soil slopes to minimise erosion during rehabilitation (as needed, and once construction in a specific area has ceased).	▪ Monitor activities and record and report non-compliance.	▪ As needed during the construction phase	▪ ECO
		6.2.4. Any irrigation of the development area for landscaping or dust control purposes should be controlled, such that it does not result in	▪ Check compliance with specified conditions of the Stormwater	▪ Weekly or bi-weekly	▪ ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		any measurable increase in moisture being passed into natural drainage lines.	Management Plan and Method Statement.		
		6.2.5. Drainage along the sides of the roads should be designed so that it does not result in concentrated flows into watercourses.	▪ Check compliance with specified conditions of the Stormwater Management Plan and Method Statement.	▪ Weekly or bi-weekly	▪ ECO
		6.2.6. Perform periodic inspections and maintenance of soil erosion measures and stormwater control structures.	▪ Monitor activities and record and report non-compliance.	▪ As needed during the construction phase	▪ ECO
6.3. Pollution of the surrounding environment as a result of the contamination of stormwater. Contamination could result from the spillage of chemicals, oils, fuels, sewage, solid waste, litter etc.	To prevent contaminated stormwater from entering into and adversely impacting on freshwater ecosystems and reducing the water quality. To reduce sedimentation of nearby water systems. To apply best practice principles in managing risks to storm water pollution.	6.3.1. The appointed Contractor should compile a Method Statement for Stormwater Management during the construction phase.	▪ Compile a Method Statement for Stormwater Management during the construction phase. ▪ Inspect and verify if a Method Statement for Stormwater Management has been compiled by the Contractor via audits prior to the commencement of the construction phase.	▪ Prior to the construction phase. ▪ Once-off prior to the commencement of the construction phase.	▪ Contractor ▪ ECO
		6.3.2. Provide secure storage for fuel, oil, chemicals and other waste materials to prevent contamination of stormwater runoff. Fuels and chemicals (i.e. any hazardous materials and dangerous goods) used during the construction phase must be stored safely on site and in bunded areas. Fuel and chemical storage containers must be inspected to ensure that any leaks are detected early.	▪ Monitor the storage and handling of dangerous goods and hazardous materials on site via site audits and record non-compliance and incidents. Monitor if spillages have taken place and if they are removed correctly.	▪ Weekly	▪ ECO
		6.3.3. All stockpiles must be protected from erosion and stored on flat areas where run-off will be minimised. Erosion and sedimentation into water bodies must be minimised through effective stabilisation. No stockpiling should take place within a watercourse.	▪ Monitor the excavations and stockpiling process throughout the construction phase via visual site inspections. Record non-compliance and incidents.	▪ Daily	▪ ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		6.3.4. Stockpiles must be located away from river channels i.e. greater than 32 m.			
		6.3.5. Littering and contamination of water resources during construction must be prevented by effective construction camp management.	▪ Monitor via site audits and record non-compliance and incidents (i.e. by implementing walk through inspections).	▪ Weekly	▪ Contractor and ECO
		6.3.6. Emergency plans must be in place to deal with potential spillages (especially those leading to any watercourses).	▪ Check compliance with specified conditions of the Stormwater Management Plan and Method Statement.	▪ Weekly or Bi-weekly	▪ ECO
		6.3.7. Erosion and sedimentation into water bodies must be minimised through the effective stabilisation (gabions and Reno mattresses or similar) and the re-vegetation of any disturbed riverbanks.	▪ Check compliance with specified conditions of the Stormwater Management Plan and Method Statement.	▪ Weekly or Bi-weekly	▪ ECO
		6.3.8. Ensure that the temporary site camp and ablution facilities are established at least 32 m away from the banks of the major drainage lines.	▪ Monitor the placement of the site camp via visual inspections, and record and report any non-compliance.	▪ Once-off prior to construction and as required during the construction phase.	▪ ECO
		6.3.9. Ensure that there is no ad-hoc crossing of channels by vehicles during the construction phase. Access routes across the site should be strictly demarcated and selected with a view to minimise impacts on drainage lines.	▪ Check compliance with specified conditions of the Stormwater Management Plan and Method Statement.	▪ Weekly or Bi-weekly	▪ ECO
		6.3.10. Ensure that no waste materials or sediments are left in the surrounding drainage lines (as a result of the construction).	▪ Check compliance with specified conditions of the Stormwater Management Plan and Method Statement.	▪ Weekly or Bi-weekly	▪ ECO
		6.3.11. Regular inspections of stormwater infrastructure should be undertaken to ensure that it is kept clear of all debris and weeds.	▪ Monitor via site audits and record non-compliance and incidents (i.e. by implementing walk through inspections). ▪	▪ Weekly	▪ Contractor and ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
C. OPERATIONAL PHASE					
6.4. Stormwater discharge into the surrounding environment during operations	To minimise the contamination of stormwater by uncontrolled release of contaminated or grey water. To protect soil resources and prevent soil erosion.	6.4.1. An operational phase Stormwater Management Plan should be designed and implemented, with a view to prevent the passage of concentrated flows from hardened surfaces and onto natural areas.	▪ Compile a Stormwater Management Plan for the operational phase. ▪ Inspect and verify if a Stormwater Management Plan has been compiled prior to the commencement of the operational phase.	▪ Continuously during operational phase. ▪ Once-off prior to the commencement of the operational phase.	▪ Project Developer
		6.4.2. All release points into the natural environment must have appropriate energy dissipaters to minimise scouring/erosion.	▪ Monitor activities and record and report non-compliance. ▪ Monitor the placement of energy dissipaters via visual inspections, and record and report any non-compliance.	▪ On-going	▪ Project Developer
		6.4.3. As far as reasonably possible, separate “clean” and “dirty” storm water. As far as reasonably possible, capture and contain “dirty” stormwater for appropriate disposal/discharge.	▪ Monitor via site audits and record non-compliance and incidents (i.e. by implementing inspections).	▪ Weekly or as required during operations.	▪ Project Developer
		6.4.4. Regular inspections of stormwater infrastructure should be undertaken to ensure that it is kept clear of all debris and weeds.	▪ Undertake regular inspections of the stormwater infrastructure (i.e. by implementing walk through inspections).	▪ Weekly/Monthly	▪ Project Developer
D. DECOMMISSIONING PHASE					
6.5. The proposed solar facility would be expected to run for a minimum period of 20 years, after which it would either be decommissioned, alternatively upgraded or an application submitted to obtain a new license. Should the plant be decommissioned, the solar field would be rehabilitated to its original (pre-development) state. In the (unlikely) event that none of the mitigation measures outlined for the construction and operational phases of the proposed project had been implemented, the period of time for recovery to take place would be extended. In the event that decommissioning occurs, and assuming implementation of mitigation measures, the hydrological regime should fully recover over time to present day conditions.					

7 EROSION MANAGEMENT PLAN

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
A. PLANNING AND DESIGN PHASE					
7.1. Soil degradation as a result of erosion. Erosion can occur as a result of the alteration of the land surface run-off characteristics, which can be caused by construction related land surface disturbance, vegetation removal, and the establishment of hard surface areas including roads.	Ensure that disturbance and existence of hard surfaces causes no erosion on or downstream of the site.	7.1.1. Design an effective system of storm water run-off control, where required (e.g. areas with concentrated volumes of run-off). The system must effectively collect and safely disseminate run-off water from all accumulation points and prevent down slope erosion.	▪ Ensure that the storm water run-off control is included in the engineering design.	▪ Once-off during the planning and design phase.	▪ Project Developer
B. CONSTRUCTION PHASE					
7.2. Soil degradation as a result of erosion. Erosion can occur as a result of the alteration of the land surface run-off characteristics, which can be caused by construction related land surface disturbance, vegetation removal, and the establishment of hard surface areas including roads.	Ensure that disturbance and existence of hard surfaces causes no erosion on or downstream of the site.	7.2.1. Implement an effective system of storm water run-off control, where required. The system must effectively collect and safely disseminate run-off water from all accumulation points and prevent down slope erosion.	▪ Undertake site inspections to verify the effectiveness and integrity of the storm water run-off control system and record any erosion on site or downstream. Corrective action must be implemented to the run-off control system if erosion occurs.	▪ Every 2 months during the construction phase	▪ ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
7.3. Soil degradation as a result of erosion. Erosion can occur as a result of the alteration of the land surface run-off characteristics, which can be caused by construction related land surface disturbance, vegetation removal, and the establishment of hard surface areas including roads.	Ensure that vegetation clearing does not pose a high erosion risk.	7.3.1. Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion.	▪ Undertake a periodic site inspection to record the occurrence of and re-vegetation progress of all areas that require re-vegetation.	▪ Every 4 months during the construction phase	▪ ECO
7.4. Increased wind erosion and resultant deposition of dust	Prevent wind erosion and resultant deposition of dust on surrounding indigenous vegetation.	7.4.1. Sand, stone and cement should be stored in demarcated areas, and covered or sealed to prevent wind erosion and resultant deposition of dust on the surrounding indigenous vegetation.	▪ Undertake regular inspections of the via site audits to verify that sand, stone and cement are stored and handled as instructed.	▪ Daily	▪ ECO and Contractor
		7.4.2. During construction, efforts should be made to retain as much natural vegetation as possible on the site, to reduce disturbed areas and maintain plant cover, thus reducing erosion risks.	▪ Monitor activities via site inspections and record and report non-compliance.	▪ Daily	▪ ECO and Contractor
		7.4.3. All stockpiles must be protected from erosion and stored on flat areas where run-off will be minimised. Erosion and sedimentation into water bodies must be minimised through effective stabilisation.	▪ Monitor the stockpiling process throughout the construction phase via visual site inspections. Record non-compliance and incidents.	▪ Daily	▪ ECO
7.5. Excessive loss of natural vegetation within the development footprint area from erosion	Prevent loss of natural vegetation through erosion.	7.5.1. Vegetation clearing during construction must be restricted to the footprint of the proposed project components and planned infrastructure only. It should be phased to ensure that the minimum area of soil is exposed to potential erosion at any one time.	▪ Monitor vegetation clearing throughout the construction phase via visual site inspections. Record non-compliance and incidents. ▪ Undertake regular monitoring for erosion to ensure is reduced and rectified as soon as possible.	▪ Daily ▪ Daily	▪ ECO and Contractor ▪ ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		7.5.2. Stockpile the shallow topsoil layer separately from the subsoil layers. Reinstate the topsoil layers (containing seed and vegetative material) when construction is complete to allow the plants to rapidly re-colonise the bare soil areas.	▪ Rehabilitate disturbed areas and monitor the presence of alien invasive species on site.	▪ Daily (stockpiling) and once-off for the reinstatement of the top soil layer	▪ ECO and Contractor
		7.5.3. Re-seed with locally-sourced seed of indigenous vegetation species.	▪ Re-seed with seeds of indigenous grass species.	▪ Once off	▪ ECO with advice from a Terrestrial Ecology Specialist (if required)
		7.5.4. Topsoil stockpiles not used in three months after stripping must be seeded to prevent dust and erosion.	▪ Regular monitoring for erosion to ensure that no erosion problems are occurring at the site. All erosion problems observed should be rectified as soon as possible.	▪ Weekly initially and thereafter monthly	▪ ECO and Contractor
7.6. Erosion of surface soils, rilling and gulleys.	Measures to be implemented that address or avoid the loss of surface soils and exacerbates gulley formation.	7.6.1. Identify cause of erosion and possible means of redress (i.e. implement erosion control measures, where applicable), such as the use of geofabric, stone gabions and re-vegetation or similar measures. 7.6.2. Erosion control measures should seek to reduce surface flow velocity and allow for settlement on site of silt laden surface waters. Washaways, excessive loss of soils and gulleys can be considered to be indicative of excessive erosion.	▪ Monitor the erosion on site during construction, as well as the implementation and effectiveness of erosion control on site (such as the use of geofabric, stone gabions and re-vegetation or similar measures).	▪ Ongoing and as required during erosion events.	▪ ECO and Project Developer
C. OPERATIONAL PHASE					
7.7. Soil degradation as a result of erosion. Erosion can occur as a result of the alteration of the land surface run-off characteristics.	Ensure that disturbance and existence of hard surfaces causes no erosion on or downstream of the site.	7.7.1. Maintain the storm water run-off control system. Monitor erosion and remedy the storm water control system in the event of any erosion occurring.	▪ Undertake site inspections to verify the effectiveness and integrity of the storm water run-off control system and record any erosion on site or downstream. Corrective action must	▪ Bi-annually	▪ Project Developer

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
			be implemented to the run-off control system if erosion occurs.		
7.8. Soil degradation as a result of erosion. Erosion can occur as a result of the alteration of the land surface run-off characteristics.	That denuded areas are re-vegetated to stabilise soil against erosion.	7.8.1. Facilitate re-vegetation of denuded areas throughout the site.	▪ Undertake a periodic site inspection to record the progress of all areas that require re-vegetation.	▪ Bi-annually	▪ Project Developer
7.9. Excessive loss of natural vegetation in the development footprint area and resulting impacts indigenous vegetation, faunal habitat and habitat fragmentation.	Prevent loss of natural vegetation and minimise habitat fragmentation and the loss of connectivity as a result of erosion.	7.9.1. The use of silt fences, sand bags or other suitable methods must be implemented in areas that are susceptible to erosion. All erosion control mechanisms need to be regularly maintained.	▪ Monitor efficiency of erosion control measures.	▪ Weekly or monthly	▪ Project Developer
		7.9.2. Conduct regular monitoring for erosion to ensure that no erosion problems are occurring at the site as a result of the roads and other infrastructure. Ensure that all erosion problems are rectified as soon as possible.	▪ Undertake regular monitoring for erosion to ensure is reduced and rectified as soon as possible.	▪ Monthly	▪ Project Developer
D. DECOMMISSIONING PHASE					
7.10. Soil degradation as a result of erosion. Erosion can occur as a result of the alteration of the land surface run-off characteristics, which can be caused by decommissioning related land surface disturbance, vegetation removal, and the establishment of hard surface areas including roads.	Ensure that disturbance and existence of hard surfaces causes no erosion on or downstream of the site.	7.10.1. Implement an effective system of storm water run-off control, where required. The system must effectively collect and safely disseminate run-off water from all accumulation points and prevent down slope erosion.	▪ Undertake site inspections to verify the effectiveness and integrity of the storm water run-off control system and record any erosion on site or downstream. Corrective action must be implemented to the run-off control system if erosion occurs.	▪ Every 2 months during the decommissioning phase, and then every 6 months after completion of decommissioning, until final sign-off is achieved.	▪ ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
7.11. Soil degradation as a result of erosion. Erosion can occur as a result of the alteration of the land surface run-off characteristics, which can be caused by decommissioning related land surface disturbance, vegetation removal, and the establishment of hard surface areas including roads.	Ensure that vegetation clearing does not pose a high erosion risk.	7.11.1. Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion.	▪ Undertake a periodic site inspection to record the occurrence of and re-vegetation progress of all areas that require re-vegetation.	▪ Every 4 months during the decommissioning phase, and then every 6 months after completion of decommissioning, until final sign-off is achieved.	▪ ECO

8 HAZARDOUS SUBSTANCES LEAKAGE OR SPILLAGE MONITORING SYSTEM

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
A. CONSTRUCTION PHASE					
8.1. Contamination of soil and risk of damage to vegetation and/or fauna through spillage of concrete and cement.	To control concrete and cement batching activities in order to reduce spillages and resulting contamination of soil, groundwater and the vegetation and/or fauna.	8.1.1. If any concrete mixing takes placed on site, this must be carried out in a clearly marked, designated area at the site camp on an impermeable surface (such as on boards or plastic sheeting and/or within a bunded area with an impermeable surface).	▪ Monitor the handling and storage of sand, stone and cement as instructed.	▪ Daily	▪ Project Developer Contractor and ECO
		8.1.2. Bagged cement must be stored in an appropriate facility and at least 10 m away from any water courses, gullies and drains.	▪ Monitor the handling and storage of sand, stone and cement as instructed.	▪ Daily	▪ Project Developer, Contractor and ECO
		8.1.3. A washout facility must be provided for washing of concrete associated equipment. Water used for washing must be restricted.	▪ Monitor the handling and storage of sand, stone and cement as instructed.	▪ Daily	▪ Project Developer, Contractor and ECO
		8.1.4. Hardened concrete from the washout facility or concrete mixer can either be reused or disposed of at an appropriate licenced disposal facility. Proof of disposal (i.e. waste disposal slips or waybills) should be retained on file for auditing purposes.	▪ Monitor the handling and storage of sand, stone and cement as instructed. ▪ Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents.	▪ Daily ▪ Monthly	▪ Project Developer, Contractor and ECO ▪ ECO
		8.1.5. Empty cement bags must be secured with adequate binding material if these will be temporarily stored on site. Empty cement bags must be collected from the construction area at the end of every day. Sand and aggregates containing cement must be kept damp to prevent the generation of dust.	▪ Monitor the handling and storage of sand, stone and cement as instructed.	▪ Daily	▪ Project Developer, Contractor and ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		8.1.6. Any excess sand, stone and cement must be removed from site at the completion of the construction period and disposed at a licenced waste disposal facility. Proof of disposal (i.e. waste disposal slips or waybills) should be retained on file for auditing purposes.	▪ Monitor the handling and storage of sand, stone and cement as instructed. ▪ Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents.	▪ Daily ▪ Monthly	▪ Project Developer, Contractor and ECO ▪ ECO
8.2. Contamination of soil and risk of damage to vegetation and/or fauna through spillage of fuels and oils.	To control and eliminate fuel and oil spillages which may result in soil contamination and damage to vegetation and/or fauna.	8.2.1. Ensure that adequate containment structures are provided for the temporary storage of liquid dangerous goods and hazardous materials on site (such as chemicals, oil, fuel, hydraulic fluids, lubricating oils etc.). Appropriate bund areas must be provided for the storage of these materials at the site camp. Bund areas should contain an impervious surface in order to prevent spillages from entering the ground. Bund areas should have a capacity of 110 % of the volume of the largest tank in the bund (tanks include storage of fuel/diesel).	▪ Monitor the storage and handling of dangerous goods and hazardous materials on site via site audits and record non-compliance and incidents.	▪ Weekly	▪ Contractor and ECO
		8.2.2. Monitor and inspect construction equipment and vehicles to ensure that no fuel spillage takes place. Ensure that drip trays are provided for construction equipment and vehicles as required.	▪ Monitor the construction equipment and vehicles and monitor the occurrence of spills and the management process thereof. ▪ Record all spills and lessons learnt.	▪ Daily ▪ During spill events	▪ Contractor and ECO ▪ ECO
		8.2.3. Contractor to compile a Method Statement for refuelling activities under normal and emergency situations. If on-site servicing and refuelling is required in emergency situations, a designated area must be created at the construction site camp for this purpose. Drip trays or similar impervious materials must be used during these procedures.	▪ Verify if a Method Statement is compiled by reviewing approved and signed off reports. ▪ Monitor the refuelling/ servicing process and record the occurrence of any spillages.	▪ Once-off prior to commencement of construction. ▪ During emergency refuelling and servicing activities.	▪ ECO ▪ ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		8.2.4. Spilled fuel, oil or grease must be retrieved and contaminated soil removed, cleaned and replaced.	▪ Monitor the handling and storage of fuels and oils via site audits and monitor if spillages have taken place and if so, are removed correctly. Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents.	▪ Daily (or during spills)	▪ Contractor and ECO
		8.2.5. Contaminated soil to be collected by the Contractor (under observation of the ECO) and disposed of at a registered waste facility designated for this purpose. Proof of disposal (i.e. waste disposal slips or waybills) should be retained on file for auditing purposes.	▪ Monitor the correct removal of contaminated soil. Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents.	▪ Daily (or during spills)	▪ Contractor and ECO
		8.2.6. A Spill Response Method Statement must be compiled by the Contractor for the construction phase in order to manage potential spill events.	▪ Compile a Spill Response Method Statement. ▪ Audit signed and approved Spill Response Method Statement.	▪ Once-off (and thereafter updated as required during the construction phase). ▪ Once-off (and thereafter as required during the construction phase).	▪ Contractor and Project Developer, ECO
		8.2.7. The Contractor must ensure that adequate spill containment and clean-up equipment are provided on site for use during spill events.	▪ Monitor via site audits and record incidents and non-compliance.	▪ Daily/Weekly	▪ ECO and Contractor
		8.2.8. Portable bioremediation kit (to remedy chemical spills) is to be held on site and used as required.	▪ Ensure that a well-maintained portable bioremediation kit is available on site and that construction personnel and	▪ Daily	▪ Contractor and ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
			contractors are aware of its location and instructions		
		8.2.9. In case of a spillage of hazardous chemicals where contamination of soil occurs, depending on the degree and level of contamination, excavation and removal to a hazardous waste disposal facility could be necessary. If the spillage is widespread and the soil is considered to be significantly contaminated, a specialist will need to be immediately appointed to address the spillage. This will usually entail the collection of samples of the contaminated soil followed by analysis in terms of the 2014 National Norms and Standards for the Remediation of Contaminated Land and Soil Quality (i.e. GN 331). If the soil is determined to be significantly contaminated, then compliance with Part 8 of the NEMWA should be achieved by the Applicant, including notifying the Minister of Environment, Forestry and Fisheries of the significant contamination.	▪ Ensure that a suitably qualified specialist is appointed to collect and analyse the contaminated soil samples in terms of the 2014 Norms and Standards (i.e. GN 331) in order to determine if the soil is significantly contaminated or not. ▪ If the contaminated soil is considered to be significantly contaminated, then compliance with Part 8 of the NEMWA should be achieved by the Applicant.	▪ During spill events	▪ Project Developer
		8.2.10. The Contractor must record and document all significant spill events.	▪ Monitor documentation and records of significant spill events via audits and record non-compliance and incidents.	▪ During spill events	▪ ECO
B. OPERATIONAL PHASE					
8.3. Contamination of soil and risk of damage to vegetation and/or fauna through spillage of fuels and oils	To control and eliminate fuel and oil spillages which may result in soil contamination and damage to vegetation and/or fauna.	8.3.1. Monitor and inspect maintenance equipment and vehicles to ensure that no fuel spillage takes place.	▪ Implement specifications for maintenance equipment use as specified by the maintenance Contractor.	▪ Monthly	▪ Project Developer
		8.3.2. Spilled fuel, oil or grease is retrieved during operations where possible and contaminated soil removed, cleaned and replaced.	▪ Monitor the handling and storage of fuels and oils via site audits and monitor if spillages have taken place and if so, are removed correctly. Monitor waste	▪ During spills	▪ Project Developer

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
			disposal slips and waybills via site audits and record non-compliance and incidents.		
		8.3.3. Contaminated soil to be collected by the Contractor and disposed of at a registered waste facility designated for this purpose. Proof of disposal (i.e. waste disposal slips or waybills) should be retained on file for auditing purposes.	▪ Monitor the correct removal of contaminated soil. Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents.	▪ During spills	▪ Project Developer
		8.3.4. A Spill Response Plan must be compiled for the operational phase in order to manage potential spill events.	▪ Compile a Spill Response Plan. ▪ Audit signed and approved Spill Response Method Statement.	▪ Once-off (and thereafter updated as required). ▪ Once-off (and thereafter as required).	▪ Project Developer ▪ Facility Manager
		8.3.5. Ensure that adequate spill containment and clean-up equipment are provided on site for use during spill events. Portable bioremediation kit (to remedy chemical spills) is to be held on site and used as required.	▪ Ensure that a well-maintained portable bioremediation kit is available on site and that operational personnel are aware of its location and instructions.	▪ Weekly	▪ Facility Manager
		8.3.6. In case of a spillage of hazardous chemicals where contamination of soil occurs, depending on the degree and level of contamination, excavation and removal to a hazardous waste disposal facility could be necessary. If the spillage is widespread and the soil is considered to be significantly contaminated, a specialist will need to be immediately appointed to address the spillage. This will usually entail the collection of samples of the contaminated soil followed by analysis in terms of the 2014 National Norms and Standards for the Remediation of Contaminated Land and Soil Quality (i.e. GN 331). If the soil is determined to be significantly	▪ Ensure that a suitably qualified specialist is appointed to collect and analyse the contaminated soil samples in terms of the 2014 Norms and Standards (i.e. GN 331) in order to determine if the soil is significantly contaminated or not. ▪ If the contaminated soil is considered to be	▪ During spill events	▪ Project Developer

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		contaminated, then compliance with Part 8 of the NEMWA should be achieved by the Applicant, including notifying the Minister Environment, Forestry and Fisheries of the significant contamination.	significantly contaminated, then compliance with Part 8 of the NEMWA should be achieved by the Applicant.		
		8.3.7. Ensure that adequate containment structures are provided for the temporary storage of liquid dangerous goods and hazardous materials on site (such as chemicals, oil, fuel, hydraulic fluids, lubricating oils etc.). Appropriate bund areas must be provided for the storage of these materials at the PV facility. Bund areas should contain an impervious surface in order to prevent spillages from entering the ground. Bund areas should have a capacity of 110 % of the volume of the largest tank in the bund (tanks include storage of fuel/diesel).	▪ Monitor the storage and handling of dangerous goods and hazardous materials on site via site audits and record non-compliance and incidents.	▪ Weekly	▪ Facility Manager
8.4. Impacts due to management solid and liquid wastes disposed of on the site during operational phase.	Prevent environmental impacts as a result of the operational phase such as pollution.	8.4.1. All operation waste to be removed from the site by an appointed service provider.	▪ Waste removal and disposal to be monitored throughout operation.	▪ Monthly	▪ Facility Manager
		8.4.2. All liquid waste or spills (used oil, paints, lubricating compounds and grease from vehicles passing through the entrance facility) to be packaged and disposed appropriately at a registered landfill site.	▪ Monitor the correct removal of liquid waste or spills. Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents.	▪ During spills	▪ Project Developer
		8.4.3. Adequate containers for the cleaning of equipment and materials (paint, solvent) must be provided in order to avoid spillages.	▪ Monitor the storage and handling of dangerous goods and hazardous materials on site via site audits and record non-compliance and incidents.	▪ Weekly	▪ Facility Manager
C. DECOMMISSIONING PHASE					
8.5. No specific impacts are associated with the decommissioning phase other than those from the operational phase that will still be relevant for the duration of the decommissioning phase due to on-going occupation of the area.					

9 ENVIRONMENTAL AWARENESS AND FIRE MANAGEMENT PLAN

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
A. PLANNING AND DESIGN PHASE					
9.1. Potential impacts resulting from the lack of overall compliance with the conditions of the EA (issued by the DEFF)	Ensure compliance with all environmental conditions of approval (issued by DEFF as part of the EA).	9.1.1. Audit the implementation of the EMPr requirements.	▪ Audit report on compliance with actions and monitoring requirements.	▪ Weekly	▪ Project Developer
		9.1.2. Establish clear and transparent reporting of the activities undertaken with regard to all recommendations included in the EMPr.	▪ Audit report on compliance with actions and monitoring requirements.	▪ Weekly	▪ Project Developer
B. CONSTRUCTION PHASE					
9.2. Potential risk of fire due to construction activities or behaviour of staff on site during the construction phase	Prevent fire on site resulting of workers smoking or starting fires (i.e. cooking, heating purposes).	9.2.1. Designate smoking areas, as well as areas for cooking, where the fire hazard could be regarded as insignificant.	▪ Ad-hoc checks to ensure workers are smoking or cooking in designated areas only.	▪ Daily	▪ ECO and Contractor
		9.2.2. Educate workers on the dangers of open and/or unattended fires.	▪ Ensure fire safety requirements are well understood and respected by construction personnel. ▪ Carry out Environmental Awareness Training. ▪ Conduct audits of the signed attendance registers.	▪ Ongoing. ▪ Once-off training and ensure that all new staff are inducted. ▪ Monthly	▪ ECO and Contractor ▪ Contractor/ ECO ▪ ECO
		9.2.3. Prohibit open fires. Appropriate fire safety training should also be provided to staff that are to be on the site for the duration of the construction phase.	▪ Ensure fire safety requirements are well understood and respected by construction personnel. Provide basic fire safety training.	▪ On-going	▪ ECO and Contractor
		9.2.4. Ensure that cooking takes place in a designated area shown on the site map. Ensure that no firewood or kindling may be gathered from the site or surrounds.	▪ Check compliance with specified conditions using a report card, and allocate fines when necessary.	▪ On-going	▪ ECO and Contractors

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		9.2.5. Fire-fighting equipment must be made available at various appropriate locations on the construction site.	▪ Ensure fire safety requirements are well understood and respected by workers. ▪ Assurance of functionality of fire extinguishers via inspections and certification by an accredited fire service company.	▪ On-going ▪ Bi-annually	▪ ECO and Contractor ▪ Contractor
9.3. Inappropriate behaviour of civil contractors and sub-contractors during the construction phase	Prevent unnecessary impacts on the surrounding environment by ensuring that contractors are aware of the requirements of the EMPr. Ensure that contractors and sub-contractors do not induce impacts on the surrounding environment as a result of unplanned pollution on site. Ensure that actions by on-site contractors and sub-contractors and workers are properly managed in order to minimise impacts to surrounding environment.	9.3.1. Ensure that the EMPr and the EA (should it be granted by the DEA), are included in all tender documentation and contractors and sub-contractors contracts.	▪ Check compliance with specified conditions using a report card, and allocate fines when necessary.	▪ On-going	▪ ECO and Contractors
		9.3.2. Contractors and sub-contractors must use the ablution facilities situated in a designated area within the site; and no bathing/washing should be permitted outside the designated area.	▪ Check compliance with specified conditions using a report card, and allocate fines when necessary.	▪ On-going	▪ ECO and Contractors
		9.3.3. All litter will be deposited in a clearly labelled, closed, animal-proof disposal bin in the construction area; particular attention needs to be paid to food waste.	▪ Check compliance with specified conditions using a report card, and allocate fines when necessary.	▪ On-going	▪ ECO and Contractors
		9.3.4. No person other than a qualified specialist or personnel authorised by the Project Developer, will disturb or remove plants outside the demarcated construction area.	▪ Check compliance with specified conditions using a report card, and allocate fines when necessary.	▪ On-going	▪ ECO and Contractors
		9.3.5. No person other than a qualified specialist or personnel authorised by the Project Developer, will disturb animals on the site.	▪ Check compliance with specified conditions using a report card, and allocate fines when necessary.	▪ On-going	▪ ECO and Contractors
		9.3.6. Educate workers on site about suitable behaviour on site and initiate environmental awareness. Staff must be informed that no trapping, snaring or feeding of any animal will be allowed.	▪ Carry out Environmental Awareness Training. ▪ Conduct audits of the signed attendance registers.	▪ Once-off training and ensure that all new staff are inducted. ▪ Monthly	▪ Contractor/ ECO ▪ ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
9.4. Inappropriate planning and of site camp establishment.	Ensure that environmental issues are taken into consideration in the planning for site establishment.	9.4.1. All construction activities, materials, equipment and personnel must be restricted to the actual construction area specified (as required to undertake the construction work). The construction area must be demarcated by the Contractor.	▪ Monitor compliance and record non-compliance and incidents.	▪ Before construction	▪ ECO
		9.4.2. The Contractor should install and maintain Construction Site Information Boards in the position, quantity, design and dimensions specified by the Project Developer.	▪ Monitor compliance and record non-compliance and incidents.	▪ Before construction	▪ ECO
		9.4.3. General building materials should be stored in appropriate designated areas on site such that there will be no runoff from these areas towards sensitive systems. The site camp must be removed after construction.	▪ Monitor compliance and record non-compliance and incidents.	▪ Before construction	▪ ECO
9.5. Increased animal road mortality	Reduction in animal mortality	9.5.1. The construction staff should be made aware of the presence of fauna and within the proposed project area. The construction personnel and staff must also be made aware of the general speed limits on site and must be alert at all times for potential crossings, and should be trained on how to react in these situations.	▪ Carry out Environmental Awareness Training. ▪ Conduct audits of the signed attendance registers.	▪ Once-off training and ensure that all new staff are inducted. ▪ Monthly	▪ Contractor/ ECO ▪ ECO
		9.5.2. To ensure that animals are not attracted to the site (and potentially resulting in increased road mortality), the waste collection bins and skips should be covered with suitable material, where appropriate, and the site camp must be kept clean on a daily basis.	▪ Monitor the activities via visual inspections, and record and report any non-compliance.	▪ Daily	▪ Contractor and ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		9.5.3. Establish a monitoring programme to record the number of faunal road mortalities and collisions. If it is established that the number of collisions and faunal fatalities increase within an area, particularly with regards to smaller species (reptiles), then measures such as exclusion fences within these areas only should be installed.	▪ Appropriate monitoring and recording should be undertaken. ▪ Exclusion fences should be installed, if needed to direct animals to safe road crossings.	▪ Weekly ▪ As required	▪ ECO ▪ ECO and Contractor
9.6. Increased energy consumption during the construction phase.	Reduce energy consumption where possible.	9.6.1. Encourage the use of energy saving equipment at the site camp site (such as low voltage lights and low pressure taps) and promote recycling. Construction personnel must be made aware of energy conservation practices as part of the Environmental Awareness Training programme.	▪ Contractor to monitor energy usage via audits. ▪ Carry out Environmental Awareness Training. ▪ Conduct audits of the signed attendance registers.	▪ Monthly ▪ Once-off training and ensure that all new staff are inducted. ▪ Monthly	▪ Contractor ▪ Contractor/ ECO ▪ ECO
9.7. Impact on the regional water balance as a result of increased water usage.	Reduce water usage during the construction phase.	9.7.1. Water conservation should be practiced as follows: ▪ Cleaning methods utilised for cleaning vehicles, floors, etc. should aim to minimise water use (e.g. sweep before wash-down). ▪ Ensure that regular audits of water systems are conducted to identify possible water leakages. 9.7.2. Avoid the use of potable water for dust suppression during the construction phase and consider the use of alternative approved sources, where possible.	▪ Monitor via site audits and record non-compliance and incidents.	▪ Monthly	▪ ECO
		9.7.3. Make construction personnel aware of the importance of limiting water wastage, as well as reducing water use.	▪ Carry out Environmental Awareness Training with a discussion on water usage and conservation. ▪ Conduct audits of the signed attendance registers.	▪ Once-off training and ensure that all new staff are inducted. ▪ Monthly	▪ Contractor/ ECO ▪ ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
C. OPERATIONAL PHASE					
9.8. Potential risk of fire due to behaviour of staff on site during the operational phase	Ensure appropriate and efficient fire prevention during the operational phase.	9.8.1. Designate smoking areas as well as areas for cooking, where the fire hazard could be regarded as insignificant.	▪ Random inspections during a month to ensure workers are smoking or starting fires in designated areas only.	▪ Monthly	▪ Facility Manager
		9.8.2. Educate workers on the dangers of open and/or unattended fires.	▪ Ensure fire safety requirements are well understood and respected by operational personnel. ▪ Carry out Environmental Awareness Training. ▪ Conduct audits of the signed attendance registers.	▪ Ongoing ▪ Once-off training and ensure that all new staff are inducted. ▪ Monthly	▪ Facility Manager ▪ Facility Manager ▪ Facility Manager
		9.8.3. Prohibit open fires. Appropriate fire safety training should also be provided to staff that are to be on the site for the duration of the operational phase.	▪ Ensure fire safety requirements are well understood and respected by operational personnel. Provide basic fire safety training.	▪ On-going	▪ Project Developer
		9.8.4. Ensure that adequate fire-fighting equipment is available and easily accessible on site.	▪ Ensure fire safety requirements are well understood and respected by workers. ▪ Assurance of functionality of fire extinguishers via inspections and certification by an accredited fire service company.	▪ On-going ▪ Bi-annually	▪ Facility Manager ▪ Project Developer
9.9. Increased energy consumption during the operational phase.	Reduce energy consumption where possible.	9.9.1. Encourage the use of energy saving equipment at the PV facility (such as low voltage lights and low pressure taps) and promote recycling. Operational personnel must be made aware of energy conservation practices as part of the environmental awareness training programme.	▪ Monitor energy usage via site investigations. ▪ Conduct training for all operational personnel.	▪ Monthly ▪ As and when required and ensure that all new staff are inducted.	▪ Facility Manager ▪ Project Developer
9.10. Impact on the regional water balance as a result of increased water usage.	Reduce water usage during operations.	9.10.1. Water conservation to be practiced in line with Energy Saving Policies as follows: ▪ Cleaning methods utilised for cleaning vehicles, floors, the offices etc. should	▪ Record water usage during the operational phase, conduct audits and record non-compliance and incidents.	▪ Monthly	▪ Facility Manager

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		aim to minimise water use (e.g. sweep before wash-down). ▪ Where possible, encourage the re-use of water. ▪ Ensure that regular audits of water systems are conducted to identify possible water leakages. 9.10.2. Consider installing water saving devices (e.g. dual flush toilets, automatic shut-off taps, etc.).			
		9.10.3. Carry out environmental awareness training with a discussion on water usage and conservation, and make operational personnel aware of the importance of limiting water wastage.	▪ Conduct training for all operational personnel.	▪ As and when required during operations and ensure that all new staff are inducted.	▪ Facility Manager
9.11. Non respect of waste management practices	Minimise the production of general waste. Ensure compliance with relevant waste management legislation. Minimise pollution of the environment.	9.11.1. Control and implement waste management plans. Ensure that relevant legislative requirements are respected. 9.11.2. Determine specific areas on site for temporary management of waste.	▪ Control of waste management practices throughout operation phase.	▪ Monthly	▪ Facility Manager
		9.11.3. Promote waste reduction, re-use, and recycling opportunities on site during the operation phase. 9.11.4. Ensure an adequate and sustainable use of resources.	▪ Monitor waste generation and collection throughout operation.	▪ Monthly	▪ Facility Manager
9.12. Excessive generation of waste water on site during the operation phase	Maintain reasonable levels of waste water generation	9.12.1. Waste water must be collected and disposed of at a suitable licenced disposal facility. Proof of disposal (i.e. waste disposal slips or waybills) should be retained on file for auditing purposes.	▪ Waste water generation to be monitored throughout the operational phase. ▪ Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents.	▪ Quarterly	▪ Facility Manager
D. DECOMMISSIONING PHASE					
9.13. Ensure that the construction mitigation and management measures are adhered to during the decommissioning phase.					

10 SPECIFIC PROJECT RELATED ENVIRONMENTAL IMPACTS

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
A. PLANNING AND DESIGN PHASE					
A.1. VISUAL IMPACTS					
10.1. Potential visual intrusion of construction and operational activities on existing views of sensitive visual receptors	Reduce visual intrusion of construction and operational activities project wide.	10.1.1. Ensure that visual management measures are included in the EMPr, monitored by an ECO, including the siting of the construction camps and material stockpiles in visually unobtrusive positions in the landscape, away from public roads.	▪ Ensure that this is taken into consideration during the planning and design phase by reviewing signed minutes of meetings or signed reports.	▪ During design cycle and before construction commences.	▪ Project Developer
10.2. Potential visual intrusion of solar arrays and related infrastructure and the impact on receptors, including residents and visitors, as well as game farms in the area.	To reduce the visual intrusion of the operation infrastructure on the surrounding landscape and receptors.	10.2.1. Ensure that the design of the facility takes the following into consideration: • Operational and Maintenance buildings are located in unobtrusive low-lying areas, away from public roads, and/or screened with earth berms where necessary. • Muted natural colours and non-reflective finishes are used for buildings and structures generally. • Internal access roads are kept as narrow as possible, and existing roads or tracks are used as far as possible. • Plan for outdoor or security lighting to be fixed with reflectors to minimise light spillage. • Internal power lines within the PV Facilities are located underground where possible. • Discrete outdoor signage is used and prohibit intrusive commercial or billboard signage.	▪ Ensure that this is taken into consideration during the planning and design phase by reviewing signed minutes of meetings, designs or signed reports.	▪ During design cycle and before construction commences.	▪ Project Developer

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
A.2. HERITAGE IMPACTS (ARCHAEOLOGY AND CULTURAL LANDSCAPE)					
10.3. Impacts to archaeological resources	Achieve a layout that minimizes the potential later impacts to archaeological resources and/or graves.	10.3.1. Commission a detailed pre-construction archaeological survey of the approved PV layouts in order to (1) ascertain whether any further sites are present within the footprints and (2) choose the densest and best areas of background scatter for formal sampling (i.e. to determine appropriate sample areas from which to collect artefacts). While background scatter artefacts occur widely and in variable densities across the landscape, it is suggested that one area per PV project footprint could be collected from in order to record some of the variability across the wider project area. Further recommendations will stem from the results of that survey. The survey should be done well in advance of construction (preferably at least 6 months) in order to allow time for the following: • The field survey; • Reporting to Heritage Western Cape (HWC) and application for Workplan approval; • Conducting the mitigation fieldwork; • Analysis and reporting; and • Final approval by HWC.	▪ Ensure that this is taken into consideration during the planning and design phase and that an Archaeologist with suitable qualifications and experience is appointed to undertake a pre-construction survey by reviewing signed minutes of meetings or signed reports or the appointment letter. ▪ Ensure that the pre-construction survey findings are taken into consideration during the planning and design phase, as necessary.	▪ During design cycle and before construction commences.	▪ Project Developer
		10.3.2. Ensure that the design ensures the protection of the possible grave at waypoint 150. The feature should be fenced and marked as a sensitive area.	▪ Ensure that this is taken into consideration during the planning and design phase by reviewing signed minutes of meetings or signed reports or the appointment letter.	▪ Once-off	▪ Project Developer
		10.3.3. No activity is to happen north of the existing farm fence alongside waypoint 177, an existing Later Stone Age (LSA) site. The design must ensure the protection of the archaeological site at waypoint 177. The existing farm fence must be retained in its current location and all project activities kept to	▪ Ensure that this is taken into consideration during the planning and design phase by reviewing signed minutes of meetings or signed reports or the appointment letter.	▪ Once-off	▪ Project Developer

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		the south of it. **This is only applicable to the Grootfontein PV 1, Grootfontein PV 2 and Grootfontein PV 3 projects.**			
10.4. Impacts to the natural and cultural landscape.	Reduce the degree of visual contrast in the landscape.	10.4.1. Locate the laydown area, batching plant and buildings far from the public road. 10.4.2. Ensure the use of natural colours and finishes on buildings.	▪ Ensure that this is taken into consideration during the planning and design phase by reviewing signed minutes of meetings, designs or signed reports.	▪ During design cycle and before construction commences.	▪ Project Developer
A.3. TERRESTRIAL ECOLOGY IMPACTS					
10.5. The ousting of fauna through anthropogenic activities, disturbance of refugia and general change in habitat, with impacts on terrestrial ecology as a result of the final site layout and routes of the access roads	Maintain all activities to the designated footprint and existing roadways or built structures. Avoidance of unnecessary disturbance to site and surrounds and established buffers where required.	10.5.1. Ecologist to review the final layout plan in relation to existing drainage patterns and comment accordingly on storm water management across the site.	▪ Ensure that this is taken into consideration during the planning and design phase by reviewing signed minutes of meetings, designs or signed reports. ▪ Review the site plan with the ECO and possibly an ecologist (if required).	▪ Once-off, prior to the commencement of construction	▪ Project Developer
10.6. Destruction of indigenous vegetation without relevant licences or permits.	Ensure compliance with relevant Provincial and National legislation in respect of habitat and vegetation forms, where applicable.	10.6.1. Ensure the necessary permits or licences are identified and applied for as applicable. 10.6.2. Await response and provision of permit. 10.6.3. Undertake plant rescue if and where required.	▪ Review the findings of the Terrestrial Biodiversity and Species Assessment and consider legislative requirements in respect of loss of indigenous vegetation etc.	▪ Once-off, prior to the commencement of construction	▪ Project Developer and Ecologist
10.7. Sediment transport by wind	Where vegetation is cleared, measures to counteract aeolian (wind-blown) transport in the short and long term should be implemented, where necessary.	10.7.1. Use of drift fence and related measures, where required. 10.7.2. Planting of *Vachellia karroo* on cleared areas as windbreak (Appendix D).	▪ Plant according to wind direction and sediment transport, where required.	▪ Once-off, prior to the commencement of construction	▪ Project Developer and Ecologist

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		10.7.3. Appoint an Ecologist to advise on clearance and planting, where required.			
A.4. AQUATIC ECOLOGY IMPACTS					
10.8. Changes in the geomorphological state of drainage patterns and site, as well as changes to the faunal ethos in an indirect manner	Reduce changes in the geomorphological state of drainage patterns in order to reduce impacts on aquatic ecology	10.8.1. Exclusion areas should be maintained. Maintain scarp slopes are unimpeded by development. Avoid the major drainage lines, such as the Klein Droëlaagte River and Droëlaagte River. Avoid extensive alteration of sheet wash areas. The sensitivities are captured in the sensitivity map included in Appendix F of this EMPr. 10.8.2. Maintenance and establishment of an ambulatory set back of more than 100 m from the identified riparian areas and points of sheet wash as per the map presented in the Aquatic Biodiversity and Species Report, and Appendix F of this EMPr. 10.8.3. The construction and establishment of modules and arrays should be undertaken without the clearance of vegetation. Where vegetation proves excessively tall and affects either construction or operation, pruning may be effected. 10.8.4. A detailed stormwater management and drainage plan should be developed that considers inter alia, surface flows arising from elevated areas above the PV facilities and its discharge from the facilities. This philosophy must include attenuation and energy dissipation mechanisms and redress of erosion and sheet flow across site. 10.8.5. Management of fauna within the site and surrounds, as well as the incorporation of wildlife porosity into fence lines and the implementation of measures on the energised fence line to avoid mortalities to wildlife.	▪ Ensure that this is taken into consideration during the design. ▪ Verify that this has been undertaken by reviewing approved plans.	▪ Once-off during the planning and design phase ▪ Once-off during the planning and design phase.	▪ Project Developer

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
10.9. Increased electrical light pollution, leading to changes in nocturnal behavioral patterns of fauna	Reduce changes in nocturnal behavioral patterns of fauna.	10.9.1. Ensure reduced security lighting, downward lighting and restriction on lumens employed	▪ Ensure that this is taken into consideration during the design. ▪ Verify that this has been undertaken by reviewing approved plans.	▪ Once-off during the planning and design phase ▪ Once-off during the planning and design phase.	▪ Project Developer
10.10. Impact on surface water resources.	To reduce the impact of the proposed PV project on the surrounding drainage lines	10.10.1. Ensure that the Department of Human Settlements, Water and Sanitation are consulted with to confirm the need and requirements of a Water Use Licence, as noted in the Aquatic Biodiversity and Species Assessment.	▪ Ensure that the requirements of the Department of Human Settlements, Water and Sanitation are considered during the planning and design phase. ▪ Ensure that the Water Use Licence or General Authorisation, if required, is submitted and approved prior to the commencement of construction.	▪ Once-off during the planning and design phase.	▪ Project Developer
A.5. RIVERINE RABBIT					
10.11. Impact on Riverine Rabbits due to construction and operational phase activities due to habitat loss and disturbance	Reduce habitat loss and disturbance	10.11.1. Adhere to the development restrictions placed on areas of High and Very High sensitivity in the Riverine Rabbit Assessment and adhere to the sensitivity maps provided within the assessment when determining the final layout of the PV facilities and associated infrastructure. The sensitivities are captured in the sensitivity map included in Appendix F of this EMPr. No PV fields are to be placed in these areas and any roads through these areas should use existing footprint areas, where possible. 10.11.2. The design should ensure that there is no electrical fencing around the PV fields or substations (and associated battery facility) or other infrastructure that are within 20 cm of the ground as some fauna can become stuck against such fences and are electrocuted to death.	▪ Ensure that this is taken into consideration during the design. ▪ Verify that this has been undertaken by reviewing approved plans.	▪ Once-off during the planning and design phase ▪ Once-off during the planning and design phase.	▪ Project Developer
A.6. AVIFAUNA IMPACTS					

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
10.12. Entrapment of medium and large terrestrial birds between the perimeter fences, leading to mortality.	Prevent mortality of avifauna	10.12.1. A single perimeter fence should be used[2].	▪ Design the facility with a single perimeter fence.	▪ Once-off during the planning phase.	▪ Project Developer
10.13. Displacement of avifauna due to habitat loss in the development footprint.	Prevent displacement of avifauna	10.13.1. A 300 m infrastructure-free buffer must be maintained at water reservoirs in terms of the sensitivities determined in Figure 12 of the Avifauna Assessment report and as captured in the sensitivity mapping showing in Appendix F of this EMPr. 10.13.2. No solar panels to be constructed in drainage lines, in terms of the sensitivities determined in Figure 12 of the Avifauna Assessment report and as captured in the sensitivity mapping showing in Appendix F of this EMPr.	▪ Design the facility with 300 m buffers around boreholes and with no solar panels in drainage lines.	▪ Once-off during the planning phase.	▪ Project Developer
10.14. Electrocution of raptors on the internal 33 kV poles	Prevent electrocutions	10.14.1. Use underground cabling as opposed to above ground power lines for 33 kV cables.	▪ Design the facility with underground cabling	▪ Once-off during the planning phase.	▪ Project Developer
A.7. SOCIO-ECONOMIC IMPACTS					
10.15. Local job creation	Maximize potential job creation for locals	10.15.1. It is strongly suggested that a 'locals first' policy with regard to labour needs is implemented. The developer should make every effort to ensure the majority of construction workers are *de facto* residents of the Tankwa Karoo, Touws River and/or Ceres region.	▪ Review the labour and contractor policy	▪ Once-off during the planning and design phase.	▪ Project Developer
10.16. Human Development via the Economic	Draft an Economic Development Plan to align local investment with local needs. A comprehensive EDP	10.16.1. The EDP to be developed must be prepared by community development practitioners, to ensure that it can be effectively implemented and managed, bringing maximum benefit to the	▪ Draft the EDP which would in each instance serve as the method	▪ Once-off during the planning and design phase.	▪ Project Developer

[2] If a fence is used consisting of an outer diamond mesh fence and inner electric fence with a separation distance of approximately 100 mm or less, it should not pose any risk of entrapment for large terrestrial species and can be considered a single fence.

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
Development Plan (EDP)	enabling maximum benefit and agency to the beneficiary communities.	community. A third-party approach is recommended. 10.16.2. The developer or the appointed agent must engage with local communities, religious organisations, organised agriculture, NGOs, CBOs and local government structures to identify and agree upon priorities and include them in the EDP. 10.16.3. Where possible, the EDP should align with the Integrated Development Plans (IDPs) of the relevant Local Municipalities.	through which the mitigation actions are monitored.		
A.8. GEOHYDROLOGY IMPACTS					
10.17. Groundwater impact as a result of over-abstraction	To reduce the impact of the proposed PV project on the groundwater resources	10.17.1. If ground water from existing boreholes is to be used as a water source during the project phases, then a registration process must be followed for the use of existing boreholes; i.e. Section 39 of the National Water Act (Act 36 of 1998, as amended). Ensure that the Department of Human Settlements, Water and Sanitation (DHSWS) are consulted with to confirm the need and requirements of a General Authorisation for use of existing boreholes in the vicinity. In addition, agreements must be put in place with the current land owners for the use of groundwater. These agreements must be legally valid documents. 10.17.2. If no such agreements can be put in place, and if ground water needs to be used, then additional boreholes may be drilled on the relevant farm portions, followed by yield and water quality testing, and then authorization from DHSWS to use the ground water will be required.	▪ Ensure that the requirements of the DHSWS are considered during the planning and design phase. ▪ Ensure that the General Authorisation or Water Use Licence is submitted and approved prior to the commencement of construction, based on the requirements of the DHSWS.	▪ Once-off during the planning and design phase.	▪ Project Developer
		10.17.3. If ground water from existing boreholes is to be used during the project phases, then a Geohydrology Specialist must be appointed and must undertake a site visit and hydrocensus during the design and planning phase to quantify the number of potential boreholes that could be used	▪ Ensure that this is taken into consideration during the planning and design phase and that Geohydrology Specialist with suitable qualifications and experience is appointed to undertake	▪ During design cycle and before construction commences.	▪ Project Developer

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		for abstraction, as well as, their proximity to the development and other nearby groundwater sources and users. Groundwater quality sampling is also recommended to determine whether the quality of the water meets the quality recommendations for the cleaning of solar panels, and for other purposes during the construction and operational phases.	a hydrocensus and water quality sampling by reviewing signed minutes of meetings or signed reports or the appointment letter. ▪ Ensure that the findings are taken into consideration during the planning and design phase, as necessary.		
A.9. IMPACTS RESULTING FROM THE BATTERY ENERGY STORAGE SYSTEMS					
10.18. Risk of fire, explosion or release of toxic gas, and spillage of electrolyte as a result of the Lithium Ion Battery Energy Storage Systems	Minimise the risk of fire, explosion or release of toxic gas, and spillage of electrolyte as a result of the Lithium Ion Battery Energy Storage Systems (BESS)	10.18.1. Ensure that adequate research is undertaken by the Project Developer during the planning and design phase to select the supplier with the best technology and which has substantial environmental and safety mechanisms built in to the design of the BESS. Reputable suppliers that comply with the necessary legislation and regulations must be selected.	▪ Ensure that this is taken into consideration during the planning and design phase by reviewing signed minutes of meetings or signed reports.	▪ During design cycle and before construction commences.	▪ Project Developer
		10.18.2. Ensure that the Department of Environment, Forestry and Fisheries is contacted if any BESS technology, other than Lithium Ion, is being considered and that relevant approval from the Competent Authority is obtained.	▪ Ensure that this is taken into consideration during the planning and design phase by reviewing signed minutes of meetings or signed reports.	▪ During design cycle and before construction commences.	▪ Project Developer
		10.18.3. Engage with a Risk Assessment specialist prior to construction to advise on any additional mitigation measures that need to be considered from a fire, explosion or release of toxic gas perspective.	▪ Ensure that a Risk Assessment Specialist is appointed during the planning and design phase by keeping the appointment letter on file. ▪ Ensure that the recommendations of the Risk Assessment specialist are taken into consideration in the design, as required.	▪ During design cycle and before construction commences. ▪ During design cycle and before construction commences.	▪ Project Developer ▪ Project Developer
		10.18.4. Ensure that the BESS's are located in a clearly demarcated area in order to prevent unnecessary access.	▪ Ensure that this is taken into consideration during the planning and design phase by reviewing	▪ During design cycle and before construction commences.	▪ Project Developer

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		10.18.5. Ensure that the individual BESS's are located at adequate distances from each other in order to limit the knock-on effect or propagation of potential fires. 10.18.6. Ensure that the BESS is placed on an impermeable surface (e.g. concrete surface) which has adequate containment mechanisms to collect contaminated storm water. 10.18.7. Adhere to the appropriate international standards and South African National Standards (SANS) requirements in terms of the assembly and operation of the BESS.	signed minutes of meetings, designs or signed reports.		
		10.18.8. Ensure that the responsibilities of the various parties are defined clearly for the life cycle of the BESS, such as when the BESS is being transported to site, when it reaches site, during operations, during transport off site in the event of malfunction or any technical issues. A clear plan must be devised that deals with the above.	▪ Ensure that this is taken into consideration during the planning and design phase by reviewing signed minutes of meetings, designs or signed reports.	▪ During design cycle and before construction commences.	▪ Project Developer
		10.18.9. A fire management plan must be compiled and implemented during the construction, operational and decommissioning phases, which must include an action plan for fires and emergency response specifically relating to the BESS.	▪ Verify that the fire management plan is compiled and being implemented and signed off prior to the commencement of operations.	▪ Prior to the construction phase	▪ Project Developer
		10.18.10. The Project Applicant must develop a Spill Contingency Plan and Emergency Response Action Plan that deals with all potential spills and emergency response, specifically relating to the BESS.	▪ Ensure there is a spill and emergency response plan specifically relating to BESS.	▪ Prior to the construction phase	▪ Project Developer
		10.18.11. Ensure that the contact details of the local municipality and emergency response officials are kept on file and clearly sign-posted on site. 10.18.12. Ensure that the contact details for the supplier of the BESS is kept readily available and sign-posted	▪ Verify that the contact details of the local municipality, emergency response officials and the selected BESS supplier and retained and maintained on file prior to construction.	▪ Prior to the construction phase	▪ Project Developer

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		on site, should they need to be contacted during emergency situations.			
A.10. CIVIL AVIATION IMPACTS					
10.19. Potential impacts on civil aviation installations as a result of the proposed project.	Minimise the impact on nearby landing strips and other civil aviation installations.	10.19.1. Ensure that feedback is obtained from the South African Civil Aviation Authority and relevant permits obtained, if necessary, and that recommendations are incorporated into the design, as necessary.	▪ Ensure that this is taken into consideration during the planning and design phase by reviewing signed minutes of meetings or signed reports.	▪ During design cycle and before construction commences.	▪ Project Developer
B. CONSTRUCTION PHASE					
B.1. SOIL AND AGRICULTURAL IMPACTS					
10.20. Soil degradation as a result of topsoil loss. Loss of topsoil can result from poor topsoil management during construction related excavations.	Ensure that soil resources are protected and that topsoil loss is minimized.	10.20.1. If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.	▪ Record GPS positions of all occurrences of below-surface soil disturbance (e.g. excavations). Record the date of topsoil stripping and replacement. ▪ Check that topsoil covers the entire disturbed area.	▪ As required, whenever areas are disturbed.	▪ ECO
B.2. VISUAL IMPACTS					
10.21. Potential visual intrusion of construction activities on existing views of sensitive visual receptors	Reduce visual intrusion of construction activities project wide.	10.21.1. Implement dust suppression and litter control measures, as well as rehabilitation of borrow pits (if required) and haul roads to minimise their visual effect on the surroundings. Ensure regular reporting to an environmental management team by the ECO during the construction phase.	▪ Ensure that this is taken into consideration prior to the commencement of construction. ▪ Conduct site inspections to monitor implementation and report any non-compliance.	▪ Once-off during the construction phase. ▪ Weekly	▪ Project Developer ▪ ECO
10.22. Potential effect of dust and noise from trucks and construction	To reduce the effect of dust and noise from trucks and construction machinery on the	10.22.1. Ensure that the EMPr is implemented during the construction phase via the appointment of an ECO.	▪ Ensure that this is undertaken prior to construction and the signed	▪ Once-off prior to construction ▪ Weekly	▪ Project Developer ▪ ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
machinery on residents and visitors to the area, particularly users of the main arterial route (R356), to the site	surrounding landscape and receptors.	10.22.2. Ensure that the construction camp, batching plants (if required), stockpiles and other facilities are located in visually unobtrusive areas, away from public roads.	appointment letter of the ECO is kept on file. ▪ Conduct site inspections to monitor implementation and report any non-compliance.		
B.3. HERITAGE IMPACTS (ARCHAEOLOGY AND CULTURAL LANDSCAPE)					
10.23. Construction vehicles and activities could result in damage to or destruction of archaeological sites and/or graves.	Minimise the chances of significant archaeological sites and/or graves being disturbed.	10.23.1. Ensure that no activity takes place outside of the authorized construction footprint.	▪ Carry out visual inspections to ensure strict control over the behaviour of construction staff in order to restrict activities to within demarcated areas.	▪ Weekly	▪ ECO
		10.23.2. The ECO must ensure that all staff are informed of the possibility of finding buried archaeological resources and graves (i.e. ensure that all personnel are aware of the potential of encountering archaeological resources and graves and what to do if this occurs (i.e. to report any suspicious stone features prior to disturbance)).	▪ Carry out Environmental Awareness Training to ensure that the Contractors and all staff are informed of the possible type of heritage features that may be encountered during the construction phase. ▪ Conduct audits of the signed attendance registers.	▪ Once-off training and ensure that all new staff are inducted. ▪ Monthly ▪ As required/ necessary during the construction phase.	▪ Contractor/ ECO ▪ ECO
		10.23.3. The ECO must conduct formal monitoring site visits to (1) verify that all work is remaining within the authorised area and (2) check for any fossils or artefact concentrations that might be revealed.	▪ Carry out inspections and record findings and any non-compliance.	▪ Weekly	▪ ECO
		10.23.4. If any concentrations of archaeological material, graves or stone features are uncovered during the proposed construction, work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution. Sufficient time should be allowed to remove/collect such material. A professional archaeologist or palaeontologist, depending on the	▪ Monitor excavations and construction activities for archaeological materials via visual inspections and report the finds accordingly. ▪ Contact the heritage authorities and the identified archaeologist if any heritage features are uncovered.	▪ Daily or during excavations. ▪ As required/ necessary during the construction phase.	▪ Contractor and ECO ▪ Project Developer

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		nature of the finds, must be contracted as soon as possible to inspect the findings.			
10.24. Impacts to the natural and cultural landscape.	Reduce the degree of visual contrast in the landscape.	10.24.1. Minimise the disturbance footprint. 10.24.2. Employ dust suppression measures. 10.24.3. Ensure effective rehabilitation.	▪ Carry out visual inspections to ensure strict control over the behaviour of construction staff in order to restrict activities to within demarcated areas, implementation of dust suppression and effective rehabilitation mechanisms.	▪ Weekly	▪ ECO
B.4. PALAEONTOLOGY IMPACTS					
10.25. Disturbance, damage, destruction or sealing-in of scientifically valuable fossil material embedded within bedrock or exposed at ground surface within the development footprint.	Safeguarding, recording and sampling of scientifically-important fossil material encountered or exposed during development (Chance Fossil Finds)	10.25.1. The ECO should be made aware of the possibility of important fossil remains (bones, teeth, petrified wood, plant-rich horizons, fossil termitaria etc.) being found or unearthed during the construction phase of the development. Ensure that monitoring of all bedrock excavations (> 1 m) and major cleared sites for fossil remains is undertaken on an on-going basis by the ECO during the construction phase. Refer to the Chance Fossil Finds Procedure (Appendix C of this EMPr). 10.25.2. Significant fossil finds should be safeguarded and reported at the earliest opportunity to Heritage Western Cape (HWC) for recording and sampling by a professional palaeontologist (Contact details: Heritage Western Cape. Protea Assurance Building, Green Market Square, Cape Town 8000. Private Bag X9067, Cape Town 8001. Tel: 086-142 142. Fax: 021-483 9842. Email: hwc@pgwc.gov.za).	▪ Regular visual inspection of substantial excavations and cleared areas for fossil remains. Chance fossil finds to be safeguarded (site taped-off or fossils set aside) and reported to HWC for possible mitigation.	▪ Ongoing during the construction phase	▪ ECO
		10.25.3. Recording and judicious sampling of exceptional new fossil material and relevant geological data (e.g. stratigraphy, taphonomy) from the development footprint must be undertaken. Professional mitigation should conform to best practice. The palaeontologist concerned will need a Fossil Collection Permit from HWC.	▪ Standard palaeontological recording and collection methods (GPS / photos / field notes / careful wrapping of specimens for transport).	▪ Following report of significant new fossil finds by ECO	▪ Professional palaeontologist assisted by ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		10.25.4. Curation of fossil specimens at an approved repository (e.g. museum).	▪ Cataloging and safe storage of fossils plus key field data in an approved repository (museum / university).	▪ Following mitigation	▪ Professional palaeontologist
		10.25.5. Final technical report on palaeontological heritage within study area submitted to HWC.	▪ Minimum reporting requirements specified by heritage resources agency (e.g. SAHRA / HWC).	▪ Following mitigation and preliminary analysis of fossil finds	▪ Professional palaeontologist
B.5. TERRESTRIAL ECOLOGY IMPACTS[3]					
10.26. Exclusion or entrapment of (in particular) large fauna	Species that may be found present in the construction footprint and laydown area should be driven from site.	10.26.1. Appoint a specialist to conduct an inspection of the final project area and sweep or inspect the site for any fauna, once the fencing is complete (i.e. the established site should be flushed to ensure any large wildlife is not contained within the fenced area). 10.26.2. Ensure regular flushing of the area throughout the construction phase.	▪ Ensure that a suitable Ecologist is appointed once the fencing is installed to inspect the area and flush the fauna from within. ▪ Ensure that this is taken into consideration during the construction phase.	▪ Once-off once the fence is installed ▪ On-going	▪ Project Developer and Specialist ▪ ECO and Contractor
10.27. Changes in edaphics (soils) due to excavation and import of soils, leading to the alteration of plant communities and fossorial species in and around these points	Minimize the alteration of plant communities and fossorial species	10.27.1. Ensure construction activities are limited to the development foot print in order to minimise the extent of impact	▪ Carry out inspections to ensure that access is being limited to the construction footprint.	▪ Daily	▪ ECO
10.28. Changes in water resources and surface water in terms of water quality	Reduce the changes in water resources and surface water in terms of water quality	10.28.1. Ensure all hazardous materials are adequately stock piled in a leak proof receptacle. 10.28.2. Ensure a spill kit is placed on site in order to contain any hydrocarbon leaks if necessary.	▪ Ensure that this is taken into consideration during the construction and record any non-compliance.	▪ On-going	▪ ECO and Contractor

[3] Management actions relating to alien invasive vegetation management are covered in Section 4 of this EMPr.

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
10.29. Clearance of vegetation to establish roadways and other infrastructure	To reduce negative impacts on and loss of indigenous vegetation and protected trees.	10.29.1. Appoint a specialist to undertake a second review and site visit of the final layout of the development footprint, possibly during the late summer or early winter period, in order to identify any plant species on site that may require "rescue" as well as any exotic weeds/vegetation that require removal. 10.29.2. Identification of roadways and areas where extensive vegetation loss will result based on the final design is required. 10.29.3. Ensure that the footprint required for the proposed project activities (such as temporary stockpiling etc.) is clearly demarcated and kept at a minimum. 10.29.4. Clearance activities are to be strictly confined to the development footprint. Clearance is to be carried out where needed to accommodate infrastructure.	▪ Appoint an Ecologist to oversee the final development footprint area through a reconnaissance survey.	▪ Prior to the commencement of construction	▪ Project Developer, Specialist and ECO
10.30. Increased dust generation as a result of movement of traffic and other construction related factors, which will affect factors such as palatability of vegetation.	To limit the impact of dust on terrestrial ecology.	10.30.1. Impose a speed limit on construction vehicles operating within the construction site.	▪ Implement speed control mechanisms prior to commencement of construction. ▪ Carry out random inspections to verify whether proper speed control is being implemented.	▪ On-going ▪ Random during the construction phase	▪ ECO and Contractor ▪ ECO
10.31. Incidental pollution events, including the loss of solid waste, spillage of liquids such as hydrocarbons and other fuels as well as possible sewerage and other waste is likely to alter select points within the subject site, possibly	Minimize the impacts on terrestrial ecology due to incidental pollution events.	10.31.1. A waste management plan is to be compiled and implemented onsite. 10.31.2. A spill kit is to be placed on site in order to curtail and contain any hydrocarbon spill. 10.31.3. A designated waste area is to be placed within a suitable place onsite, which is to be identified by the appointed ECO.	▪ Ensure that this is taken into consideration during the construction phase and record any non-compliance.	▪ On-going	▪ ECO and Contractor

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
affecting habitat form and other factors.					
10.32. General disturbance on account of pedestrian movement and activities on site	To advise construction staff of the requirements in respect of management of flora and fauna on site during the construction phase.	10.32.1. Limit pedestrian/labour movement to within the confines of the site. 10.32.2. Appropriate signage and environmental induction are to be carried out in order to convey this point to onsite labourers (i.e. convey acceptable areas in which to traverse within the subject site).	▪ Carry out Environmental Awareness Training with a discussion on the management of terrestrial fauna and flora on site. ▪ Conduct audits of the signed attendance registers.	▪ Prior to construction and as required by the Environmental Control Officer. Ensure that all new staff are inducted. ▪ Monthly	▪ ECO and Contractor
B.6. AQUATIC ECOLOGY IMPACTS					
10.33. Changes in the geomorphological state of drainage patterns and site, as well as changes to the faunal ethos in an indirect manner	Reduce changes in the geomorphological state of drainage patterns in order to reduce impacts on aquatic ecology	10.33.1. The laydown area for the PV facilities should be subject to compaction and the use of dust suppressants when in operation, to prevent excessive particulate matter becoming airborne. 10.33.2. Cordon off the sites to prevent inward migration of fauna.	▪ Ensure that this is taken into consideration during the construction phase and record any non-compliance. ▪ Carry out inspections to ensure that the sites are cordoned off.	▪ On-going	▪ ECO and Contractor
10.34. Changes in water resources and surface water in terms of water quality (i.e. impact on water chemistry) as a result of construction activities	Reduce the changes in water resources and surface water in terms of water quality	10.34.1. Provide adequate storm water controls to ensure attenuation of storm water runoff emanating from the PV panels and other hard panned surfaces	▪ Ensure that this is taken into consideration during the construction and record any non-compliance.	▪ On-going	▪ ECO and Contractor
B.7. RIVERINE RABBIT					
10.35. Impact on Riverine Rabbits due to construction phase activities due to habitat loss and disturbance	Reduce habitat loss and disturbance	10.35.1. All vehicles should adhere to a low speed limit on site. Heavy vehicles should be restricted to 30 km/h and light vehicles to 40 km/h. 10.35.2. As Riverine Rabbit activity is highest between dusk and dawn, traffic during these hours should be curtailed.	▪ Implement speed control mechanisms prior to commencement of construction. ▪ Carry out random inspections to verify whether proper speed control is being implemented.	▪ On-going ▪ Random during the construction phase ▪ Daily	▪ ECO and Contractor ▪ ECO ▪ ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		10.35.3. Limiting access to the site and ensuring that construction staff and machinery remain within the demarcated construction areas during the construction phase. 10.35.4. Environmental induction for all staff and contractors on-site must be undertaken.	▪ Carry out inspections to ensure that access is being limited to the construction footprint. ▪ Carry out Environmental Awareness Training. ▪ Conduct audits of the signed attendance registers.	▪ Once-off training and ensure that all new staff are inducted. ▪ Monthly	▪ ECO and Contractor ▪ ECO
B.8. AVIFAUNA IMPACTS					
10.36. The noise and movement associated with the construction activities at the development footprint will be a source of disturbance which would lead to the displacement of avifauna from the area	Prevent unnecessary displacement of avifauna by ensuring that contractors are aware of the requirements of the Construction EMPr (CEMPr.)	10.36.1. A site-specific CEMPr must be implemented, which gives appropriate and detailed description of how construction activities must be conducted. All contractors are to adhere to the CEMPr and should apply good environmental practice during construction. The CEMPr must specifically include the following: • No off-road driving; • Maximum use should be made of existing access roads and the construction of new roads should be kept to a minimum as far as practical; • Measures to control noise and dust according to latest best practice; • Restricted access to the rest of the property; • Strict application of all recommendations in the Terrestrial Biodiversity and Species Assessment Report pertaining to the limitation of the footprint, limiting the vegetation clearance to what is absolutely necessary, and rehabilitation of transformed areas.	▪ Implementation of the CEMPr. Oversee activities to ensure that the CEMPr is implemented and enforced via site audits and inspections. Report and record any non-compliance. ▪ Ensure that construction personnel are made aware of the impacts relating to off-road driving. ▪ Construction access roads must be demarcated clearly. Undertake site inspections to verify. ▪ Monitor the implementation of noise control mechanisms via site inspections and record and report non-compliance. ▪ Ensure that the construction area is demarcated clearly and that construction personnel are made aware of these demarcations. Monitor via site inspections and report non-compliance.	▪ On a daily basis ▪ Weekly ▪ Weekly ▪ Weekly ▪ Weekly	▪ Contractor and ECO ▪ Contractor and ECO ▪ Contractor and ECO ▪ Contractor and ECO ▪ Contractor and ECO
B.9. SOCIO-ECONOMIC IMPACTS					

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
10.37. Disruption of local social structures	Prevent unnecessary social order disturbance, general disorientation and deterioration of social capital	10.37.1. The developer should make every effort to ensure the majority of construction workers are *de facto* residents of the Tankwa Karoo, Touws River and/or Ceres region. 10.37.2. Where possible, subcontract to local construction companies.	▪ Composition of workforce to be monitored during construction to assess the number of *de facto* local residents employed. Review of the registers held by the contractors. ▪ Undertake inspections to monitor compliance.	▪ Monthly or bi-monthly ▪ Monthly	▪ Project Developer and ECO
10.38. Increased social ills and risky behaviours	Minimise increase of social ills and risky behaviours associated with workforce influx to the area.	10.38.1. The developer should make every effort to ensure the majority of construction workers are de facto residents of the Tankwa Karoo, Touws River and/or Ceres region. 10.38.2. Where possible, subcontract to local construction companies. 10.38.3. Develop and implement communication strategies to facilitate participation. The developer should be mindful of and regularly engage with landowners, farm residents and with Touws River and/or Ceres local communities. The former can be achieved through liaison with the Tankwa Ceres Karoo Farmers' Union. The latter can be achieved in collaboration with local community organisations. 10.38.4. The developer should develop and clearly communicate a Code of Conduct for all employees related to the project, which includes zero tolerance of activities such as violence, alcohol and drug abuse. 10.38.5. Introduce weekly randomized alcohol and drug testing for all employees related to the project. 10.38.6. Make condoms freely available to all employees related to the project. 10.38.7. No construction workers should be allowed to sleep at the construction site. 10.38.8. All COVID regulations and safety precautions in force at the time of construction, operation and decommissioning must be communicated to workforce, enforced and upheld by the developer.	▪ Composition of workforce to be monitored during construction to assess the number of *de facto* local residents employed. Review of the registers held by the contractors. ▪ Undertake inspections to monitor compliance. ▪ Undertake audits to ensure that the community communication strategy is compiled, and that dates and outcomes of engagement are reviewed. Report non-compliance. ▪ Verify that a Code of Conduct is developed and is being implemented with written proof kept on file. ▪ Verify that a random testing programme is developed and is being implemented with written proof kept on file. Testing dates and results to reviewed. ▪ Hold Environmental Awareness Training to discuss social issues. All new staff should be inducted. Attendance registers should be monitored and kept on file. ▪ Security records must be reviewed to verify no personnel stay over on	▪ Monthly or bi-monthly ▪ Monthly ▪ Monthly ▪ Monthly ▪ Monthly ▪ Once-off training and ensure that all new staff are inducted. ▪ Weekly ▪ Weekly ▪ As required ▪ Annually	▪ Project Developer and ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		10.38.9. The construction workforce should receive COVID-19 and HIV awareness training before the commencement of construction. In addition, HIV and TB testing and counselling should be made available to the construction workforce free of charge. 10.38.10. Local HIV infection rates/ARV treatment loads must be monitored annually through close interaction with the local clinic. Should infections and treatment loads increase at a rate greater than the anticipated rate of increase; the developers (or the appointed agent) must re-evaluate its HIV awareness training, take corrective action where necessary, and repeat said training.	site. Record and report any non-compliance. ▪ Verify that COVID regulations and safety precautions are developed and is being implemented with written proof kept on file. ▪ Hold relevant training sessions and ensure that all staff attend. Dates, duration, and content outline of prevention of disease training and register of attendance reviewed. ▪ Verify that local HIV infection rates/ARV treatment loads are monitored annually with written proof kept on file.		
10.39. Increased burden on existing social and bulk services	Minimise increased burden on existing social and bulk services and densification.	10.39.1. It is strongly suggested that a 'locals first' policy with regard to labour needs is implemented. The developer should make every effort to ensure the majority of construction workers are de facto residents of the Tankwa Karoo, Touws River and/or Ceres region. 10.39.2. Where possible, subcontract to local construction companies.	▪ Composition of workforce to be monitored during construction to assess the number of *de facto* local residents employed. Review of the registers held by the contractors. ▪ Undertake inspections to monitor compliance.	▪ Monthly or bi-monthly ▪ Monthly	▪ Project Developer and ECO
10.40. Increased road use and road traffic related accidents and/or damage	Minimise the impact of the construction activities on the local traffic and avoid accidents with pedestrians, animals and other drivers on the surrounding roads. Reduce number of road accidents due to increased traffic during construction.	10.40.1. Traffic expert should be consulted, prior to construction, and a road and traffic management plan devised and implemented to mitigate potential negative consequences of increased road use during construction.	▪ Ensure that the traffic specialist is appointed and the plan is compiled prior to commencement of construction. ▪ Verify that this has been undertaken by reviewing approved plans and appointment letter.	▪ Once-off during the planning and design phase ▪ Once-off during the planning and design phase.	▪ Project Developer and Contractor ▪ ECO
10.41. Unrealistic expectations regarding local job creation	Minimize unrealistic job expectations, negative attitudes and/or behaviour towards project	10.41.1. It is strongly suggested that a 'locals first' policy with regard to labour needs is implemented. The developer should make every effort to ensure the majority of construction workers are de facto	▪ Composition of workforce to be monitored during construction to assess the number of *de facto* local	▪ Monthly or bi-monthly	▪ Project Developer and ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		residents of the Tankwa Karoo, Touws River and/or Ceres region. 10.41.2. The developer must engage the local communities in the study area on the nature, duration, number and availability of employment opportunities well in advance of any construction activities taking place. It is recommended that existing social structures be utilised for such interaction, and that the process be commenced once environmental authorisations have been granted. 10.41.3. The developer should establish employment desks in the Tankwa Karoo, Touws River and/or Ceres region to facilitate employment-related queries, and maintain a register of applicants which reflects their respective expertise, skill level and contact/residential details. Whenever planned or ad hoc employment is considered, the register should be consulted to identify appropriately qualified candidates. 10.41.4. Employment procedures should not preclude the educationally and resource poor. 10.41.5. The existence of the employment desks and the relevant procedures associated with the selection and appointment of workers must be communicated to the local communities. 10.41.6. Where possible, the developer should subcontract to local construction companies.	residents employed. Review of the registers held by the contractors. ▪ Undertake audits to ensure that the community communication strategy is compiled, and that dates and outcomes of engagement are reviewed in terms of the number of jobs to be created. Report non-compliance. ▪ Verify that employment desks are developed and is being implemented with written proof kept on file. ▪ Composition of workforce to be monitored during construction to assess the number of *de facto* local residents employed and range of educational background. Review of the registers held by the contractors. ▪ Verify that local communities are informed of employment desks and such desks are being implemented with written proof kept on file. ▪ Undertake inspections to monitor compliance.	▪ Once off before construction and thereafter monthly ▪ Monthly ▪ Monthly ▪ Monthly ▪ Monthly	
10.42. Creation of temporary employment	Reduce risks associated with short term employment	10.42.1. The developer should make every effort to ensure the majority of construction workers are de facto residents of the Tankwa Karoo, Touws River and/or Ceres region. 10.42.2. Where possible, the developer should subcontract to local construction companies. 10.42.3. The developer should comply with the Employment Equity Act (EEA) and make every effort to ensure equal access to employment, taking the demographics of the area into account.	▪ Composition of workforce to be monitored during construction to assess the number of *de facto* local residents employed. Review of the registers held by the contractors. ▪ Undertake inspections to monitor compliance. ▪ Compliance with employment legislation to be monitored and composition of workforce to be	▪ Monthly or bi-monthly ▪ Monthly ▪ Monthly ▪ Monthly ▪ Monthly ▪ Monthly ▪ As required	▪ Project Developer, Contractor and ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		10.42.4. The developer should establish local employment desks in the Tankwa Karoo, Touws River and/or Ceres region to facilitate employment-related queries, and maintain a register of applicants which reflects their respective expertise, skill level and contact/residential details. 10.42.5. Whenever planned or ad hoc employment is considered, the register should be consulted to identify appropriately qualified candidates. 10.42.6. Employment opportunities and the existence of the employment desk must be communicated to the local communities in the Tankwa Karoo, Touws River and/or Ceres region. 10.42.7. The developer should offer debt education workshops for all project related employees. The developer is encouraged to provide on-the-job training and additional training programs to improve the chances of skills development during the construction phase.	monitored during construction to assess the number of *de facto* local residents employed and range of educational background. Review of the registers held by the contractors. ▪ Verify that employment desks are developed and is being implemented with written proof kept on file. ▪ Verify that employment desks are implemented and consulted, with written proof kept on file. ▪ Verify that local communities are informed of employment desks and such desks are being implemented with written proof kept on file. ▪ Record of debt education workshops and other skills training to be reviewed. Register of attendance reviewed.		
10.43. Increased household income attainment and standard of living	Enhance income levels and standard of living of benefitting households thereby stimulating local economy.	10.43.1. The developer should make every effort to ensure the majority of construction workers are de facto residents of the Tankwa Karoo, Touws River and/or Ceres region. 10.43.2. Employment opportunities and the existence of the employment desks must be communicated to the local communities in the Tankwa Karoo, Touws River and/or Ceres region.	▪ Composition of workforce to be monitored during construction to assess the number of *de facto* local residents employed. Review of the registers held by the contractors. ▪ Verify that local communities are informed of employment desks and such desks are being implemented with written proof kept on file.	▪ Monthly or bi-monthly	▪ Project Developer, Contractor and ECO
10.44. Potential increase in crime	Minimise potential increase in theft related crimes	10.44.1. Access to the project site should be controlled with only authorised staff permitted entry. Movement to and from the project site should be controlled where construction workers are transported to and from the pick-up area and project site by the developer or the appointed agent only. 10.44.2. The developer could consider forming or participating in a local safety forum and/or	▪ Access and transport arrangement records must be reviewed and any non-compliances recorded and reported. ▪ Verify if this is taken into consideration by reviewing signed	▪ Monthly ▪ Once off ▪ Once off	▪ Project Developer, Contractor and ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		community watch to address any concerns related to possible crime escalation. 10.44.3. The developer could consider erecting and/or contributing to the costs of erecting security cameras and/or a repeater to help improve crime prevention and management in the area.	minutes of meetings or signed reports. ▪ Verify if this is taken into consideration by reviewing signed minutes of meetings or signed reports.		
10.45. Potential decrease in local eco-tourism	Minimize the potential decrease in local eco-tourism	10.45.1. The developer should make use of local eco-tourism services and product providers where possible. 10.45.2. The developer should provide consultants, contractors and other skilled project related staff with a list of local eco-tourism services and product providers with a clear request to support local eco-tourism, where possible.	▪ Verify if this is taken into consideration by reviewing signed minutes of meetings or signed reports.	▪ As required	▪ Project Developer, Contractor and ECO
10.46. Potential marginalisation of local residents	Reduce potential marginalisation of local residents	10.46.1. The developer should consider appointing a community liaison person tasked with establishing and maintaining effective communication with local residents and/or their representatives.	▪ Verify if this is taken into consideration by reviewing signed minutes of meetings or signed reports.	▪ As required	▪ Project Developer, Contractor and ECO
10.47. Development and/or growth of locally-owned industries	Enhance the growth and/or development of locally owned industries	10.47.1. The developer should make use of local service and goods providers where possible. 10.47.2. The developer should provide consultants, contractors and other skilled project related staff with a list of local service and goods providers with a clear request to support local businesses where such services are required.	▪ Verify purchase of local goods and services through proof of purchase. ▪ Verify if this is taken into consideration by reviewing signed minutes of meetings or signed reports.	▪ Three times during the estimated 14-month construction period ▪ As required	▪ Project Developer, Contractor and ECO
B.10. GEOHYDROLOGY IMPACTS					
10.48. Groundwater impact as a result of over-abstraction	To prevent the lowering of groundwater levels as a result of over-abstraction (should ground water be used during the project phases)	10.48.1. The boreholes that are to be used must be correctly yield tested prior to use according to the National Standard (SANS 10299-4:2003, Part 4 – Test pumping of water boreholes) so that the correct pump sizes and installation depths can be determined. This includes a Step Test, Constant Discharge Test and recovery monitoring.	▪ Ensure that this is taken into consideration and that a Geohydrology Specialist with suitable qualifications and experience is appointed to undertake relevant tests by reviewing signed minutes of meetings or signed reports or the appointment letter.	▪ Once off prior to use and then monthly to monitor the parameters.	▪ Project Developer and ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		10.48.2. The boreholes should also be sampled and chemically and microbiologically analysed by a SANAS accredited laboratory. 10.48.3. Once the boreholes are in use they should be equipped with: • Observation pipes - so that the water levels can be measured (either manually or by data loggers); • Flow meters – to assess how much water is used and thereby all authorisations in place for use of the water are adhered to; and • Sampling tap – to enable annual sampling to ensure the groundwater is safe for continued use – especially if it is to be used as drinking water. 10.48.4. Adhere to the borehole's safe yield and to monitor water levels and flow.	▪ Ensure that the borehole parameters are documented to ensure trends and consumption can be monitored.		
10.49. Potential impact on groundwater quality as a result of accidental oil spillages or fuel leakages.	To reduce the potential of groundwater pollution.	10.49.1. Avoid using old or damaged construction equipment and vehicles and ensure that they are well maintained and regularly serviced in order to ensure no leakages. All vehicles and other equipment (generators etc.) must be regularly serviced to ensure they do not spill oil. 10.49.2. Any engines that stand in one place for an excessive length of time must have drip trays. Diesel fuel storage tanks, if required, should be above ground on an impermeable concrete surface in a bunded area. 10.49.3. Vehicles should be refuelled on paved (impervious) areas, optimally off-site. If off-site refuelling is not possible, a designated area and impermeable surface should be established at the construction site camp for this purpose. If liquid product is being transported it must be ensured this does not spill during transit.	▪ Construction vehicles and equipment need to be monitored throughout the construction phase. Monitor via site audits and record non-compliance and incidents. ▪ Monitor the placement of fuel storage tanks and use of drip trays at the site camp via visual inspections. Monitor the usage of spill containment measures and record and report non-compliance. ▪ Monitor the placement and designation of the area for refuelling at the site camp via visual inspections. Monitor the occurrence of potential spills and the usage of spill containment measures and record and report non-compliance.	▪ Four times per annum for the construction period, i.e. at 3 months, 6 months, 9 months and 12 months. ▪ Weekly ▪ Weekly ▪ Weekly ▪ Monthly ▪ Weekly ▪ Weekly	▪ Project Developer and ECO ▪ Project Developer and ECO ▪ Project Developer and ECO ▪ Project Developer and ECO ▪ Project Developer and ECO ▪ Project Developer and ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		10.49.4. If spillages occur during refuelling, they should be contained and removed as rapidly as possible, with correct disposal procedures of the spilled material, and reported. Proof of disposal (waste disposal slips or waybills) should be obtained and retained on file for auditing purposes. 10.49.5. Emergency measures and plans must be put in place and rehearsed in order to prepare for accidental spillage. 10.49.6. Vehicle and washing areas must also be on paved surfaces and the by-products removed to an evaporative storage area or a hazardous waste disposal site (if the material is hazardous).	▪ Monitor the refuelling/ servicing process and record the occurrence of any spillages. ▪ Monitor the implementation of emergency spill containment and contingency plans, including holding emergency drills. Record and report non-compliance. ▪ Monitor the placement of vehicle and washing area via visual inspections. Monitor the correct disposal of spilled material or contaminated soil and audit the waybills. Record and report non-compliance. ▪ Waste removal and disposal to be monitored. Monitor via site audits and record non-compliance and incidents. Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents.		▪ Project Developer and ECO
B.11. WASTE MANAGEMENT					
10.50. Pollution of the surrounding environment (including drainage lines) as a result of the handling, temporary stockpiling and disposal of general waste.	Reduce environmental impacts such as soil, surface water and groundwater contamination as a result of incorrect storage, handling and disposal of general waste. Minimise the production of waste. Ensure compliance with waste management legislation.	10.50.1. General waste (i.e. construction waste, building rubble, discarded concrete, bricks, tiles, wood, glass, window panes, air conditioners, plastic, metal, excavated material, packaging material, paper and domestic waste etc.) generated during the construction phase should be stockpiled temporarily (i.e. once-off) on site in a designated area within suitable waste collection bins and skips (or similar). Waste collection bins and skips should be covered with suitable material, where appropriate.	▪ Monitor the strategic placement of the temporary, designated waste stockpiling area at the site camp via visual inspections, and record and report any non-compliance. ▪ Monitor the temporary storage and handling of general waste on site via site audits and record non-compliance and incidents (i.e. conduct visual inspections of the temporary waste storage area).	▪ Once-off prior to the commencement of the construction phase and as required as the construction phase process evolves. ▪ Daily	▪ ECO and Contractor ▪ ECO
		10.50.2. Should the on-site stockpiling of general waste exceed 100 m^3 and a period of 90 days, then the National Norms and Standards for the Storage of	▪ Record the amount of general waste that is temporarily stockpiled at the designated area on site, as well as	▪ Daily ▪ Weekly	▪ Contractor ▪ ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		Waste (published on 29 November 2013 under GN 926) must be adhered to.	the duration and record non-compliance and incidents. ▪ Monitor the duration and amounts of general waste that is temporarily stockpiled at the designated area on site via site audits and record non-compliance and incidents (i.e. conduct visual inspections of the temporary waste storage area). ▪ Audit compliance with the Norms and Standards for the Storage of Waste (published on 29 November 2013 under GN 926) if the storage amounts are exceeded (i.e. only if required).	▪ Monthly	▪ Project Developer
		10.50.3. Ensure that the designated stockpiling area for general waste (i.e. skips and waste collection bins) is inspected on a daily basis to verify its condition and integrity, particularly after rainfall events.	▪ Monitor the temporary, designated waste stockpiling area at the site camp, as well as the handling of general waste on site via site audits and record non-compliance and incidents.	▪ Daily	▪ ECO
		10.50.4. Ensure that general waste generated during the construction phase is removed from the site on a regular basis, and safely disposed of at an appropriate, licenced waste disposal facility by an approved waste management Contractor. Waste disposal slips or waybills should be kept on file as proof of disposal. As a general principle, waste manifests must be obtained to prove legal disposal of waste.	▪ Ensure that a suitable Waste Management Contractor is appointed to remove and dispose the general waste at an appropriate, licenced waste disposal facility. ▪ Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents.	▪ Once-off prior to the construction phase. ▪ Weekly	▪ Project Developer and ECO
		10.50.5. Ensure that the construction site is kept clean at all times and that construction personnel are made aware of correct waste disposal methods. Littering must be prevented through effective site camp management.	▪ Monitor the condition of the site camp throughout the construction phase via visual site inspections. Record non-compliance and incidents.	▪ Daily ▪ Once-off training and ensure that all new staff are inducted. ▪ Monthly	▪ ECO and Contractor ▪ ECO and Contractor ▪ ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
			▪ Carry out Environmental Awareness Training. ▪ Conduct audits of the signed attendance registers.		
		10.50.6. Sufficient general waste disposal bins must also be provided for use by construction personnel throughout the site. These bins must be emptied on a regular basis.	▪ Monitor general waste generation by construction staff and collection via audits throughout the construction phase.	▪ Daily or Weekly	▪ ECO and Contractor.
		10.50.7. Ensure that all general waste emanating from the construction phase is removed from site prior to the commencement of the rehabilitation and operational phases.	▪ Undertake a final inspection at the end of the construction phase in order to verify and ensure that all general waste is removed from site and correctly disposed, prior to the commencement of the rehabilitation and operational phases.	▪ At the end of the construction phase.	▪ ECO and Contractor.
		10.50.8. Promote waste reduction, re-use, and recycling opportunities on site during the construction phase.	▪ Monitor waste generation and collection throughout construction. ▪ Investigate if any complaints have been expressed by the surrounding community regarding waste handling.	▪ Weekly or bi-weekly	▪ ECO and Contractor
		10.50.9. Ensure an adequate and sustainable use of resources.	▪ Monitor waste generation and collection throughout construction.	▪ Weekly or bi-weekly	▪ ECO and Contractor
		10.50.10. Control and implement waste management plans provided by contractors. Ensure that relevant legislative requirements are respected.	▪ Control of waste management practices throughout construction phase	▪ Weekly or bi-weekly	▪ ECO and Contractor
10.51. Pollution of the surrounding environment as a result of the handling, temporary stockpiling and disposal of hazardous waste.	Reduce environmental impacts such as soil, surface water and groundwater contamination as a result of incorrect storage, handling and disposal of hazardous waste.	10.51.1. Hazardous waste (i.e. empty tins, oils, fuel spillages, spilled materials and chemicals etc.) generated during the construction phase should be stockpiled temporarily (i.e. once-off) on site in a designated area in suitable waste collection bins and leak-proof storage skips (or similar). Waste collection bins and skips should be covered with suitable material, where appropriate. Hazardous	▪ Monitor the strategic placement of the temporary, designated waste stockpiling area at the site camp via visual inspections, and record and report any non-compliance. ▪ Monitor the temporary storage and handling of hazardous waste on site via site audits and record non-	▪ Once-off prior to the commencement of the construction phase and as required as the construction process evolves. ▪ Daily	▪ ECO and Contractor ▪ ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		waste must be stored separately from all other general waste. The designated stockpiling area must be labelled correctly.	compliance and incidents (i.e. conduct visual inspections of the temporary waste storage area).		
		10.51.2. Should the on-site stockpiling of hazardous waste exceed 80 m^3, then the National Norms and Standards for the Storage of Waste (published on 29 November 2013 under GN 926) must be adhered to.	▪ Record the amount of hazardous waste that is temporarily stockpiled at the designated area on site, as well as the duration and record non-compliance and incidents. ▪ Monitor the duration and amounts of hazardous waste that is temporarily stockpiled at the designated area on site via site audits and record non-compliance and incidents (i.e. conduct visual inspections of the temporary waste storage area). ▪ Audit compliance with the Norms and Standards for the Storage of Waste (published on 29 November 2013 under GN 926) if the storage amounts are exceeded (i.e. only if required).	▪ Daily ▪ Weekly ▪ Monthly	▪ Contractor ▪ ECO ▪ Project Developer
		10.51.3. Ensure that the designated stockpiling area for hazardous waste (i.e. leak proof skips and waste collection bins) is inspected on a daily basis to verify its condition and integrity, particularly after rainfall events.	▪ Monitor the temporary, designated waste stockpiling area at the site camp, as well as the handling of hazardous waste on site via site audits and record non-compliance and incidents.	▪ Daily	▪ ECO
		10.51.4. Ensure that all hazardous waste is removed from the site on a regular basis, and safely disposed at an appropriate, licenced hazardous waste disposal facility by an approved waste management Contractor.	▪ Ensure that a suitable Waste Management Contractor is appointed to remove and dispose the hazardous waste at an appropriate, licenced hazardous waste disposal facility. ▪ Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents.	▪ Once-off prior to the construction phase. ▪ Weekly	▪ Project Developer/ Contractor ▪ ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		10.51.5. Ensure that the construction site is kept clean at all times and that construction personnel are made aware of correct waste disposal methods. Littering must be prevented through effective site camp management.	▪ Monitor the condition of the site camp throughout the construction phase via visual site inspections. Record non-compliance and incidents. ▪ Carry out Environmental Awareness Training. ▪ Conduct audits of the signed attendance registers.	▪ Daily ▪ Once-off training and ensure that all new staff are inducted. ▪ Monthly	▪ ECO and Contractor ▪ ECO and Contractor ▪ ECO
		10.51.6. Ensure that all hazardous waste emanating from the construction phase is removed from site prior to the commencement of the rehabilitation and operational phases.	▪ Undertake a final inspection at the end of the construction phase in order to verify and ensure that all general waste is removed from site and correctly disposed, prior to the commencement of the rehabilitation and operational phases.	▪ At the end of the construction phase.	▪ ECO and Contractor.
		10.51.7. All liquid waste (used oil, paints, lubricating compounds and grease) to be packaged and disposed of by appropriate means.	▪ Waste removal and disposal to be monitored throughout construction	▪ Weekly or bi-weekly	▪ ECO and Contractor
		10.51.8. Adequate containers for the cleaning of equipment and materials (paint, solvent) must be provided as to avoid spillages.	▪ Waste removal and disposal to be monitored throughout construction	▪ Weekly or bi-weekly	▪ ECO and Contractor
		10.51.9. Wastewater from construction and painting activities must be collected in a designated container and disposed of at a suitable disposal point off site.	▪ Waste removal and disposal to be monitored throughout construction	▪ Weekly or bi-weekly	▪ ECO and Contractor
		10.51.10. Control and implement waste management plans provided by contractors. Ensure that relevant legislative requirements are respected.	▪ Control of waste management practices throughout construction phase.	▪ Weekly or bi-weekly	▪ ECO and Contractor

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
C. OPERATIONAL PHASE					
C.1. VISUAL IMPACTS					
10.52. Potential visual intrusion of solar arrays and related infrastructure and the impact on receptors, including residents and visitors, as well as game farms in the area.	To reduce the visual intrusion of the operation infrastructure on the surrounding landscape and receptors.	10.52.1. Ensure that the Operational and Maintenance buildings are indeed located in unobtrusive low-lying areas, away from public roads, and/or screened with earth berms where necessary, as per the recommendations in the planning and design phase. 10.52.2. Ensure that muted natural colours and non-reflective finishes are indeed used for buildings and structures generally, as per the recommendations in the planning and design phase. 10.52.3. Keep internal access roads as narrow as possible, and use existing roads or tracks as far as possible. 10.52.4. Ensure that outdoor or security lighting are fitted with reflectors to minimise light spillage, as recommended during the planning and design phase. 10.52.5. Ensure that internal power lines are located underground where possible, as recommended during the planning and design phase. 10.52.6. Ensure that discrete outdoor signage is used and prohibit intrusive commercial or billboard signage is prohibited, as recommended during the planning and design phase.	▪ Ensure that this is undertaken prior to operations via onsite inspections. ▪ Ensure that visual mitigation measures are monitored by management on an on-going basis, including the control of signage, lighting and wastes on the site by the appointed Environmental Manager.	▪ Once-off prior at the beginning of the operational phase. ▪ On-going	▪ Project Developer and Environmental Manager ▪ Project Developer and Environmental Manager
C.2. HERITAGE IMPACTS (ARCHAEOLOGY AND CULTURAL LANDSCAPE)					
10.53. Impacts to the natural and cultural landscape.	Reduce the degree of visual contrast in the landscape.	10.53.1. Minimise light pollution. 10.53.2. Signage to be small and unobtrusive.	▪ Ensure that visual mitigation measures are monitored by management on an on-going basis, including the control of signage, and	▪ On-going	▪ Project Developer and Environmental Manager

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
			lighting by the appointed Environmental Manager.		
C.3. TERRESTRIAL ECOLOGY IMPACTS[4]					
10.54. Continued alteration of habitat structure and composition on account of continuing low level anthropogenic impacts, such as "shading of vegetation" from arrays	Avoidance of unnecessary disturbance to site and surrounds and established buffers where required.	10.54.1. Ensure that the faunal components are retained and management of the facilities are ecologically driven.	▪ Ensure that this is taken into consideration during the operational phase and record any non-compliance.	▪ Monthly	▪ Project Developer and Environmental Manager
10.55. Ousting (and recruitment) of various fauna on account of long-term changes in the surrounding habitat /environment	Avoidance of unnecessary disturbance to site and surrounds and established buffers where required.	10.55.1. Exclusion areas should be maintained. Maintain scarp slopes and ensure that they are unimpeded by the proposed development. Avoid extensive alteration of sheet wash areas.	▪ Carry out inspections to ensure that no-go areas are maintained.	▪ Monthly	▪ Project Developer and Environmental Manager
10.56. Changes in the geomorphological state of the subject site on account of long-term climatic changes and the concomitant change in the nature of the catchment arising from the land use change	Reduce changes in the geomorphological state of drainage patterns in order to reduce impacts on terrestrial ecology	10.56.1. Exclusion areas should be maintained. Maintain scarp slopes unimpeded by development. Avoid extensive alteration of sheet wash areas. 10.56.2. Cordon off the sites to prevent inward migration of fauna.	▪ Carry out inspections to ensure that the sites are cordoned off and no-go areas are maintained.	▪ Monthly	▪ Project Developer and Environmental Manager

[4] Management actions relating to alien invasive vegetation management are covered in Section 4 of this EMPr.

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
10.57. Changes in water resources and water quality (i.e. impact on water chemistry) as a result of operational activities	To manage operations that may impact on surface and sub-surface water quality	10.57.1. All stagnant/parked vehicles operating within the site are to have a drip tray placed underneath the engine. 10.57.2. A spill kit is to be placed onsite in order to limit any impact 10.57.3. Limit access to the riverine areas.	▪ Ensure that this is taken into consideration during the operational phase and record any non-compliance.	▪ Monthly	▪ Project Developer and Environmental Manager
C.4. AQUATIC ECOLOGY IMPACTS					
10.58. Changes in the geomorphological state of the subject site on account of long-term climatic changes and the concomitant change in the nature of the catchment arising from the land use change.	Reduce changes in the geomorphological state	10.58.1. Cordon off the sites to prevent inward migration of fauna.	▪ Carry out inspections to ensure that the sites are cordoned off.	▪ Monthly	▪ Project Developer and Environmental Manager
10.59. Changes in water resources and surface water in terms of water quality (i.e. impact on water chemistry) as a result of operational activities	Reduce the changes in water resources and surface water in terms of water quality	10.59.1. Provide adequate storm water controls to ensure attenuation of storm water runoff emanating from the PV panels and other hard panned surfaces. 10.59.2. Implement proper spill control and management, such as the retention of emergency spill kits on site.	▪ Ensure that this is taken into consideration during the operational phase and record any non-compliance.	▪ Monthly	▪ Project Developer and Environmental Manager
C.5. RIVERINE RABBIT					

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
10.60. Impact on Riverine Rabbits due to operational phase activities due to habitat loss and disturbance	Reduce habitat loss and disturbance	10.60.1. Human activity and disturbance outside of the fenced PV areas should be kept to a minimum and restricted to required maintenance activities only. 10.60.2. All vehicles should adhere to a low speed limit on-site. Heavy vehicles should be restricted to 30 km/h and light vehicles to 40 km/h. 10.60.3. Ensure that all the operational phase management plans are fully implemented and that the associated monitoring and feedback mechanisms to management are in place	▪ Implement speed control mechanisms prior to commencement of operations. ▪ Carry out random inspections to verify whether proper speed control is being implemented. ▪ Carry out inspections to ensure that access is being limited to the PV footprint as best as possible. ▪ Ensure that these mitigation measures are monitored on an on-going basis, and any non-compliances reported.	▪ On-going ▪ Random during the operational phase ▪ Once-off training and ensure that all new staff are inducted. ▪ Monthly	▪ Project Developer
C.6. AVIFAUNA IMPACTS					
10.61. Total or partial displacement of avifauna due to habitat transformation associated with the vegetation clearance and the presence of the solar PV plants and associated infrastructure.	Prevent unnecessary displacement of avifauna by ensuring that the rehabilitation of transformed areas is implemented by an appropriately qualified rehabilitation specialist, according to the recommendations of the botanical specialist study.	10.61.1. Develop a Habitat Restoration Plan (HRP) and ensure that it is approved. 10.61.2. Monitor rehabilitation via site audits and site inspections to ensure compliance. Record and report any non-compliance.	▪ Appointment of rehabilitation specialist to develop HRP. ▪ Site inspections to monitor progress of HRP. ▪ Adaptive management to ensure HRP goals are met.	▪ Once-off ▪ Once a year ▪ As and when required	▪ Project Developer ▪ Environmental Manager ▪ Project Developer
C.7. SOCIO-ECONOMIC IMPACTS					
10.62. Creation of long term employment	Enhance benefits of long-term employment particularly for de facto residents of Touws River and/or Ceres.	10.62.1. The developer should make every effort to ensure the majority of unskilled workers employed during this phase are de facto residents of the Tankwa Karoo, Touws River and/or Ceres region. 10.62.2. Employment opportunities and the existence of the employment desks must be communicated to the	▪ Composition of workforce to be monitored during operations to assess the number of de facto local residents employed. Review of the employment registers. ▪ Verify that local communities are informed of employment desks and	▪ Bi-annually	▪ Project Developer

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		local communities in the Tankwa Karoo, Touws River and/or Ceres region. 10.62.3. The employment desk registers compiled during construction phase should be consulted to identify appropriately qualified candidates. 10.62.4. The developer must comply with the EEA and make every effort to ensure equal access to employment, taking the demographics of the area into account. 10.62.5. Contracts ensuring that knowledge sharing and on-the-job training should be enforced as a condition for the development of the project.	such desks are being implemented with written proof kept on file. ▪ Verify that employment desks consulted, with written proof kept on file. ▪ Compliance with employment legislation to be monitored and composition of workforce to be monitored during operations to assess the number of de facto local residents employed and range of educational background. Review of the registers held by the contractors. ▪ Record of skills training to be reviewed. Register of attendance reviewed.		
10.63. Development and/or growth of locally-owned industries	Realise opportunity to enhance growth of locally owned industries.	10.63.1. The developer should procure goods and services locally where possible. 10.63.2. The developer should provide consultants, and other project related staff with a list of local service providers with a clear request to support local businesses where such services are required.	▪ Verify purchase of local goods and services through proof of purchase. ▪ Verify if this is taken into consideration by reviewing signed minutes of meetings or signed reports.	▪ Annually	▪ Project Developer
C.8. GEOHYDROLOGY IMPACTS					
10.64. Groundwater impact as a result of over-abstraction	To prevent the lowering of groundwater levels as a result of over-abstraction (should ground water be used during the project phases)	10.64.1. The boreholes that are to be used must be correctly yield tested prior to use according to the National Standard (SANS 10299-4:2003, Part 4 – Test pumping of water boreholes) so that the correct pump sizes and installation depths can be determined. This includes a Step Test, Constant Discharge Test and recovery monitoring. 10.64.2. Adhere to the borehole's safe yield and to monitor water levels and flow.	▪ Ensure that this is taken into consideration and that a Geohydrology Specialist with suitable qualifications and experience is appointed to undertake relevant tests by reviewing signed minutes of meetings or signed reports or the appointment letter. ▪ Ensure that the borehole parameters are documented to ensure trends and consumption can be monitored.	▪ Once off prior to use and then monthly to monitor the parameters.	▪ Project Developer and Environmental Manager

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
10.65. Potential impact on ground water quality as a result of using cleaning agents	To reduce the potential of groundwater pollution.	10.65.1. Environmentally safe cleaning agents that breakdown naturally must be used for cleaning the panels. No chemicals that that could cause adverse effects to the natural environment should be allowed.	▪ Ensure that these mitigation measures are monitored on an on-going basis, and any non-compliances reported.	▪ On-going	▪ Project Developer and Environmental Manager
10.66. Potential impact on groundwater quality as a result of accidental oil spillages or fuel leakages.	To reduce the potential of groundwater pollution.	10.66.1. Avoid using old or damaged equipment and vehicles and ensure that they are well maintained and regularly serviced in order to ensure no leakages. All vehicles and other equipment (generators etc.) must be regularly serviced to ensure they do not spill oil. 10.66.2. Any engines that stand in one place for an excessive length of time must have drip trays. Diesel fuel storage tanks, if required, should be above ground on an impermeable concrete surface in a bunded area. 10.66.3. Vehicles should be refuelled on paved (impervious) areas, optimally off-site. If off-site refuelling is not possible, a designated area and impermeable surface should be established at the facility for this purpose. If liquid product is being transported it must be ensured this does not spill during transit. 10.66.4. If spillages occur during refuelling, they should be contained and removed as rapidly as possible, with correct disposal procedures of the spilled material, and reported. Proof of disposal (waste disposal slips or waybills) should be obtained and retained on file for auditing purposes. 10.66.5. Emergency measures and plans must be put in place and rehearsed in order to prepare for accidental spillage. 10.66.6. Vehicle and washing areas must also be on paved surfaces and the by-products removed to a hazardous waste disposal site (if the material is hazardous).	▪ Vehicles and equipment need to be monitored throughout the operational phase. Monitor via site audits and record non-compliance and incidents. ▪ Monitor the placement of fuel storage tanks and use of drip trays at the site camp via visual inspections. Monitor the usage of spill containment measures and record and report non-compliance. ▪ Monitor the placement and designation of the area for refuelling at the site camp via visual inspections. Monitor the occurrence of potential spills and the usage of spill containment measures and record and report non-compliance. ▪ Monitor the refuelling/ servicing process and record the occurrence of any spillages. ▪ Monitor the implementation of emergency spill containment and contingency plans, including holding emergency drills. Record and report non-compliance. ▪ Monitor the placement of vehicle and washing area via visual inspections. Monitor the correct disposal of spilled material or contaminated soil and audit the waybills. Record and report non-compliance.	▪ Four times per annum ▪ Weekly ▪ Weekly ▪ Weekly ▪ Monthly ▪ Weekly ▪ Weekly	▪ Project Developer and Environmental Manager

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
			▪ Waste removal and disposal to be monitored. Monitor via site audits and record non-compliance and incidents. Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents.		
C.9. IMPACTS RESULTING FROM THE BATTERY ENERGY STORAGE SYSTEMS					
10.67. Risk of fire, explosion or release of toxic gas and spillage of electrolyte as a result of the Lithium Ion BESS	Minimise the risk of fire, explosion or release of toxic gas and spillage of electrolyte as a result of the Lithium Ion BESS	10.67.1. Ensure that the operational staff are trained on the risks associated with fire, explosion and release of toxic gas, and potential electrolyte spillages, and how to react under these situations. 10.67.2. To ensure the safety of the workers, appropriate Personal Protective Equipment (PPE) (appropriate gloves, safety glasses/face shield, appropriate clothing) should be worn in the vicinity of the BESS.	▪ Carry out Environmental Awareness Training with a discussion on the risks associated with the BESS. ▪ Conduct audits of the signed attendance registers.	▪ Prior to operations and as required by the Environmental Manager. Ensure that all new staff are inducted. ▪ Monthly	▪ Project Developer and Environmental Manager ▪ Environmental Manager
		10.67.3. Ensure that adequate measures are put in place to verify that the pre-assembled BESS is in good working order before it gets transported to site to prevent any unnecessary risks.	▪ Ensure that this is undertaken via onsite inspections.	▪ Prior to operations	▪ Environmental Manager
		10.67.4. Ensure that the BESS is assembled and operated in line with the specifications of the supplier or manufacturer.	▪ Ensure that this is undertaken prior to operations via onsite inspections.	▪ Throughout operations	▪ Environmental Manager
		10.67.5. Ensure that the contact details of the local municipality and emergency response officials are kept on file and clearly sign-posted on site. 10.67.6. Ensure that the contact details for the supplier of the BESS is kept readily available and sign-posted	▪ Verify that the contact details of the local municipality, emergency response officials and the selected BESS supplier and retained and sign-posted throughout operations.	▪ Prior to the operational phase	▪ Project Developer

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		on site, should they need to be contacted during emergency situations.			
		10.67.7. Any spill or leakage from the battery storage facility must be attended to and cleaned immediately and must be disposed of at an appropriate licensed waste disposal facility. Waybills must be retained and retained on file.	▪ Monitor if spillages have taken place and if so, are removed correctly. Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents.	▪ During spills	▪ Project Developer
		10.67.8. Ensure that there is no maintenance of the battery on site; and that old BESS's are removed from the site by the supplier or manufacturer.	▪ Ensure that this is undertaken via onsite inspections.	▪ Throughout operations	▪ Environmental Manager
C.10. WASTE MANAGEMENT					
10.68. Pollution of the surrounding environment as a result of the handling, temporary storage and disposal of solid waste (general and hazardous).	Reduce soil and groundwater contamination as a result of incorrect storage, handling and disposal of general and hazardous waste.	10.68.1. Sufficient waste collection bins and skips (or similar) should be provided at the PV facility. Waste collection bins and skips should be covered with suitable material and correctly labelled, and should be kept in a designated, demarcated area, where access control is monitored and managed.	▪ Monitor waste generation and collection throughout the operational phase.	▪ Weekly	▪ Facility Manager
		10.68.2. Segregation of hazardous waste from general waste to be in place. Waste separation is encouraged and therefore receptacles should be labelled to reflect the different waste types.	▪ On-site inspection of waste segregation. ▪ Control of waste management practices throughout operational phase.	▪ Weekly ▪ Weekly	▪ Facility Manager ▪ Facility Manager
		10.68.3. General waste and hazardous waste should be removed from the site on a regular basis and disposed of at an appropriate, licenced waste disposal facility. Hazardous waste should be removed by an approved waste management Contractor. General solid waste could be removed from the site by municipal services. Waste disposal slips or waybills should be kept on file for auditing purposes as proof of disposal, as applicable	▪ Inspection of the waste storage area. ▪ Monitor via site audits and record non-compliance and incidents. Facility Manager to monitor and audit disposal slips.	▪ Daily ▪ Monthly	▪ Facility Manager

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		10.68.4. Ensure that the PV facility is kept clean at all times and that operational personnel are made aware of correct waste disposal methods.	▪ Conduct training for all operational personnel. ▪ Monitor the state of PV facility via site audits and record non-compliance and incidents.	▪ Once-off during operations and ensure that all new staff are inducted. ▪ Daily	▪ Facility Manager
		10.68.5. No solid waste may be burned or buried on site.	▪ Monitor via site audits and record non-compliance and incidents.	▪ Daily	▪ Facility Manager
		10.68.6. Waste amounts shall be recorded on a monthly basis.	▪ Waste amounts to be documented.	▪ Monthly	▪ Facility Manager
		10.68.7. All operational waste (concrete, steel, rubbles etc.) to be removed from the site and waste hierarchy of prevention, as the preferred option, followed by reuse, recycling, recovery must be implemented, where possible.	▪ Waste removal and disposal to be monitored	▪ Monthly	▪ Facility Manager
		10.68.8. Other non-hazardous solid waste (e.g. packaging material) to be disposed of at a licensed landfill.	▪ Waste removal and disposal to be monitored	▪ Monthly	▪ Facility Manager
		10.68.9. All liquid waste (used oil, paints, lubricating compounds and grease) to be packaged and disposed of by appropriate means.	▪ Waste removal and disposal to be monitored	▪ Monthly	▪ Facility Manager
		10.68.10. Adequate containers for the cleaning of equipment and materials (paint, solvent) must be provided as to avoid spillages.	▪ Waste removal and disposal to be monitored	▪ Monthly	▪ Facility Manager
		10.68.11. Wastewater from operations and painting activities must be collected in a designated container and disposed of at a suitable disposal point off site.	▪ Waste removal and disposal to be monitored	▪ Monthly	▪ Facility Manager

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
D. DECOMMISSIONING PHASE					
D.1. SOIL AND AGRICULTURAL IMPACTS					
10.69. Soil degradation as a result of topsoil loss. Loss of topsoil can result from poor topsoil management during decommissioning related excavations.	Ensure that soil resources are protected and that topsoil loss is minimized.	10.69.1. If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.	▪ Record GPS positions of all occurrences of below-surface soil disturbance (e.g. excavations). Record the date of topsoil stripping and replacement. ▪ Check that topsoil covers the entire disturbed area.	▪ As required, whenever areas are disturbed.	▪ ECO
D.2. VISUAL IMPACTS					
10.70. Potential visual effect of any remaining structures, platforms and disused roads on the landscape.	Prevent unnecessary visual clutter and focusing attention of surrounding visual receptors on the proposed development.	10.70.1. Ensure that the solar PV arrays are removed and that building structures are demolished or recycled for new uses. 10.70.2. Rip and regrade hardened platform areas and access roads that are no longer required. 10.70.3. Exposed or disturbed areas must be revegetated or returned to grazing to blend with the surroundings.	▪ Carry out site visits and inspections of the sites to verify the implementation of mitigation measures and ensure good housekeeping is maintained. Record and report any non-compliance. ▪ Ensure that procedures for the removal of structures and stockpiles during the decommissioning phase are implemented, including recycling of materials and rehabilitation of the site to a visually acceptable standard as prescribed in a rehabilitation plan, and signed off by the delegated authority.	▪ Daily ▪ Daily	▪ Contractor and ECO ▪ Contractor and ECO
D.3. HERITAGE IMPACTS (ARCHAEOLOGY AND CULTURAL LANDSCAPE)					
10.71. Impacts to the natural and cultural landscape.	Reduce the degree of visual contrast in the landscape.	10.71.1. Minimise the disturbance footprint. 10.71.2. Employ dust suppression measures. 10.71.3. Ensure effective rehabilitation.	▪ Carry out visual inspections to ensure strict control over the behaviour of staff in order to restrict activities to within demarcated areas, implementation of dust suppression	▪ Weekly	▪ ECO

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
			and effective rehabilitation mechanisms.		
D.4. TERRESTRIAL AND AQUATIC ECOLOGY IMPACTS[5]					
10.72. A reversion to an early seral stage and a reversion to present faunal population states within the study area, with some variation to these populations being possible	Reduce the impact on fauna	10.72.1. Ensure that there is appropriate disposal of materials and waste during decommissioning activities. 10.72.2. Manage stabilisation and reinstatement of the land.	▪ Ensure that this is taken into consideration during the decommissioning phase and record any non-compliance.	▪ Monthly	▪ Contractor and ECO
10.73. Changes in the geomorphological state of drainage lines as hydraulic changes arise within the catchment	Reduce changes in the geomorphological state of drainage lines as hydraulic changes arise within the catchment	10.73.1. Provide adequate storm water controls to ensure attenuation of storm water runoff emanating from hard panned surfaces. 10.73.2. Cordon off access to dendritic drainage lines.	▪ Ensure that this is taken into consideration during the decommissioning phase and record any non-compliance.	▪ Monthly	▪ Contractor and ECO
D.5. AVIFAUNA IMPACTS					
10.74. The noise and movement associated with the activities at the PV footprints will be a source of disturbance which would lead to the displacement of avifauna from the area	Prevent unnecessary displacement of avifauna by ensuring that contractors are aware of the requirements of the Decommissioning EMPr (DEMPr.)	10.74.1. A site-specific DEMPr must be implemented, which gives appropriate and detailed description of how decommissioning activities must be conducted. All contractors are to adhere to the DEMPr and should apply good environmental practice during decommissioning. The DEMPr must specifically include the following: • No off-road driving; • Maximum use of existing roads during the decommissioning phase and the construction	▪ Implementation of the DEMPr. Oversee activities to ensure that the DEMPr is implemented and enforced via site audits and inspections. Report and record any non-compliance. ▪ Ensure that decommissioning personnel are made aware of the impacts relating to off-road driving.	▪ On a daily basis ▪ Weekly ▪ Weekly ▪ Weekly ▪ Weekly	▪ Contractor and ECO ▪ Contractor and ECO ▪ Contractor and ECO ▪ Contractor and ECO ▪ Contractor and ECO

[5] Management actions relating to alien invasive vegetation management are covered in Section 4 of this EMPr.

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		of new roads should be kept to a minimum as far as practical; • Measures to control noise and dust according to latest best practice; • Restricted access to the rest of the property; • Strict application of all recommendations in the Terrestrial Biodiversity and Species Assessment Report pertaining to the limitation of the footprint.	▪ Access roads must be demarcated clearly. Undertake site inspections to verify. ▪ Monitor the implementation of noise control mechanisms via site inspections and record and report non-compliance. ▪ Ensure that the decommissioning area is demarcated clearly and that decommissioning personnel are made aware of these demarcations. Monitor via site inspections and report non-compliance.		
D.6. SOCIO-ECONOMIC IMPACTS					
10.75. Job losses as a result of the decommissioning of the proposed project	Minimize job losses	10.75.1. The developer should comply with relevant South African labour legislation when retrenching employees. 10.75.2. The developer should implement appropriate succession training of locally employed staff earmarked for retrenchment during decommissioning.	▪ Verify that retrenchment practices are compliant with South African labour legislation. ▪ Verify that the Project Developer implemented succession training of locally employed staff before the plant is decommissioned.	▪ Once-off during the decommissioning phase	▪ Contractor and ECO
D.7. GEOHYDROLOGY IMPACTS					
10.76. Potential impact on groundwater quality as a result of accidental oil spillages or fuel leakages.	To reduce the potential of groundwater pollution.	10.76.1. Implement the same management actions as those during the construction phase.	▪ Implement the same monitoring methodology as those during the construction phase.	▪ Implement the same monitoring frequency as those during the construction phase.	▪ Implement the same monitoring responsibility as those during the construction phase.
D.8. IMPACTS RESULTING FROM THE BATTERY ENERGY STORAGE SYSTEMS					
10.77. Risk of fire, explosion or release of toxic gas and spillage of	Minimise the risk of fire, explosion or release of toxic gas and spillage of electrolyte	10.77.1. Ensure that the BESS is dissembled in line with the specifications of the supplier or manufacturer.	▪ Carry out site visits and inspections of the sites to verify the	▪ As required during dissembling	▪ Project Developer and ECI

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
electrolyte as a result of the Lithium Ion BESS	as a result of the Lithium Ion BESS	10.77.2. Used batteries must be transported off site inside containers via suitable vehicles by the supplier of the BESS. 10.77.3. The transport vehicle should be designated with relevant health and safety symbols. 10.77.4. A set of equipment necessary to combat any spillage or leakage should be provided and the transport team trained on how to use it.	implementation of mitigation measures.		
D.9. WASTE MANAGEMENT					
10.78. Generation of waste due to disassembly of the solar facility.	Avoid substantial negative impacts at the decommissioning phase due to insufficient planning.	10.78.1. Suitable receptacles must be provided for the temporary storage of various waste types such as scrap metal and concrete, until it is removed to the nearest licensed landfill.	▪ Audit the implementation of mitigation measures recommended for the decommissioning phase.	▪ During the decommissioning phase	▪ ECO
		10.78.2. Waste separation is encouraged and therefore receptacles should be labelled to reflect the different waste types.	▪ Audit the implementation of mitigation measures recommended for the decommissioning phase.	▪ During the decommissioning phase	▪ ECO

11 APPENDIX A – CV OF THE EAP

CV OF PAUL LOCHNER

Employer: Council for Scientific and Industrial Research (CSIR)
PO Box 320, Stellenbosch, 7600, South Africa
Phone: +27 21 888 2486 (w), +27 84 442 3646 (cell)
Email: plochner@csir.co.za
Date of Birth: 13 June 1969
Nationality: South African

BIOSKETCH

Paul Lochner is an environmental assessment practitioner at the CSIR in Stellenbosch, with 28 years of experience in a wide range of environmental assessment and management studies. His particular experience is in environmental planning and assessment for renewable energy, electricity grid infrastructure, desalination, oil & gas, wetlands & coastal zone management, and industrial & port development. He has been closely involvement in the research and application of Strategic Environmental Assessment in South Africa, and also has wide experience in Environmental & Social Impact Assessment, Environmental Management Programs and Environmental Screening Studies.

PERSONAL SKILLS AND CAPABILITIES

- Holistic understanding of environmental and social aspects at policy, program and project levels
- Ability to lead, inspire and motivate a team of environmental scientists in a consulting business
- Coordination of experts from diverse disciplines to support evidence-based decision-making
- Ability to integrate of environmental, social and economic aspects within a systems model
- Design of innovative processes to respond effectively to proposals and meet needs of clients
- Review and quality assurance for environmental assessment processes and reports
- Project management, financial management, report writing and communication skills.

EDUCATION

- BSc (Civil Engineering) awarded with Honours, *University of Cape Town*, 1990
- MPhil (Environmental Science), *University of Cape Town,* 1992

EMPLOYMENT

- Environmental scientist at CSIR (Stellenbosch) from October 1992 to present.
- Group Leader of CSIR Environmental Management Services since August 2008.

PROFESSIONAL REGISTRATION

- Environmental Assessment Practitioners Association of South Africa (EAPASA), Registration Number 2019/745

PROFESSIONAL MEMBERSHIP AND POSITIONS HELD

- Member of the International Association for Impact Assessment (IAIA)
- 1996 to present: Chairperson of Blouvlei Intaka Island Environmental Committee at Century City, Cape Town, which oversees management of the Intaka Island Nature Reserve
- 2010 to present: Chairperson of Intaka Island Environmental Trust, that oversees the operation of the Eco-centre and education program at the Intaka Island Nature Reserve
- 2017: Conference Organising Committee member and Program Director for IAIA South Africa national conference, August 2017, Goudini.

LANGUAGE CAPABILITY

	Speaking	*Reading*	*Writing*
English	Excellent	Excellent	Excellent
Afrikaans	Average	Average	Average

TRACK RECORD OF PROFESSIONAL EXPERIENCE

This is an abbreviated record of experience. A full record is available on request. Projects are located in South Africa unless otherwise stipulated.

Duration	Project description	Role	Client
2019 (in progress)	**Basic Assessments** for proposed PV and EGI Developments near Ceres	Project leader	Veroniva (PTY) Ltd
2019 (in progress)	**Environmental scoping** for a Desalination Plant and Water Carriage System for water supply to Windhoek and the central coastal area of Namibia	Project author	NamWater (Namibia) and KfW Development Bank (Germany)
2019 (in progress)	**Environmental Performance Compliance Study** for Foundries in South Africa	Project reviewer	National Foundries Technology Network
2019	**Independent Expert review** of the ecology study as part of the EIA and EMPR for diamond prospecting at Bloemhof Dam Nature Reserve, North West province	Independent reviewer	DEA Appeals Office
2018-2019	**Greater Saldanha Bay Strategic Environmental Assessment (SEA):** Phase 1 Monitoring and Decision Support System	Project leader	Western Cape provincial government
2018-2019	**Environmental Screening Study** for a proposed 100 to 150 megalitre/day desalination facility for City of Cape Town, Phase 1: Pre-feasibility study	Project co-leader	City of Cape Town and iX Engineers
2018-2019	**EIA for 150 MW wind power project in Ghana**	Proposal and EIA Quality Assurance	Volta River Authority and Seljen Consult Ltd
2019	**Environmental Assessment** for the Kenhardt solar PV facility and electrical infrastructure (100 MW x 3), Northern Cape	Project leader	Scatec Solar Africa (Pty) Ltd
2017-2019	**SEA for Wind & Solar Photovoltaic Energy** development in South Africa (Phase 2)	Project reviewer	DEA & national Dept of Energy (DOE)
2017-2019	**SEA for the Expansion of EGI Corridors** in South Africa	Project reviewer	DEA, DOE, iGas, Eskom (national electricity utility)
2017-2019	**SEA for Energy Corridors** and development of a gas pipeline network for South Africa	Project reviewer	DEA, DOE, iGas, Eskom (national electricity utility)
2017-2019	**SEA for Aquaculture** Development in South Africa (marine and freshwater)	Project leader	DEA and national Dept of Agriculture Forestry and Fisheries (DAFF)
2018	**Environmental Assessments** for the Vryburg Solar project (115 MW x 3) in the Vryburg Renewable Energy Development Zone (REDZ)	Co-project manager and co-author	Veroniva & Scatec
2018	**EIA** for West Bank Waste Water Treatment works **marine outfall pipeline,** East London	Independent reviewer	WSP and Buffalo City Municipality
2017-2018	**Site selection and environmental screening** for a proposed 120 – 150 ML/day desalination plant for the City of Cape Town	Project leader	City of Cape Town and iX Engineers
2017-2018	**EIA and EMP for Icyari Coltan Mine**, Rwanda	Project reviewer	Mawarid Mining Rwanda Ltd (MMRL), UAE

Duration	Project description	Role	Client
2016-2017	**SEA for the Square Kilometre Array** radio-telescope in the Karoo, South Africa	Project leader	DEA and DST
2016-2017	**SEA for Shale Gas Development** in the Karoo region of South Africa	Project co-leader	DEA and other government departments
2015-2016	**SEA for the development of Electrical Grid Infrastructure** for South Africa	Project leader	DEA and Eskom (national electricity utility)
2017	EIA for the 75 MW x 12 **solar photovoltaic** energy projects near Dealesville, Free State	Project leader	Mainstream Renewable Power SA
2014-2015	EIA for Ishwati Emoyeni 140 MW **wind energy project** and supporting electrical infrastructure at Murraysburg, Western Cape	Project leader	Windlab South Africa
2012-2015	**SEA for identification of renewable energy zones** for wind and solar photovoltaic projects in South Africa	Project leader	DEA and other national government departments
2012-2013	**Environmental Screening Study (ESS) for a desalination plant** for the City of Cape Town	Project leader	City of Cape Town & WorleyParsons
2012-2013	EIA for the **desalination plant** for the Saldanha area	Project leader	West Coast District Municipality & WorleyParsons
2012-2013	EIA for the **manganese export terminal** at the Port of Ngqura and Coega Industrial Development Zone (IDZ)	Project leader	Transnet
2011 - 2012	EIA (x2) for **100 MW solar photovoltaic** project at Blocuso and 100 MW solar PV project at Roode Kop in the Northern Cape	Project leader	Mainstream Renewable Power
2011 – 2012	EIA (x2) for 75 MW **solar photovoltaic project** at GlenThorne and 75 MW project at Valleydora, in the Free State	Project leader	Solaire Direct
2010-2011	More than 10 Basic Environmental Assessments (BAs) for **solar photovoltaic projects** in the Western Cape, Northern Cape, Eastern Cape and Free State	Project leader	Conducted for Dutch, German, French and South African companies
2010/2011	**EIA for a 100 MW wind project at Zuurbron and a 50 MW wind project Broadlands** in the Eastern Cape	Project leader	WindCurrent SA (German-based company)
2010-2011	**EIAs (x4) for the proposed InnoWind wind energy projects near Swellendam, Heidelberg, Albertinia and Mossel Bay (totalling approx 210 MW),** Western Cape, South Africa	Project leader	InnoWind South Africa (Pty) Ltd
2009-2010	**EIA for the proposed Electrawinds wind energy facility** of 45-75 MW capacity in the Coega IDZ, Eastern Cape	Project leader	Electrawinds N.V. (Belgium)
2009-2010	**EIA for proposed 180 MW Jeffreys Bay wind energy project,** Eastern Cape	Project Leader and co-author	Mainstream Renewable Power South Africa
2009-2010	**EIA for the proposed 70 megalitre/day desalination plant** at Mile 6 near Swakopmund, Namibia	Project leader	NamWater, Namibia
2009	**ESS for a proposed Deepwater Port,** Container Hub and Industrial Development Zone, Ghana	Project Manager	Project Management International Pty Ltd
2009	**EMP for the Operational Phase of the Berg River Dam**, Franschoek, South Africa	Project leader and report co-author	TCTA (national water supply utility), South Africa
2006	**Environmental Impact Assessment** (**EIA)** for extension of Port of Ngqura, Eastern Cape	Project Leader and co-author	Transnet National Port Authority

Duration	Project description	Role	Client
2004-2005	**Environmental and Social Impact Assessment (ESIA) report** for the proposed alumina refinery near Sosnogorsk, Komi Republic, Russia	Project manager and co-author	Komi Aluminium Russia, IFC, European Bank for Reconstruction & Development (EBRD)
2005	**Guideline for Environmental Management Plans (EMPs)** for the Western Cape province	Author	Dept of Environmental Affairs & Development Planning, Western Cape
2003	**Environmental Management Plan** for the Operational Phase of the wetlands and canals at Century City, Cape Town	Project leader and lead author	Century City Property Owners' Association
2002	**Environmental Impact Assessment** for the proposed Pechiney aluminium smelter at Coega, South Africa	Project Manager and lead author	Pechiney, France
1999-2000	**Cape Action Plan for the Environment**: a biodiversity Strategy and Action Plan for the Cape Floral Kingdom - legal, institutional, policy, financial and socio-economic component	Project manager and contributing writer	World Wide Fund for Nature (WWF): South Africa and Global Environment Facility (GEF)
1999	**Management Plan** for the coastal zone between the Eerste and Lourens River, False Bay, South Africa	Project manager and lead author	Heartland Properties and Somchem (a Division of Denel)
1998	**Environmental Assessment** of the Mozal Matola Terminal Development proposed for the Port of Matola, Maputo, Mozambique	Project manager and author	SNC-Lavalin-EMS
1996-1997	**Strategic Environmental Assessment (SEA)** for the proposed Industrial Development Zone and Harbour at Coega, Port Elizabeth, South Africa	SEA project manager and report writer	Coega IDZ Initiative Section 21 Company
1995-1996	**Environmental Impact Assessment and EMP** for Development Scenarios for Thesen Island, Knysna, South Africa	Project manager and report writer	Thesen and Co.
1996	**Environmental Impact Assessment** for the Blouvlei wetlands at Century City, Cape Town	Project manager and report writer	Ilco Homes Ltd (now Monex Ltd)
1995	**Environmental Impact Assessment** for the Saldanha Steel Project, South Africa	Report author and project manager	Saldanha Steel Project
1994	**Environmental Impact Assessment** for the upgrading of resort facilities on Frégate Island, Seychelles	Project management, co-author, process facilitator	Schneid Israelite and Partners
1994	**Environmental Impact Assessment** for exploration drilling in offshore Area 2815, Namibia	Project manager and lead author	Chevron Overseas (Namibia) Limited
1994	**Management Plan** for the Rietvlei Wetland Reserve, Cape Town	Project manager and lead author	Southern African Nature Foundation (now WWF-SA)

RECENT JOURNAL PUBLICATIONS AND PEER REVIEWED PAPERS

A comprehensive list of publications is available on request, with a summary provided below of recent journal publications, book chapters and peer reviewed conference papers:

Fischer D, Lochner P and Annergarn H, 2019. Evaluating the effectiveness of Strategic Environmental Assessment to facilitate renewable energy planning and improved decision-making: a South African case study, *Impact Assessment and Project Appraisal* - article ID: IAPA 1619389.

Cape L., Retief F., Lochner P., Fischer T., and Bond A., 2018. Exploring pluralism: Different stakeholder views of the expected and realised value of strategic environmental assessment (SEA). *Environmental Impact Assessment Review*, Volume 69, March 2018, Pages 32-41.

Cape L., Lochner P. and Fischer D., 2017. SEAs for major infrastructure programmes in SA. *IAIA17 Conference Proceedings* - 37th Annual Conference of the International Association for Impact Assessment, 4-7 April 2017 | Le Centre Sheraton Montreal | Montreal | Canada | www.iaia.org

Schreiner, G.O., Scholes, R.J., Snyman-Van der Walt, L., De Jager, M., S, Esterhuyse., Dludla, A., Lochner, P.A., Wright, J., Atkinson, D., Hardcastle, P., Kotze, H. 2017. Advancing a participatory and science-based approach to policy formulation for shale gas development in South Africa. *In:* Eds Whitton, J., Cotton, M., Brasier, K. 2017. *Citizen and other stakeholder participation in unconventional fossil fuel land use decision-making, policy formation, regulatory practice or other governance mechanisms*. London: Routledge.

Lochner P, Mabin M & Cape L, 2015, Recent Strategic Environmental Assessment experience in South Africa and national principles, in *IAIA16 (Japan) Conference Proceedings*.

12 APPENDIX B – ROLES AND RESPONSIBILITIES

Responsible Person(s)	Role and Responsibilities
Developer's Project Manager (DPM)	Role The Project Developer is accountable for ensuring compliance with the EMPr and any conditions of approval from the competent authority (CA). Where required, an environmental control officer (ECO) must be contracted by the Project Developer to objectively monitor the implementation of the EMPr according to relevant environmental legislation, and the conditions of the environmental authorisation (EA). The Project Developer is further responsible for providing and giving mandate to enable the ECO to perform responsibilities, and he must ensure that the ECO is integrated as part of the project team while remaining independent. Responsibilities - Be fully conversant with the conditions of the EA; - Ensure that all stipulations within the EMPr are communicated and adhered to by the Developer and its Contractor(s); - Issuing of site instructions to the Contractor for corrective actions required; - Monitor the implementation of the EMPr throughout the project by means of site inspections and meetings. Overall management of the project and EMPr implementation; and - Ensure that periodic environmental performance audits are undertaken on the project implementation.
Developer Site Supervisor (DSS)	Role The DSS reports directly to the DPM, oversees site works, liaises with the contractor(s) and the ECO. The DSS is responsible for the day to day implementation of the EMPr and for ensuring the compliance of all contractors with the conditions and requirements stipulated in the EMPr. Responsibilities - Ensure that all contractors identify a contractor's Environmental Officer (cEO); - Must be fully conversant with the conditions of the EA. Oversees site works, liaison with Contractor, DPM and ECO; - Must ensure that all landowners have the relevant contact details of the site staff, ECO and cEO; - Issuing of site instructions to the Contractor for corrective actions required; - Will issue all non-compliances to contractors; and - Ratify the Monthly Environmental Report.
Environmental Control Officer (ECO)	Role The ECO should have appropriate training and experience in the implementation of environmental management specifications. The primary role of the ECO is to act as an independent quality controller and monitoring agent regarding all environmental concerns and associated environmental impacts. In this respect, the ECO is to conduct periodic site inspections, attend regular site meetings, pre-empt problems and suggest mitigation and be available to advise on incidental issues that arise. The ECO is also required to conduct compliance audits, verifying the monitoring reports submitted by the cEO. The ECO provides feedback to the DSS and Project Manager regarding all environmental matters. The Contractor, cEO and dEO are answerable to the Environmental Control Officer for non-compliance with the Performance Specifications as set out in the EA and EMPr.

Responsible Person(s)	Role and Responsibilities
	The ECO provides feedback to the DSS and Project Manager, who in turn reports back to the Contractor and potential and Registered Interested &Affected Parties' (RI&AP's), as required. Issues of non-compliance raised by the ECO must be taken up by the Project Manager, and resolved with the Contractor as per the conditions of his contract. Decisions regarding environmental procedures, specifications and requirements which have a cost implication (i.e. those that are deemed to be a variation, not allowed for in the Performance Specification) must be endorsed by the Project Manager. The ECO must also, as specified by the EA, report to the relevant CA as and when required. <u>Responsibilities</u> The responsibilities of the ECO will include the following: - Be aware of the findings and conclusions of all EA related to the development; - Be familiar with the recommendations and mitigation measures of this EMPr; - Be conversant with relevant environmental legislation, policies and procedures, and ensure compliance with them; - Undertake regular and comprehensive site inspections / audits of the construction site according to the generic EMPr and applicable licenses in order to monitor compliance as required; - Educate the construction team about the management measures contained in the EMPr and environmental licenses; - Compilation and administration of an environmental monitoring plan to ensure that the environmental management measures are implemented and are effective; - Monitoring the performance of the Contractors and ensuring compliance with the EMPr and associated Method Statements; - In consultation with the Developer Site Supervisor order the removal of person(s) and/or equipment which are in contravention of the specifications of the EMPr and/or environmental licenses; - Liaison between the DPM, Contractors, authorities and other lead stakeholders on all environmental concerns; - Compile a regular environmental audit report highlighting any non-compliance issues as well as satisfactory or exceptional compliance with the EMPr; - Validating the regular site inspection reports, which are to be prepared by the contractor Environmental Officer (cEO); - Checking the cEO's record of environmental incidents (spills, impacts, legal transgressions etc.) as well as corrective and preventive actions taken; - Checking the cEO's public complaints register in which all complaints are recorded, as well as action taken; - Assisting in the resolution of conflicts; - Facilitate training for all personnel on the site – this may range from carrying out the training, to reviewing the training programmes of the Contractor; - In case of non-compliances, the ECO must first communicate this to the Senior Site Supervisor, who has the power to ensure this matter is addressed. Should no action or insufficient action be taken, the ECO may report this matter to the authorities as non-compliance; - Maintenance, update and review of the EMPr; - Communication of all modifications to the EMPr to the relevant stakeholders.
developer Environmental Officer (dEO)	<u>Role</u> The dEOs will report to the Project Manager and are responsible for implementation of the EMPr, environmental monitoring and reporting, providing environmental input to the Project Manager and Contractor's Manager, liaising with contractors and the landowners as well as a range of environmental coordination responsibilities.

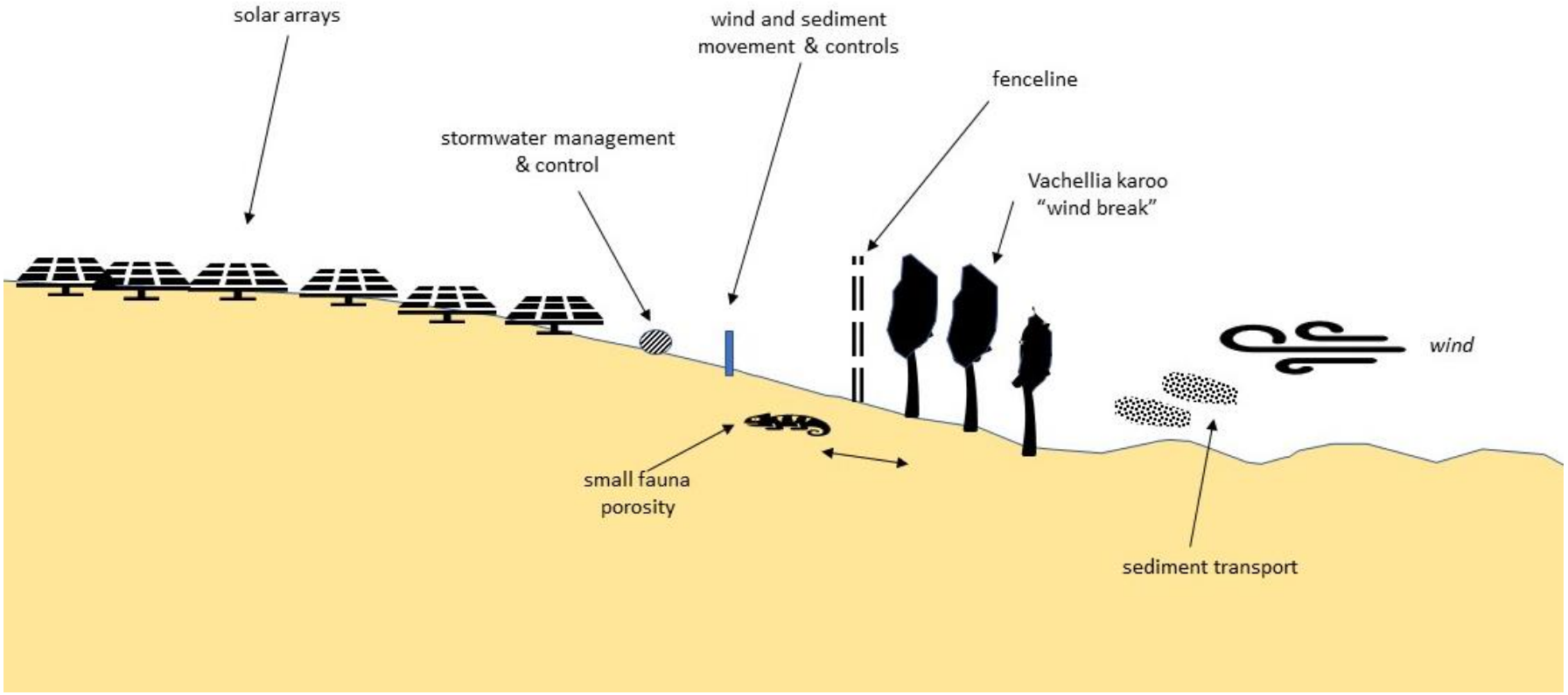
Responsible Person(s)	Role and Responsibilities
	Responsibilities - Be fully conversant with the EMPr; - Be familiar with the recommendations and mitigation measures of this EMPr, and implement these measures; - Ensure that all stipulations within the EMPr are communicated and adhered to by the Employees, Contractor(s) ; - Confine the development site to the demarcated area; - Conduct environmental internal audits with regards to EMPr and authorisation compliance (on cEO); - Assist the contractors in addressing environmental challenges on site; - Assist in incident management: - Reporting environmental incidents to developer and ensuring that corrective action is taken, and lessons learnt shared; - Assist the contractor in investigating environmental incidents and compile investigation reports; - Follow-up on pre-warnings, defects, non-conformance reports; - Measure and communicate environmental performance to the Contractor; - Conduct environmental awareness training on site together with ECO and cEO; - Ensure that the necessary legal permits and / or licenses are in place and up to date; - Acting as Developer's Environmental Representative on site and work together with the ECO and contractor;
Contractor	Role The Contractor appoints the cEO and has overall responsibility for ensuring that all work, activities, and actions linked to the delivery of the contract are in line with the EMPr and that Method Statements are implemented as described. External contractors must ensure compliance with this EMPr while performing the onsite activities as per their contract with the Project Developer. The contractors are required, where specified, to provide Method Statements setting out in detail how the impact management actions contained in the EMPr will be implemented during the development or expansion of substation infrastructure for the transmission and distribution of electricity activities. Responsibilities - project delivery and quality control for the development services as per appointment; - employ a suitably qualified person to monitor and report to the Project Developer's appointed person on the daily activities on-site during the construction period; - ensure that safe, environmentally acceptable working methods and practices are implemented and that equipment is properly operated and maintained, to facilitate proper access and enable any operation to be carried out safely; - attend on site meeting(s) prior to the commencement of activities to confirm the procedure and designated activity zones; - ensure that contractors' staff repair, at their own cost, any environmental damage as a result of a contravention of the specifications contained in EMPr, to the satisfaction of the ECO.
contractor Environmental Officer (cEO)	Role Each Contractor affected by the EMPr should appoint a cEO, who is responsible for the on-site implementation of the EMPr (or relevant sections of the EMPr). The Contractor's representative can be the site agent; site engineer; a dedicated environmental officer; or an independent consultant. The Contractor must ensure that the Contractor's Representative is suitably qualified to perform the necessary tasks and is appointed at a level such that she/he can interact effectively with other site Contractors, labourers, the Environmental Control Officer and the public. As a minimum the cEO shall meet the following criteria:

Responsible Person(s)	Role and Responsibilities
	Responsibilities - Be on site throughout the duration of the project and be dedicated to the project; - Ensure all their staff are aware of the environmental requirements, conditions and constraints with respect to all of their activities on site; - Implementing the environmental conditions, guidelines and requirements as stipulated within the EA, EMPr and Method Statements; - Attend the Environmental Site Meeting; - Undertaking corrective actions where non-compliances are registered within the stipulated timeframes; - Report back formally on the completion of corrective actions; - Assist the ECO in maintaining all the site documentation; - Prepare the site inspection reports and corrective action reports for submission to the ECO; - Assist the ECO with the preparing of the monthly report; and - Where more than one Contractor is undertaking work on site, each company appointed as a Contractor will appoint a cEO representing that company.

13 APPENDIX C – CHANCE FIND PROCEDURE FOR PALAEONTOLOGICAL RESOURCES

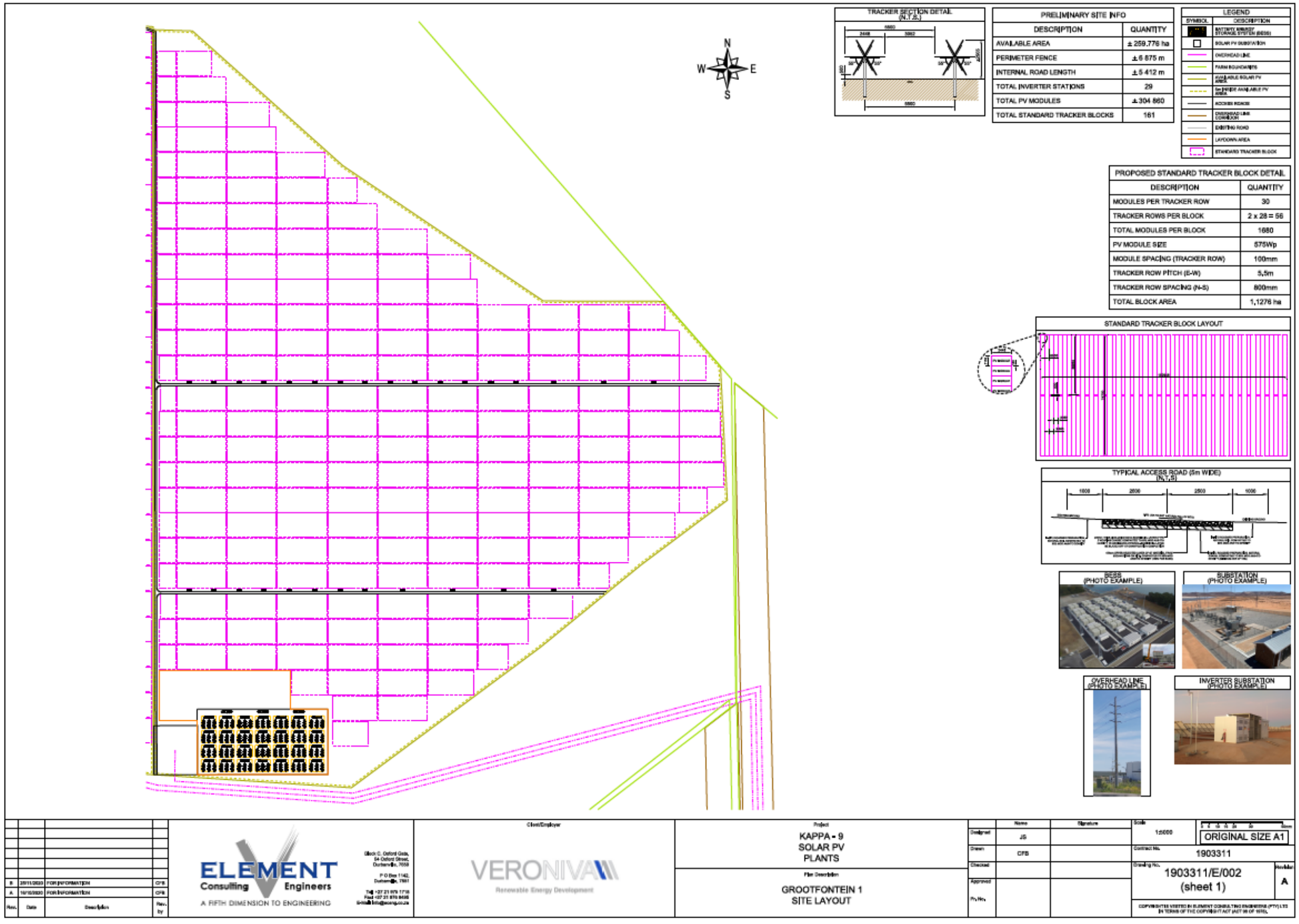
<table>
<tr><th colspan="3">CHANCE FOSSIL FINDS PROCEDURE: Proposed solar PV facilities and associated power lines to Kappa Substation, Ceres Karoo</th></tr>
<tr><td>Province & region:</td><td colspan="2">Western Cape: Cape Winelands District Municipality / Witzenberg Local Municipality</td></tr>
<tr><td>Responsible Heritage Resources Agency</td><td colspan="2">HERITAGE WESTERN CAPE (Contact details: Protea Assurance Building, Green Market Square, Cape Town 8000. Private Bag X9067, Cape Town 8001. Tel: 086-142 142. Fax: 021-483 9842. Email: hwc@pgwc.gov.za)</td></tr>
<tr><td>Rock unit(s)</td><td colspan="2">Dwyka Group, Ecca Group (Prince Albert, Whitehill, Collingham & Tierberg Formations), Late Caenozoic colluvium and alluvium.</td></tr>
<tr><td>Potential fossils</td><td colspan="2">In bedrocks: fossil fish, mesosaurid reptiles, shelly invertebrates, vascular plants (incl. petrified wood), trace fossil assemblages. In colluvium and alluvium: teeth, bones and horn cores of mammals, non-marine molluscs, calcretised trace fossils (e.g. termitaria), reworked fossil wood.</td></tr>
<tr><td rowspan="5">ECO protocol</td><td colspan="2">1. Once alerted to fossil occurrence(s): alert site foreman, stop work in area immediately (N.B. safety first!), safeguard site with security tape / fence / sand bags if necessary.</td></tr>
<tr><td colspan="2">2. Record key data while fossil remains are still in situ:
• Accurate geographic location – describe and mark on site map / 1: 50 000 map / satellite image / aerial photo
• Context – describe position of fossils within stratigraphy (rock layering), depth below surface
• Photograph fossil(s) in situ with scale, from different angles, including images showing context (e.g. rock layering)</td></tr>
<tr><td>3. If feasible to leave fossils in situ:
• Alert Heritage Resources Agency and project palaeontologist (if any) who will advise on any necessary mitigation
• Ensure fossil site remains safeguarded until clearance is given by the Heritage Resources Agency for work to resume</td><td>3. If not feasible to leave fossils in situ (emergency procedure only):
• Carefully remove fossils, as far as possible still enclosed within the original sedimentary matrix (e.g. entire block of fossiliferous rock)
• Photograph fossils against a plain, level background, with scale
• Carefully wrap fossils in several layers of newspaper / tissue paper / plastic bags
• Safeguard fossils together with locality and collection data (including collector and date) in a box in a safe place for examination by a palaeontologist
• Alert Heritage Resources Agency and project palaeontologist (if any) who will advise on any necessary mitigation</td></tr>
<tr><td colspan="2">4. If required by Heritage Resources Agency, ensure that a suitably-qualified specialist palaeontologist is appointed as soon as possible by the developer.</td></tr>
<tr><td colspan="2">5. Implement any further mitigation measures proposed by the palaeontologist and Heritage Resources Agency</td></tr>
<tr><td>Specialist palaeontologist</td><td colspan="2">Record, describe and judiciously sample fossil remains together with relevant contextual data (stratigraphy / sedimentology / taphonomy). Ensure that fossils are curated in an approved repository (e.g. museum / university / Council for Geoscience collection) together with full collection data. Submit Palaeontological Mitigation report to Heritage Resources Agency. Adhere to best international practice for palaeontological fieldwork and Heritage Resources Agency minimum standards.</td></tr>
</table>

14 APPENDIX D – STYLISED IMAGE OF MAJOR ENVIRONMENTAL MANAGEMENT INTERVENTIONS DURING AND POST CONSTRUCTION



15 APPENDIX E – SITE LAYOUT MAP

GROOTFONTEIN PV 1

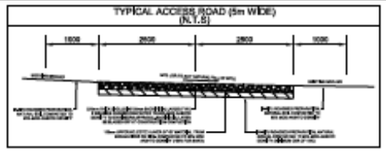


GROOTFONTEIN PV 2

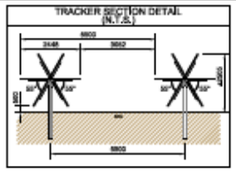
BESS (PHOTO EXAMPLE)

SUBSTATION (PHOTO EXAMPLE)

TYPICAL ACCESS ROAD (5m WIDE) (N.T.S)



TRACKER SECTION DETAIL (N.T.S.)

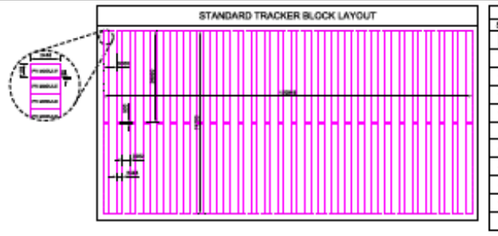


INVERTER SUBSTATION (PHOTO EXAMPLE)

OVERHEAD LINE (PHOTO EXAMPLE)

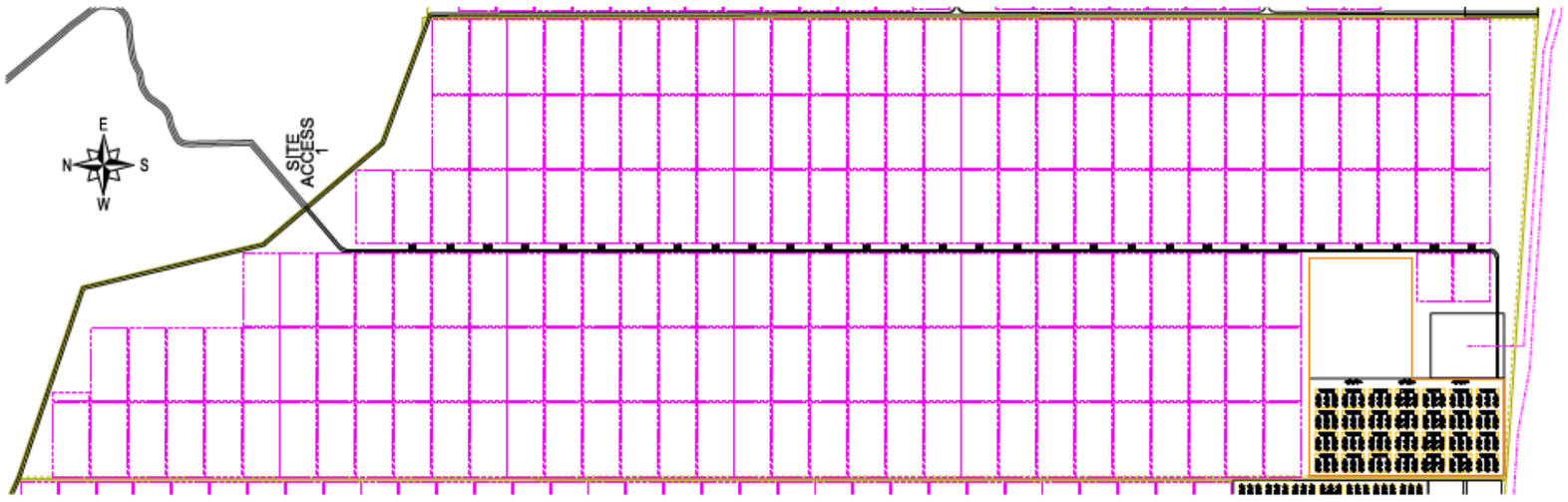
PRELIMINARY SITE INFO	
DESCRIPTION	QUANTITY
AVAILABLE AREA	± 253.6656 ha
PERIMETER FENCE	± 7 684 m
INTERNAL ROAD LENGTH	± 4 131 m
TOTAL INVERTER STATIONS	29
TOTAL PV MODULES	± 304 380
TOTAL STANDARD TRACKER BLOCKS	179

STANDARD TRACKER BLOCK LAYOUT



LEGEND	
SYMBOL	DESCRIPTION
	BATTERY ENERGY STORAGE SYSTEM (BESS)
	SOLAR PV SUBSTATION
	OVERHEAD LINE
	FARM BOUNDARIES
	AVAILABLE SOLAR PV AREA
	NO-GO/NO ACCESS AREA
	ACCESS ROADS
	OVERHEAD LINE CORRIDOR
	EXISTING ROAD
	LAYDOWN AREA
	STANDARD TRACKER BLOCK

PROPOSED STANDARD TRACKER BLOCK DETAIL	
DESCRIPTION	QUANTITY
MODULES PER TRACKER ROW	30
TRACKER ROWS PER BLOCK	2 x 28 = 56
TOTAL MODULES PER BLOCK	1680
PV MODULE SIZE	575Wp
MODULE SPACING (TRACKER ROW)	100mm
TRACKER ROW PITCH (E-W)	5,5m
TRACKER ROW SPACING (N-S)	800mm
TOTAL BLOCK AREA	1,1276 ha



Rev.	Date	Description	Rev. by
B	25/11/2020	FOR INFORMATION	CFB
A	16/10/2020	FOR INFORMATION	CFB

Client/Employer: VERONIVA Renewable Energy Development

Project: KAPPA - 9 SOLAR PV PLANTS

Plan Description: GROOTFONTEIN 2 SITE LAYOUT

	Name	Signature
Designed	JS	
Drawn	CFB	
Checked		
Approved		
Pr. Nr.		

Scale: 1:5000 — ORIGINAL SIZE A1

Contract No. 1903311

Drawing No. 1903311/E/003 (sheet 1)

Rev/Ider: A

GROOTFONTEIN PV 3

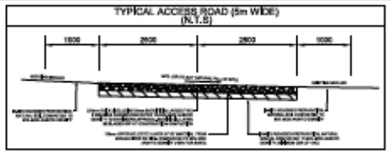
BESS (PHOTO EXAMPLE)

SUBSTATION (PHOTO EXAMPLE)

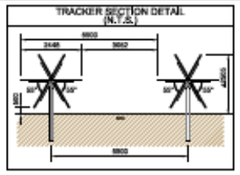
INVERTER SUBSTATION (PHOTO EXAMPLE)

OVERHEAD LINE (PHOTO EXAMPLE)

TYPICAL ACCESS ROAD (5m WIDE) (N.T.S)

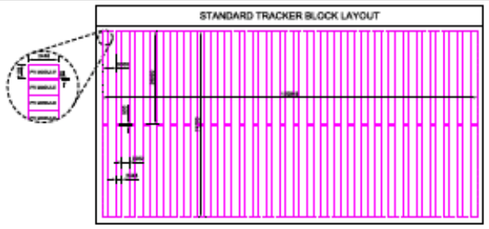


TRACKER SECTION DETAIL (N.T.S.)



PRELIMINARY SITE INFO	
DESCRIPTION	QUANTITY
AVAILABLE AREA	± 255.976 ha
PERIMETER FENCE	± 7 469 m
INTERNAL ROAD LENGTH	± 3 636 m
TOTAL INVERTER STATIONS	29
TOTAL PV MODULES	± 304 560
TOTAL STANDARD TRACKER BLOCKS	167

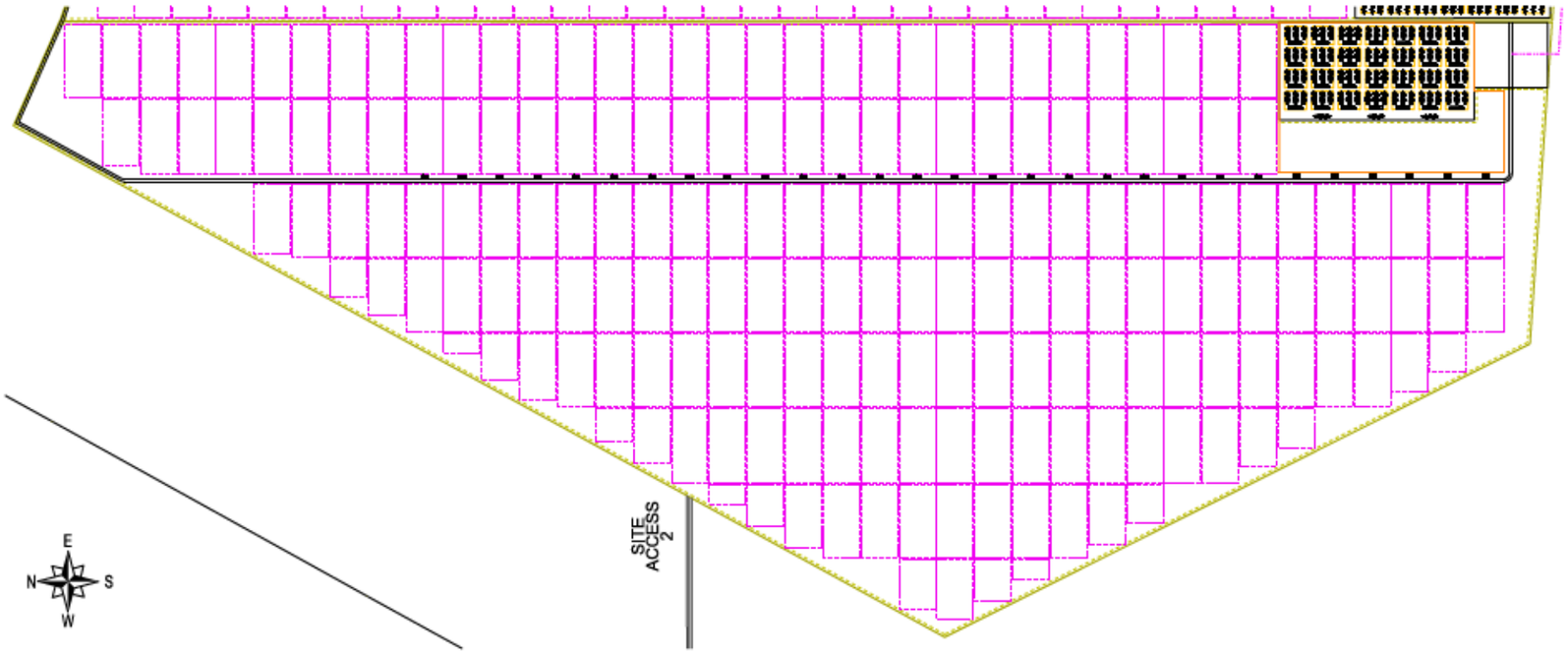
STANDARD TRACKER BLOCK LAYOUT



LEGEND

SYMBOL	DESCRIPTION
	BATTERY ENERGY STORAGE SYSTEM (BESS)
	SOLAR PV SUBSTATION
	OVERHEAD LINE
	FARM BOUNDARIES
	AVAILABLE SOLAR PV AREA
	5m BARRIER AVAILABLE PV AREA
	ACCESS ROADS
	OVERHEAD LINE CORRIDOR
	EXISTING ROAD
	LAYDOWN AREA
	STANDARD TRACKER BLOCK

PROPOSED STANDARD TRACKER BLOCK DETAIL	
DESCRIPTION	QUANTITY
MODULES PER TRACKER ROW	30
TRACKER ROWS PER BLOCK	2 x 28 = 56
TOTAL MODULES PER BLOCK	1680
PV MODULE SIZE	575Wp
MODULE SPACING (TRACKER ROW)	100mm
TRACKER ROW PITCH (E-W)	5,5m
TRACKER ROW SPACING (N-S)	800mm
TOTAL BLOCK AREA	1,1276 ha



Rev.	Date	Description	Rev. by
B	20/11/2020	FOR INFORMATION	CFS
A	19/10/2020	FOR INFORMATION	CFS

Block C, Oxford Gate, 54 Oxford Street, Durban North, 4051
P O Box 1142, Durban, 4000
Tel: +27 21 979 1710
Fax: +27 21 979 9485
E-mail: info@element.co.za

Client/Employer

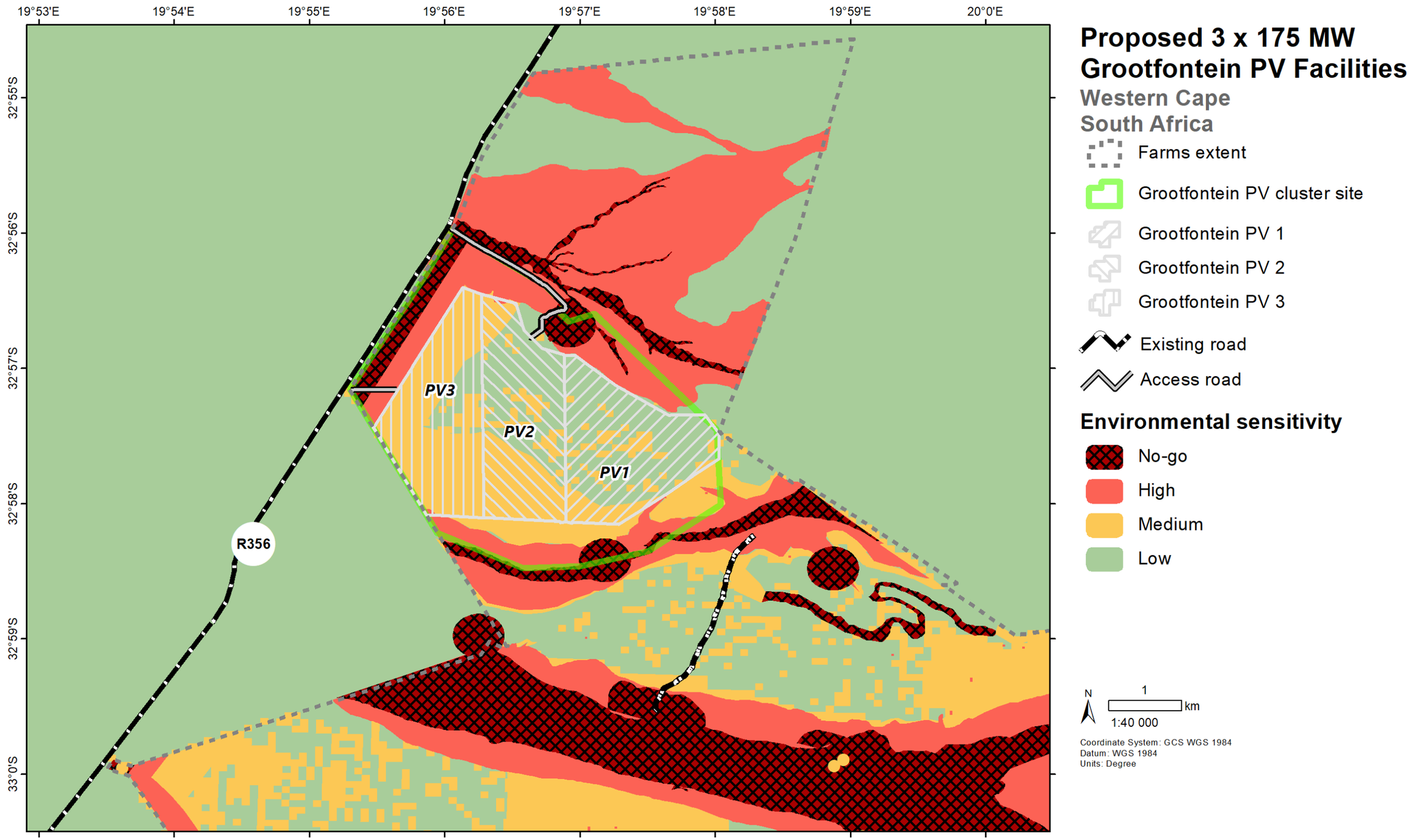
Project
KAPPA - 9 SOLAR PV PLANTS

File Description
GROOTFONTEIN 3 SITE LAYOUT

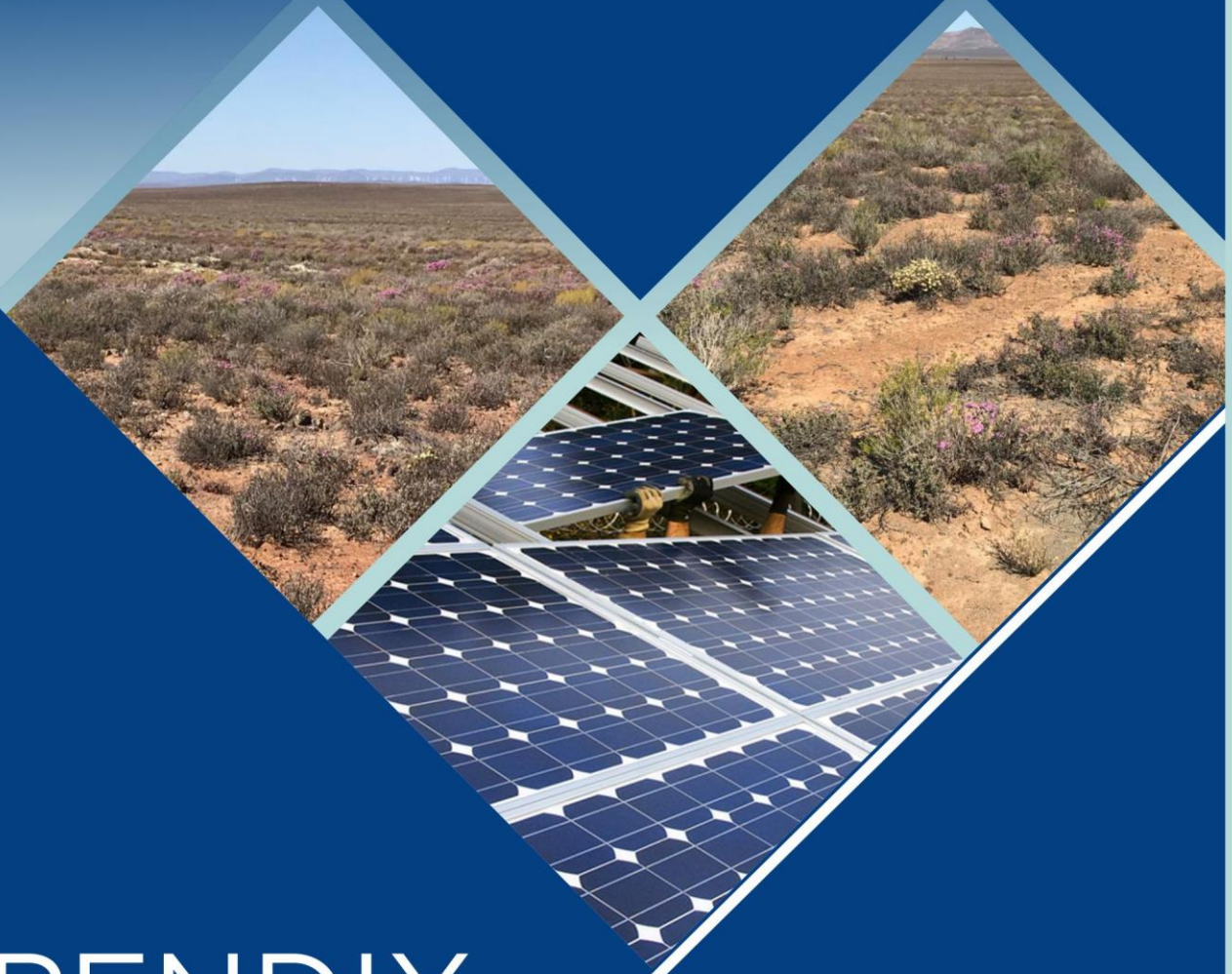
	Name	Signature
Designed	JS	
Drawn	CFS	
Checked		
Approved		
Pr.Nat.		

Scale: 1:5000
ORIGINAL SIZE A1
Contract No.: 1903311
Drawing No.: 1903311/E/004 (sheet 1)
Revision: A

16 APPENDIX F – COMBINED LAYOUT AND SENSITIVITY MAP


19°53'E
19°54'E
19°55'E
19°56'E
19°57'E
19°58'E
19°59'E
20°0'E
32°55'S
32°56'S
32°57'S
32°58'S
32°59'S
33°0'S
PV3
PV2
PV1
R356
Proposed 3 x 175 MW Grootfontein PV Facilities
Western Cape
South Africa
Farms extent
Grootfontein PV cluster site
Grootfontein PV 1
Grootfontein PV 2
Grootfontein PV 3
Existing road
Access road
Environmental sensitivity
No-go
High
Medium
Low
N
1
km
1:40 000
Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree

Basic Assessment for the Proposed Development of three 175 MW Solar Photovoltaic Facilities and associated Infrastructure (i.e. Grootfontein PV 1, Grootfontein PV 2, and Grootfontein PV 3), near Touws River, Western Cape



APPENDIX G.2

Environmental Management Programme (EMPr) for the On-Site Substations for the Grootfontein PV 1, Grootfontein PV 2, and Grootfontein PV 3 Projects

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1 INTRODUCTION

The Project Developer, Veroniva (PTY) Ltd, is proposing to develop nine 175 MW (9 X 175 MW) Solar Photovoltaic (PV) power generation facilities and associated infrastructure, north-east of Ceres and north of Touws River, in the Western Cape Province. The associated infrastructure includes various structures, buildings and electrical grid infrastructure (EGI) such as, but not limited to, nine 132 kV power lines, nine on-site substations, and nine Lithium Ion Battery Energy Storage Systems (BESS). The proposed nine Solar PV facilities will connect to the national grid at the existing Eskom Kappa Substation. The proposed projects are located within the Witzenberg Local Municipality, which falls within the Cape Winelands District Municipality, and are situated approximately 90 km from Ceres and 70 km from Touws River. Each proposed project will be developed by a separate Project Applicant. The Project Names, Project Applicants, and respective farm portions affected by the proposed PV facilities, EGI and associated infrastructure are shown in Table 1 below. The bold and italicized font in Table 1 indicates the projects that are the subject of this Environmental Management Programme (EMPr).

Table 1: Project Names, Applicants and Affected Farm Portions.

Project Name	Project Applicant	Affected Farm Portions (PV Facility and Associated Infrastructure)	Affected Farm Portions (Power Lines)
Witte Wall PV 1	Witte Wall PV 1 (PTY) LTD	▪ Witte Wall RE/171	▪ Witte Wall RE/171 ▪ Die Brak RE/241 ▪ Platfontein RE/240
Witte Wall PV 2	Witte Wall PV 2 (PTY) LTD		
Grootfontein PV 1	***Grootfontein PV 1 (PTY) LTD***	▪ ***Grootfontein RE/149*** ▪ ***Grootfontein 5/149***	▪ ***Grootfontein RE/149*** ▪ ***Hoek Doornen 1/172*** ▪ ***Witte Wall RE/171*** ▪ ***Die Brak RE/241*** ▪ ***Platfontein RE/240***
Grootfontein PV 2	***Grootfontein PV 2 (PTY) LTD***		
Grootfontein PV 3	***Grootfontein PV 3 (PTY) LTD***		
Hoek Doornen PV 1	Hoek Doornen PV 1 (PTY) LTD	▪ Hoek Doornen 1/172	▪ Hoek Doornen 1/172 ▪ Witte Wall RE/171 ▪ Die Brak RE/241 ▪ Platfontein RE/240
Hoek Doornen PV 2	Hoek Doornen PV 2 (PTY) LTD		
Hoek Doornen PV 3	Hoek Doornen PV 3 (PTY) LTD		
Hoek Doornen PV 4	Hoek Doornen PV 4 (PTY) LTD		

The proposed projects are located entirely within the Komsberg Renewable Energy Development Zone (REDZ 2), one of the eight REDZs formally gazetted in South Africa for the purpose of developing solar and wind energy generation facilities (Government Notice (GN) 114; 16 February 2018). In line with the gazetted process for projects located within a REDZ, the proposed projects are subject to a Basic Assessment (BA) process instead of a full Scoping and Environmental Impact Assessment (EIA) process and a reduced decision making period of 57 days, in terms of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) and the 2014 NEMA EIA Regulations (as amended) promulgated in Government Gazette 40772; in GN R326, R327, R325 and R324 on 7 April 2017.

Approval has been granted by the DEFF to submit combined Applications for Environmental Authorisation (EA) in terms of Regulation 11 (4) of the 2014 NEMA EIA Regulations (as amended), and the issuing of multiple EAs (should they be granted) in terms of Regulation 25 (1) and (2) of the 2014 NEMA EIA Regulations (as amended). Therefore, four separate BA Reports have been compiled, as indicated in Table 2 below, and it is proposed that nine separate EAs will be issued for each PV Facility and associated infrastructure, as well as nine separate EAs for the power lines and associated EGI that are required to support the nine PV Facilities (should they be granted):

Table 2: BA Reporting Structure and Components

	Report 1: Witte Wall Farm	Report 2: Grootfontein Farm	Report 3: Hoek Doornen Farm	Report 4: EGI
BA Reports	Group 1: Witte Wall Farm: 1 BA Report that covers the 2 PV Facilities (i.e. Witte Wall PV 1 and PV 2), 2 on-site substations, 2 Lithium Ion BESS's and all associated infrastructure.	Group 2: Grootfontein Farm: 1 BA Report that covers the 3 PV Facilities (i.e. Grootfontein PV 1, PV 2 and PV 3), 3 on-site substations, 3 Lithium Ion BESS's and all associated infrastructure.	Group 3: Hoek Doornen Farm: 1 BA Report that covers the 4 PV Facilities (i.e. Hoek Doornen PV 1, PV 2, PV 3 and PV 4), 4 on-site substations, 4 Lithium Ion BESS's and all associated infrastructure.	Group 4: EGI to support the PV Facilities: 1 BA Report that covers all the power lines and associated EGI that are required to support the 9 PV Facilities (i.e. 9 Power Lines).

This EMPr is being submitted to the National Department of Environment, Forestry and Fisheries (DEFF) as part of the Application for EA for the proposed projects. **As indicated in Table 2, this EMPr covers the proposed Grootfontein PV 1, Grootfontein PV 2 and Grootfontein PV 3 projects only** i.e. the 3 PV Facilities (i.e. Grootfontein PV 1, PV 2 and PV 3), 3 on-site substations, 3 Lithium Ion BESS's and all associated infrastructure**.** Figure 1 shows the overall locality of the proposed Grootfontein PV 1, Grootfontein PV 2 and Grootfontein PV 3 projects.

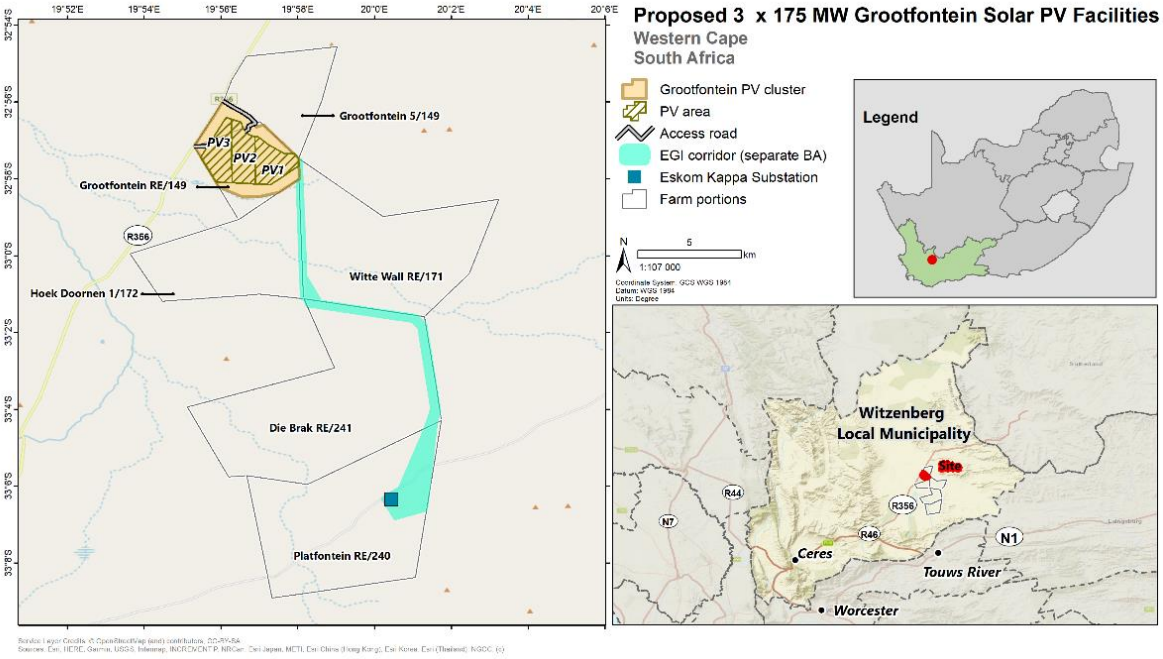


Figure 1: Locality of the Grootfontein PV 1, Grootfontein PV 2 and Grootfontein PV 3 Facilities and associated infrastructure

This EMPr is being made available to Interested and Affected Parties (I&APs), stakeholders and Organs of State, as part of the BA Report, for a 30-day review period. Comments received from stakeholders during this aforementioned review period will be incorporated into this EMPr, where applicable. Following the incorporation of comments from I&APs, stakeholders and Organs of State, this EMPr is intended as a "living" document and should continue to be updated regularly, as needed.

1.1 AUTHORS OF THE EMPr

This EMPr has been compiled by the Environmental Assessment Practitioners (Paul Lochner and Rohaida Abed) and the various specialists on the team (as indicated in Table 3). The details and expertise of the Environmental Assessment Practitioners and the specialists are provided in Appendix C and Appendix E of the BA Report. The Curriculum Vitae of the Environmental Assessment Practitioners is also included in Appendix A of this EMPr.

Paul Lochner has more than 28 years of experience in environmental assessment and management studies, primarily in the leadership and integration functions. This has included Strategic Environmental Assessments (SEA), EIAs and Environmental Management Plans. Paul is a Registered EAP (2019/745) with the Environmental Assessment Practitioners Association of South Africa (EAPASA). Paul has extensive experience in conducting environmental assessment and management processes throughout South Africa.

Rohaida Abed has a Masters degree in Environmental Science and is a registered Professional Natural Scientist (Registration Number: 400247/14) with the South African Council for Natural Scientific Professions (SACNASP). She has experience in conducting BAs and Scoping and EIAs for various sectors, including Port infrastructure and Bulk Liquid Storage facilities, and has been involved in various transport infrastructure related projects as an Environmental Control Officer.

Table 3: Details of the BA Team

Name	Organisation	Role/ Specialist Study
CSIR Project Team		
Paul Lochner (*Registered EAP (2019/745)*)	CSIR	EAP and Project Leader
Rohaida Abed (*Pr.Sci.Nat.*)	CSIR	Project Manager
Dhiveshni Moodley (*Cand.Sci.Nat.*)	CSIR	Project Officer
Luanita Snyman-van der Walt (*Pr.Sci.Nat.*)	CSIR	Project Mapping
Lizande Kellerman (*Pr.Sci.Nat.*)	CSIR	Project Specialist
Specialists		
Johann Lanz (*Pr.Sci.Nat.*)	Private	Agricultural Compliance Statement
Quinton Lawson	Quinton Lawson Architect (QARC)	Visual Impact Assessment
Bernard Oberholzer	Bernard Oberholzer Landscape Architect (BOLA)	
Dr. Jayson Orton	ASHA Consulting	Heritage Impact Assessment (Archaeology, Cultural Landscape and Palaeontology)
Dr. John Almond	Natura Viva cc	

Name	Organisation	Role/ Specialist Study
Simon Bundy (*Pr.Sci.Nat.*), Luke Maingard and Alex Whitehead (*Pr.Sci.Nat.*)	Sustainable Development Projects cc	Terrestrial Biodiversity and Species Impact Assessment
Simon Todd (*Pr.Sci.Nat.*)	3Foxes Biodiversity Solutions	Riverine Rabbit
Simon Bundy (*Pr.Sci.Nat.*), Luke Maingard and Alex Whitehead (*Pr.Sci.Nat.*)	Sustainable Development Projects cc	Aquatic Biodiversity and Species Impact Assessment
Chris van Rooyen and Albert Froneman (*Pr.Sci.Nat.*)	Chris van Rooyen Consulting	Avifauna Impact Assessment
Sandra Hill	Private	Socio-Economic Impact Assessment
Charl Muller	GEOSS South Africa (PTY) Ltd	Geohydrology Assessment
Lizande Kellerman (*Pr.Sci.Nat.*), Rohaida Abed (*Pr.Sci.Nat.*), Luanita Snyman-van der Walt (*Pr.Sci.Nat.*)	CSIR	Civil Aviation Site Sensitivity Verification
Lizande Kellerman (*Pr.Sci.Nat.*), Rohaida Abed (*Pr.Sci.Nat.*), Luanita Snyman-van der Walt (*Pr.Sci.Nat.*)	CSIR	Defence Site Sensitivity Verification
Technical Input		
Annebet Krige *Pr Eng*	Sturgeon Consulting	Traffic Impact Statement

1.2 PROJECT DESCRIPTION

It is important to point out at the outset that the exact specifications of the proposed project components will be determined during the detailed engineering phase (subsequent to the issuing of EAs, should they be granted for the proposed projects).

The proposed three 175 MW Solar PV facilities (i.e. Grootfontein PV 1, Grootfontein PV 2 and Grootfontein PV 3) will each cover an approximate area of 250 hectares (ha). This excludes access roads leading to the site. The specialists assessed larger areas on the affected farm portions in order to avoid environmental constraints and sensitivities (highlighted by the specialists), during the siting and final design of the facilities and associated infrastructure.

The proposed projects will make use of PV technology to generate electricity from solar energy. Once a Power Purchase Agreement (PPA) is awarded, the proposed facility will generate electricity for a minimum period of 20 years. The construction phase for each proposed project is expected to extend 12 to 14 months. The proposed solar facilities will **each** consist of the following components (i.e. the project components are the same for Grootfontein PV 1, Grootfontein PV 2 and Grootfontein PV 3, except where specified):

- Solar Field, comprising Solar Arrays with a maximum height of 10 m and maximum footprint of 250 hectares, including the following:
    - PV Modules;
    - Single Axis Tracking structures (aligned north-south), Fixed Axis Tracking (aligned east-west), Dual Axis Tracking (aligned east-west and north-south), Fixed Tilt Mounting Structure or Bifacial Solar Modules;
    - Solar module mounting structures comprised of galvanised steel and aluminium; and
    - Foundations which will likely be drilled and concreted into the ground.
- Building Infrastructure:
    - Offices (maximum height 7 m and footprint of 1000 m^2);

  - Operational and maintenance control centre (maximum height 7 m and footprint 500 m^2);
  - Warehouse/workshop (maximum height 7 m and footprint 500 m^2);
  - Ablution facilities (maximum height 7 m and footprint 50 m^2);
  - Converter/inverter stations (height from 2.5 m to 7 m (maximum) and footprint 2500 m^2);
  - **On-site substation and/or a switching substation building (footprint 20 000 m^2); and**
  - Guard Houses (height 3 m, footprint 40 m^2).
- Associated Infrastructure:
  - **On-site substation and/or a switching substation (the relevant section that will be maintained by the Independent Power Producer);**
  - Internal 33 kV power lines/underground cables (either underground to a maximum depth of 1.6 m or above ground with a height of 9 m);
  - Lithium Ion BESS that will cover an area of up to 8 hectares (within the laydown area) and a height of up to 5 – 10 m;
  - Underground low voltage cables or cable trays (underground to maximum depth of 1.4 m);
  - Access roads ranging between 4 - 8 m wide.
  - Internal gravel roads (width of 4 - 5 m);
  - Fencing (between 2 – 3 m high) around the PV Facilities;
  - Panel maintenance and cleaning area;
  - Storm water channels; and
  - Construction work area (i.e. laydown area of maximum 13 ha).

The on-site substation and/or switching substation has two sections, as follows:

- High voltage infrastructure leading up to the Point of Connection (i.e. the Project Applicant's section of the proposed on-site substations) which is covered in the BA Processes for the PV Facilities; and
- High voltage infrastructure extending from the Point of Connection (i.e. Eskom's section of the proposed on-site substations) up to the line bay at the Eskom Kappa Substation, which is covered in the separate BA Process for the EGI.

This EMPr has been compiled for the high voltage infrastructure leading up to the Point of Connection (i.e. the Project Applicant's section of the proposed on-site substations and/or a switching substations) to be located at the proposed Grootfontein PV 1, Grootfontein PV 2 and Grootfontein PV 3 facilities. This EMPr is included in Appendix G.2 of this BA Report (i.e. Report 2 for the Grootfontein Farm, as indicated in Table 2), and is required to comply with the Generic EMPr published for substation development (Government Gazette 42323, GN 435, dated 22 March 2019).

A separate EMPr has been compiled for the proposed Grootfontein PV 1, Grootfontein PV 2 and Grootfontein PV 3 facilities. This EMPr is included in Appendix G.1 of this BA Report (i.e. Report w for the Grootfontein Farm, as indicated in Table 2), and it complies with Appendix 4 of the 2014 NEMA EIA Regulations (as amended).

In addition, a separate EMPr has been compiled for the high voltage infrastructure extending from the Point of Connection (i.e. Eskom's section of the proposed on-site substations and/or a switching substations) to be located at the proposed Grootfontein PV 1, Grootfontein PV 2 and Grootfontein PV 3 facilities. This EMPr is included in Appendix H of the separate BA Report for the EGI (i.e. Report 4 for the EGI, as indicated in Table 2), and it complies with the Generic EMPr published for substation development (Government Gazette 42323, GN 435, dated 22 March 2019).

Furthermore, a separate EMPr has been compiled for the power lines that will enable the nine proposed PV Facilities to connect to the Eskom Kappa Substation. This EMPr is included in Appendix G of the separate BA Report for the EGI (i.e. Report 4 for the EGI, as indicated in Table 2), and it complies with the Generic EMPr published for power line development (Government Gazette 42323, GN 435, dated 22 March 2019).

The proposed project can be divided into the following three main phases:

- Construction Phase;
- Operational Phase; and
- Decommissioning Phase.

Each activity undertaken as part of the above phases may have environmental impacts and, where applicable, has been assessed in the specialist studies (included in Appendix C of this BA Report). Management and mitigation measures required to address all the impacts are included within this EMPr.

The construction phase will take place subsequent to the issuing of the EAs from the DEFF and a successful BID in terms of the Renewable Energy Independent Power Producer Programme (REIPPPP) (i.e. the issuing of a PPA).

The main activities that will form part of the construction phase per project are:

- Removal of vegetation for the proposed infrastructure, where necessary;
- Excavations for infrastructure and associated infrastructure;
- Establishment of a laydown area for equipment;
- Stockpiling of topsoil and cleared vegetation, where necessary;
- Creation of employment opportunities;
- Transportation of material and equipment to site, and personnel to and from site; and
- Construction of the solar field, on-site substations and additional infrastructure.

The following activities will occur during the operational phase per PV project:

- The generation of electricity from the proposed solar facility; and
- Maintenance of the solar field and associated infrastructure.

During the life span of the proposed projects (approximately 20 years each), on-going maintenance will be required on a scheduled basis.

Should it be decided not to extend the operational lifespan of the project beyond 20 years, the project will be decommissioned. The main aim of decommissioning is to return the land to its original, pre-construction condition. Should the unlikely need for decommissioning arise (i.e. if the facility becomes outdated or the land needs to be used for other purposes), the decommissioning procedure will involve removing the solar panels and associated infrastructures, and covering the concrete footings with soil to a depth sufficient for the re-growth of natural vegetation. Whether all components of the solar facility will be removed still needs to be agreed upon with the landowner (some components may be useful for the landowner and therefore it could be decided that those remain on site). Any other supporting infrastructure no longer in use will be removed from the site and either disposed of at a registered disposal facility or recycled if possible.

It should be noted that a detailed project description (based on the conceptual design) is provided in Section A of the BA Report.

1.3 ENVIRONMENTAL SENSITIVITIES

Section D of the BA Report provides a description of the environmental features and sensitive areas that were identified by the specialists for consideration in the layout and location of the proposed project. Refer to the specialist studies in Appendix C of the BA Report for details on the environmental sensitivities identified.

The preferred site for the proposed Grootfontein PV 1, Grootfontein PV 2 and Grootfontein PV 3 projects include approximately 1230 ha of land (as shown in Figure 1), however the proposed solar facilities and associated infrastructure each require a development area of approximately 250 ha only. The larger 1230 ha area was considered and assessed by the specialists in order to ensure that any development constraints or environmental sensitivities can be avoided in the final siting and location of the proposed facility.

Based on the findings of the specialist studies, an environmental sensitivity map has been produced. This map shows the sensitivities on site (e.g. terrestrial, aquatic, avifaunal, visual, agricultural, and heritage features) within the larger assessed area that was identified. Based on this map, the preferred location for the Grootfontein PV 1, Grootfontein PV 2 and Grootfontein PV 3 facilities, avoids the sensitive features that were identified by the specialists. Based on the boundaries of the assessed area and the constraints of the environmental sensitivities, a site layout has also been preliminarily determined for this project (Appendix C of this EMPr).

Appendix D of this EMPr includes the environmental sensitivity map which indicates the environmental sensitive areas and features identified during the BA Process (as described above), including the site layout.

1.4 IMPACTS IDENTIFIED DURING THE BA PROCESS

Based on the specialist studies (as shown in Table 3), the following main direct potential impacts, as indicated in Table 4, were identified and appropriate management and mitigation measures included within the EMPr (where required) to ensure the potential impacts are suitably addressed and managed during all phases of the project. Indirect and cumulative impacts are noted in Sections 4 to 12 of this EMPr.

Table 4: Impacts identified in the BA Process

KEY IMPACT	IMPACTS IDENTIFIED
Agriculture	▪ Loss of agricultural land use ▪ Soil degradation
Visual	**Construction Phase** ▪ Impact 1: Potential effect of dust and noise from construction machinery during the construction of the substation and pylons, and the effect of this on residents and visitors to the area. ▪ Impact 2: Potential visual effect of access roads, stockpiles and construction camps in the exposed landscape. **Operational Phase** ▪ Impact 1: Potential visual intrusion of substations and power lines, and the impact on receptors, particularly where power lines cross roads. ▪ Impact 2: Potential visual impact of industrial type activities on the rural or wilderness character of the area **Decommissioning Phase** ▪ Impact 1: Potential visual effect of any remaining electrical grid structures and disused roads on the landscape.
Heritage and Cultural Landscape	**Construction Phase** ▪ Potential impacts to archaeological resources and graves ▪ Potential impacts to the cultural landscape **Operational and Decommissioning Phase** ▪ Potential impacts to the cultural landscape
Palaeontology	**Construction Phase** ▪ Disturbance, damage or destruction of fossils within the development footprint due to excavations and surface clearance
Terrestrial Biodiversity and Species	**Construction Phase** ▪ Impact 1: Alteration of habitat structure and composition ▪ Impact 2: Ousting (and recruitment) of various fauna ▪ Impact 3: Changes in the geomorphological state of drainage patterns ▪ Impact 4: Increased Electrical Light Pollution (ELP) ▪ Impact 5: Exclusion or entrapment of (in particular) large fauna ▪ Impact 6: Changes in edaphics (soils) due to excavation and import of soils, leading to the alteration of plant communities and fossorial species in and around these points ▪ Impact 7: Changes in subsurface water resources arising from alteration of percolation and recharge at points ▪ Impact 8: Changes in water resources and surface water in terms of water quality ▪ Impact 9: Exotic weed invasion ▪ Impact 10: Clearance of vegetation to establish roadways and other infrastructure ▪ Impact 11: Dust – according to movement of traffic and other construction related factors will affect factors such as palatability of vegetation ▪ Impact 12: Incidental pollution events, including the loss of solid waste, spillage of liquids such as hydrocarbons and other fuels as well as possible sewerage and other waste is likely to alter select points within the subject site, possibly affecting habitat form and other factors ▪ Impact 13: General disturbance on account of pedestrian movement and activities on site **Operational Phase** ▪ Impact 14: Continued alteration of habitat structure and composition on account of continuing low level anthropogenic impacts, such as “shading of vegetation” from arrays ▪ Impact 15: Ousting (and recruitment) of various fauna on account of long-term changes in the surrounding habitat/environment ▪ Impact 16: Changes in the geomorphological state of the subject site on account of long-term climatic changes and the concomitant change in the nature of the catchment arising from the land use change ▪ Impact 17: Changes in water resources and water quality (i.e. impact on water chemistry) as a result of operational activities ▪ Impact 18: Exotic weed invasion as a consequence of regular and continued disturbance of site

KEY IMPACT	IMPACTS IDENTIFIED
	Decommissioning Phase ▪ Impact 19: A reversion to an early seral stage ▪ Impact 20: A reversion to present faunal population states within the study area, with some variation to these populations being possible ▪ Impact 21: Changes in the geomorphological state of drainage lines as hydraulic changes arise within the catchment ▪ Impact 22: Exotic weed invasion as a consequence of abandonment of site and cessation of weed control measures
Aquatic Biodiversity and Species	**Construction Phase** ▪ Impact 1: Changes in the geomorphological state of drainage patterns ▪ Impact 2: Increased ELP ▪ Impact 3: Changes in water resources and surface water in terms of water quality **Operational Phase** ▪ Impact 4: Changes in the geomorphological state of the subject site on account of long-term climatic changes and the concomitant change in the nature of the catchment arising from the land use change ▪ Impact 5: Changes in water resources and water quality (i.e. impact on water chemistry) as a result of operational activities **Decommissioning Phase** ▪ Impact 6: A reversion to present faunal population states within the study area, with some variation to these populations being possible ▪ Impact 7: Changes in the geomorphological state of drainage lines as hydraulic changes arise within the catchment
Riverine Rabbit	**Construction Phase** ▪ Impact on Riverine Rabbits due to construction phase activities (i.e. Habitat loss and disturbance) **Operational Phase** ▪ Impact on Riverine Rabbits due to operational phase activities (i.e. Disturbance and vehicle collisions)
Avifauna Assessment	**Construction Phase** ▪ Impact 1: Displacement due to disturbance associated with the construction of the solar PV plants and associated infrastructure **Operational Phase** ▪ Impact 1: Total or partial displacement of avifauna due to habitat transformation associated with the presence of the solar PV plants and associated infrastructure ▪ Impact 2: Mortality through collisions with the solar panels ▪ Impact 3: Entrapment of medium and large terrestrial birds between the perimeter fences, leading to mortality. ▪ Impact 4: Electrocution of priority species on the internal 33kV power lines **Decommissioning Phase** ▪ Impact 1: The noise and movement associated with the activities at the study area will be a source of disturbance which would lead to the displacement of avifauna from the area
Socio-Economic	**Construction Phase** ▪ Impact 1: Disruption of local social structures ▪ Impact 2: Increased social ills and risky behaviours ▪ Impact 3: Increased burden on existing social and bulk services ▪ Impact 4: Increased road use and road traffic related accidents and/or damage ▪ Impact 5: Unrealistic expectations regarding local job creation ▪ Impact 6: Creation of temporary employment ▪ Impact 7: Increased household income attainment and standard of living ▪ Impact 8: Potential increase in crime ▪ Impact 9: Potential decrease in local tourism ▪ Impact 10: Potential marginalisation of local residents ▪ Impact 11: Development and/or growth of locally-owned industries

KEY IMPACT	IMPACTS IDENTIFIED
	Operational Phase ▪ Impact 1: Creation of long-term employment ▪ Impact 2: Development and/or growth of locally-owned industries ▪ Impact 3: Human development via the Economic Development Plan (EDP) **Decommissioning Phase** ▪ Impact 1: Job losses ▪ Impact 2: Local economy stimulation
Geohydrology	**Construction Phase** ▪ Lowering of groundwater levels as a result of over-abstraction ▪ Potential impact on groundwater quality as a result of accidental oil spillages or fuel leakages **Operational Phase** ▪ Lowering of groundwater levels as a result of over-abstraction ▪ Potential impact on groundwater quality as a result of using cleaning agents
Traffic[1]	**Construction and Decommissioning Phases** ▪ Potential congestion and delays on the surrounding road network ▪ Potential impact on traffic safety and increase in accidents with other vehicles or animals ▪ Deterioration of the surface condition of the roads ▪ Potential dust pollution as a result of the construction and decommissioning phase vehicles ▪ Potential noise pollution as a result of the construction and decommissioning phase vehicles

2 APPROACH TO PREPARING THE EMPr

2.1 COMPLIANCE WITH RELEVANT LEGISLATION

As noted in the Gazetted EMPrs noted above (dated March 2019), the NEMA requires that an EMPr be submitted where a BA or EIA is being undertaken for an Application for EA. The content of an EMPr must either contain the information set out in Appendix 4 of the 2014 NEMA EIA Regulations (as amended) promulgated in Government Gazette 40772 and GN R326 on 7 April 2017, or must be a generic EMPr relevant to an application as identified and gazetted by the Minister in a government notice. As part of the 2016 EGI SEA, a generic EMPr was also compiled for the development and expansion of (a) overhead electricity transmission and distribution infrastructure; and (b) substation infrastructure for the transmission and distribution of electricity. On 2 March 2018, these two Generic EMPrs were gazetted in Government Gazette 41473, GN 162 and GN 163, for public comment for a period of 45 days. **On 22 March 2019, these two Generic EMPrs were gazetted for implementation in Government Gazette 42323, GN 435**. It is therefore understood that these gazetted EMPrs must be applied by all parties involved in the EA Process. This EMPr therefore subscribes to the requirements of the gazetted EMPrs (Gazette 42323, GN 435).

Since the Generic EMPrs have been gazetted and are applicable to the proposed project, the following has been undertaken:

- Section 1 of Part B of the gazetted Generic EMPr contains a pre-approved template with aspects that are common to the development of substation infrastructure. This section will be

[1] The Traffic Impact Statement is not a specialist study in terms of Appendix 6 of the EIA Regulations; however, it provides a general description of the potential traffic impacts.

completed by the contractor, with each completed page signed and dated by the holder of the EA prior to commencement of the activity. This section will not be submitted to the DEFF as it has already been pre-approved gazetted. To allow I&APs access to the pre-approved EMPr template for consideration through the decision-making process, the template is being released with the Draft BA Report. It is included in Appendix E of this EMPr.

- Section 2 of Part B of the gazetted Generic EMPr has been completed to include site specific information, a preliminary infrastructure layout and development footprint site map, and a declaration that the Applicant will comply with the pre-approved template provided in Part B: Section 1 of the gazetted EMPr. This will be submitted to the DEFF for review and decision-making and has been included in Section 4 (site specific information), Section 5 (preliminary infrastructure layout) and Section 6 (declaration of the Applicant) of this EMPr.
- Part C of the gazetted Generic EMPr has been compiled and included in Section 7 of this EMPr. It includes site specific impact management outcomes and impact management actions that are not included in the pre-approved generic EMPr. It will be submitted to the DEFF together with the Draft BA Report, for consideration of, and decision on, the Applications for EA. This section has been prepared by the EAP, with input from relevant specialists. This section of the EMPr is a supplement to the gazetted EMPr and provides site specific mitigation measures identified in the specialist studies contained in Appendix C of the Draft BA Report. It was confirmed with the DEFF Interpretation Query Unit in February 2020 that if Part C the gazetted Generic EMPr is required, the impact management outcomes and impact management actions must be provided; whilst the columns under the headings, “Implementation” and “Monitoring” can only be completed by the relevant parties after the EA is issued (as per Part B – Section 1).

2.2 STRUCTURE AND CONTENTS OF THE EMPr

This Site Specific EMPr includes the following:

- Section 4: Site specific information;
- Section 5: Preliminary infrastructure layout and development footprint site map;
- Section 6: Declaration that the Applicant will comply with the pre-approved template provided in Part B: Section 1 of the gazetted EMPr (which is included in Appendix E of this EMPr);
- Section 7: Site-Specific EMPr as required by Part C of the gazetted EMPr.

The Site-Specific EMPr follows the same template as that of Part B – Section 1 of the gazetted EMPr, as recommended. Where applicable, each section of the Site-Specific EMPr is divided into the following four phases of the project cycle:

- Planning and Design Phase;
- Construction Phase;
- Operational Phase; and
- Decommissioning Phase.

The overall goal for environmental management for the proposed project is to plan, design, construct and operate the project in a manner that:

- Minimises the ecological footprint of the project on the local environment;
- Minimises impacts on fauna, flora and freshwater ecosystems;
- Facilitates harmonious co-existence between the project and other land uses in the area;
- Enhances the socio-economic benefits in the local area; and
- Contributes to the environmental baseline and understanding of environmental impacts of electrical grid infrastructure in a South African context.

In this EMPr, the following spatial parameters apply to the management actions, unless where specified differently:

- The study area is referred to as the larger assessed area (i.e. 1230 ha and greater);
- The site as the footprint of the PV Facility (i.e. approximately 250 ha).

3 ROLES AND RESPONSIBILITIES

Since the Generic EMPrs are applicable for the on-site substations and power lines, it is best to adopt the definitions of the roles and responsibilities as captured in in the gazetted EMPrs of GN 435. This will allow consistency of the management of the project from an environmental perspective and will avoid any contradiction in terms of the roles and responsibilities.

The generic roles and responsibilities required for key role players are those of the:

- Project Developer / Developer's Project Manager (DPM);
- Developer Site Supervisor (DSS)
- Environmental Control Officer (ECO);
- Developer's Environmental Officer (DEO);
- Contractor; and
- Contractor's Environmental Officer (CEO).

The definitions of the roles and responsibilities are included in Appendix B of this EMPr.

4 SITE SPECIFIC INFORMATION

4.1 CONTACT DETAILS AND DESCRIPTION OF THE PROJECT

4.1.1 Details of the Applicant

Grootfontein PV 1 – On-Site Substation

Name of Applicant	Grootfontein PV 1 (PTY) LTD
Name of Applicant Representative	Claude Bosman
Telephone Number:	082 331 4098
Fax Number:	-
Postal Address:	P. O. Box 3253, Pinegowrie, Johannesburg, 2123
Physical Address:	8 Linden Village, Corner 4th Avenue and 11 Street, Johannesburg, 2195

Grootfontein PV 2 – On-Site Substation

Name of Applicant	Grootfontein PV 2 (PTY) LTD
Name of Applicant Representative	Claude Bosman
Telephone Number:	082 331 4098
Fax Number:	-
Postal Address:	P. O. Box 3253, Pinegowrie, Johannesburg, 2123
Physical Address:	8 Linden Village, Corner 4th Avenue and 11 Street, Johannesburg, 2195

Grootfontein PV 3 – On-Site Substation

Name of Applicant	Grootfontein PV 3 (PTY) LTD
Name of Applicant Representative	Claude Bosman
Telephone Number:	082 331 4098
Fax Number:	-
Postal Address:	P. O. Box 3253, Pinegowrie, Johannesburg, 2123
Physical Address:	8 Linden Village, Corner 4th Avenue and 11 Street, Johannesburg, 2195

4.1.2 Details and Expertise of the EAP

Company of the EAP	Council for Scientific and Industrial Research (CSIR)
Name of EAP	Paul Lochner
Telephone Number:	021 888 2486 or 084 442 3646
Fax Number:	021 888 2693
Email Address:	PLochner@csir.co.za RAbed@csir.co.za
Expertise of the EAP (Curriculum Vitae included):	**Qualifications:** ▪ B.Sc. Civil Engineering (awarded with Honours), University of Cape Town ▪ M. Phil. Environmental Science, University of Cape Town **Experience:** ▪ Paul has more than 28 years of experience in environmental assessment and management. **Professional Registration and Affiliations:** ▪ Registered EAP (2019/745) with the Environmental Assessment Practitioners Association of South Africa (EAPASA) ▪ International Association for Impact Assessment, South African Affiliate. **Curriculum Vitae of Paul Lochner is included in Appendix A of this EMPr.**

4.1.3 Project Name

Project Name	Basic Assessment for the Proposed Development of three 175 MW Solar Photovoltaic Facilities and associated Infrastructure (i.e. Grootfontein PV 1, Grootfontein PV 2, and Grootfontein PV 3), near Touws River, Western Cape

4.1.4 Description of the Project

Refer to Section 1.2 of this EMPr for a detailed description of the proposed projects.

4.1.5 Project Location

The proposed on-site substations for the Grootfontein PV 1, Grootfontein PV 2, and Grootfontein PV 3 facilities will be constructed on the Remainder of the Grootfontein 149. Details of the farm portion provided below.

NUMBER	FARM NAME	FARM NUMBER	PORTION NAME	PORTION NUMBER	LATITUDE (Y)	LONGITUDE (X)
1	Remainder of Grootfontein Farm Number 149	149	REMAINDER	0	-32.961469	19.945826

Co-ordinates of the proposed infrastructure are provided in Section A of the BA Report.

5 LAYOUT AND DEVELOPMENT FOOTPRINT SITE MAP

This section includes maps of sensitivities, as well as the preliminary infrastructure layout. As noted above, the feature and sensitivity map was prepared based on specialist feedback and existing databases. Individual feature and sensitivity maps are included in the specialist studies (Appendix C of the BA Report). Individual feature maps for each specialist theme, where relevant, are also included in Part B of the BA Report. Refer to Appendix D for the combined sensitivity and layout map for the proposed Grootfontein PV 1, Grootfontein PV 2, and Grootfontein PV 3 projects.

6 APPLICANT DECLARATION

PROJECT APPLICANT DECLARATION

The proponent/applicant or holder of the EA affirms that he/she will abide and comply with the prescribed impact management outcomes and impact management actions as stipulated in Part B: section 1 of the generic EMPr and have the understanding that the impact management outcomes and impact management actions are legally binding. The proponent/applicant or holder of the EA affirms that he/she will provide written notice to the CA 14 days prior to the date on which the activity will commence of commencement of construction to facilitate compliance inspections.

Signature Proponent/Applicant/Holder of EA

Date: 28 November 2020

Grootfontein PV 1 (PTY) LTD
Grootfontein PV 2 (PTY) LTD
Grootfontein PV 3 (PTY) LTD

7 PROJECT SPECIFIC EMPR

The project specific EMPr is presented below per specialist theme.

7.1 SOILS AND AGRICULTURE

Impact Management Outcomes: Ensuring that disturbance and existence of hard surfaces causes no erosion on or downstream of the site; ensuring that vegetation clearing does not pose a high erosion risk; ensuring that topsoil loss is minimized; and ensuring that denuded areas are re-vegetated to stabilise soil against erosion						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
PLANNING AND DESIGN PHASE						
▪ Design an effective system of stormwater run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion.	To be completed post EA by relevant parties					
CONSTRUCTION PHASE						
▪ Implement an effective system of stormwater run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion.	To be completed post EA by relevant parties					
▪ Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion	To be completed post EA by relevant parties					
▪ If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.	To be completed post EA by relevant parties					

Impact Management Outcomes: Ensuring that disturbance and existence of hard surfaces causes no erosion on or downstream of the site; ensuring that vegetation clearing does not pose a high erosion risk; ensuring that topsoil loss is minimized; and ensuring that denuded areas are re-vegetated to stabilise soil against erosion						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
OPERATIONAL PHASE						
▪ Maintain the stormwater run-off control system. Monitor erosion and remedy the storm water control system in the event of any erosion occurring.	To be completed post EA by relevant parties					
▪ Facilitate re-vegetation of denuded areas throughout the site.	To be completed post EA by relevant parties					
DECOMMISSIONING PHASE						
▪ Implement an effective system of stormwater run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion.	To be completed post EA by relevant parties					
▪ Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion.	To be completed post EA by relevant parties					
▪ If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.	To be completed post EA by relevant parties					

7.2 VISUAL IMPACTS

Impact Management Outcomes: Reduce visual intrusion of construction, operational and decommissioning activities and infrastructure on the surrounding landscape and receptors.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
DESIGN PHASE						
▪ Ensure that the construction camps and stockpiles and other facilities are located in visually unobtrusive areas, away from public roads. ▪ Locate substations in un-obtrusive low-lying areas, away from public roads. ▪ Fit outdoor / security lighting at substations with reflectors to minimise light spillage. ▪ Keep maintenance and access roads as narrow as possible, and use existing roads or tracks as far as possible.	To be completed post EA by relevant parties					
CONSTRUCTION PHASE						
▪ Implement dust suppression and litter control measures, as well as rehabilitation of borrow pits (if required) and haul roads to minimise their visual effect on the surroundings. Ensure regular reporting to an environmental management team by the ECO during the construction phase.	To be completed post EA by relevant parties					
OPERATIONAL PHASE						
▪ Ensure that visual mitigation measures are monitored by management on an on-going basis, including the control of signage, lighting and wastes on the site by the appointed Environmental Manager.	To be completed post EA by relevant parties					
DECOMMISSIONING PHASE						
▪ Ensure that procedures for the removal of structures and stockpiles during the decommissioning phase are implemented, including recycling of materials and rehabilitation of the site to a visually acceptable standard as prescribed in a rehabilitation plan, and signed off by the delegated authority. ▪ Ensure that the substation structures are removed and that building structures are	To be completed post EA by relevant parties					

Impact Management Outcomes: Reduce visual intrusion of construction, operational and decommissioning activities and infrastructure on the surrounding landscape and receptors.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
demolished or recycled for new uses. ▪ Rip and regrade access roads that are no longer required. ▪ Exposed or disturbed areas must be revegetated or returned to grazing or pasture to blend with the surroundings.						

7.3 HERITAGE IMPACTS (ARCHAEOLOGY, PALAEONTOLOGY AND CULTURAL LANDSCAPE)

Impact Management Outcomes: Achieve a layout that minimizes the potential later impacts to archaeological resources and/or graves. Reduce the degree of visual contrast in the landscape. Minimise the chances of significant archaeological sites and/or graves being disturbed.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
DESIGN PHASE						
▪ Commission a detailed pre-construction archaeological survey of the approved PV layouts in order to (1) ascertain whether any further sites are present within the footprints and (2) choose the densest and best areas of background scatter for formal sampling (i.e. to determine appropriate sample areas from which to collect artefacts). While background scatter artefacts occur widely and in variable densities across the landscape, it is suggested that one area per PV project footprint could be collected from in order to record some of the variability across the wider project area. Further recommendations will stem from the results of that survey. The survey should be done well in advance of construction (preferably at least 6 months) in order to allow time for the following: o The field survey; o Reporting to Heritage Western Cape (HWC) and application for Workplan approval; o Conducting the mitigation fieldwork;	To be completed post EA by relevant parties					

Impact Management Outcomes: Achieve a layout that minimizes the potential later impacts to archaeological resources and/or graves. Reduce the degree of visual contrast in the landscape. Minimise the chances of significant archaeological sites and/or graves being disturbed.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
○ Analysis and reporting; and ○ Final approval by HWC. ▪ No activity is to happen north of the existing farm fence alongside waypoint 177, an existing Later Stone Age (LSA) site. The design must ensure the protection of the archaeological site at waypoint 177. The existing farm fence must be retained in its current location and all project activities kept to the south of it. ▪ Locate the laydown area, batching plant and buildings far from the public road (in accordance with the sensitivity mapping provided by the Visual Specialist (i.e. at least 250 m away from arterial and district roads)). ▪ Ensure the use of natural colours and finishes on buildings.						
CONSTRUCTION PHASE						
▪ Ensure that no activity takes place outside of the authorized construction footprint. ▪ The ECO must ensure that all staff are informed of the possibility of finding buried archaeological resources and graves (i.e. ensure that all personnel are aware of the potential of encountering archaeological resources and graves and what to do if this occurs (i.e. to report any suspicious stone features prior to disturbance)). ▪ The ECO must conduct formal monitoring site visits to (1) verify that all work is remaining within the authorised area and (2) check for any fossils or artefact concentrations that might be revealed. ▪ If any concentrations of archaeological material, graves or stone features are uncovered during the proposed construction, work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution. Sufficient time should be allowed to remove/collect such material. A professional archaeologist or palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the findings. ▪ Minimise the disturbance footprint.	To be completed post EA by relevant parties					

Impact Management Outcomes: Achieve a layout that minimizes the potential later impacts to archaeological resources and/or graves. Reduce the degree of visual contrast in the landscape. Minimise the chances of significant archaeological sites and/or graves being disturbed.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
▪ Employ dust suppression measures. ▪ Ensure effective rehabilitation.						
OPERATIONAL PHASE						
▪ Minimise light pollution. ▪ Signage to be small and unobtrusive.	To be completed post EA by relevant parties					
DECOMMISSIONING PHASE						
▪ Minimise the disturbance footprint. ▪ Employ dust suppression measures. ▪ Ensure effective rehabilitation.	To be completed post EA by relevant parties					

7.4 TERRESTRIAL ECOLOGY

▪ **Impact Management Outcomes: Maintain all activities to the designated footprint and existing roadways or built structures. Avoidance of unnecessary disturbance to site and surrounds and established buffers where required. Ensure appropriate management of alien vegetation on site. Minimize the alteration of plant communities and fossorial species.**						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
PLANNING AND DESIGN PHASE						
▪ Ecologist to review the final layout plan in relation to existing drainage patterns and comment accordingly on storm water management across the site. ▪ Ensure the necessary permits or licences are identified and applied for as applicable.	To be completed post EA by relevant parties					

▪ **Impact Management Outcomes: Maintain all activities to the designated footprint and existing roadways or built structures. Avoidance of unnecessary disturbance to site and surrounds and established buffers where required. Ensure appropriate management of alien vegetation on site. Minimize the alteration of plant communities and fossorial species.**						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
Await response and provision of permit. Undertake plant rescue if and where required. ▪ Ensure compliance with relevant Environmental Specifications for the control and removal of alien invasive plant species. Appoint a specialist or contact relevant authorities to seek guidance on the removal of the alien vegetation on site. Compile and finalise invasive alien plant management programme. ▪ Where vegetation is cleared, measures to counteract aeolian (wind-blown) transport in the short and long term should be implemented, where necessary. Use of drift fence and related measures, where required. Appoint an Ecologist to advise on clearance and planting, where required.						
CONSTRUCTION PHASE						
▪ Appoint a specialist to undertake a second review and site visit of the final layout of the development footprint, possibly during the late summer or early winter period, in order to identify any plant species on site that may require “rescue” as well as any exotic weeds/vegetation that require removal. ▪ Appoint a specialist to conduct an inspection of the final project area and sweep or inspect the site for any fauna, once the fencing is complete (i.e. the established site should be flushed to ensure any large wildlife is not contained within the fenced area). Ensure regular flushing of the area throughout the construction phase. ▪ The removal of alien vegetation through mechanical mechanisms or application of a herbicide is likely to be required in order to curtail proliferation. The appointed ECO of the project is to be consulted prior to application of the herbicide. Appoint a specialist or contractor to undertake a sweep and survey of the final development footprint site, with an alien invasive plant management team to remove exotic vegetation prior to the commencement of construction. ▪ Ensure construction activities are limited to the development footprint in order to minimise the extent of impact ▪ Clearance activities are to be strictly confined to the development footprint. Clearance is to be carried out where needed to accommodate infrastructure.	To be completed post EA by relevant parties					

▪ **Impact Management Outcomes: Maintain all activities to the designated footprint and existing roadways or built structures. Avoidance of unnecessary disturbance to site and surrounds and established buffers where required. Ensure appropriate management of alien vegetation on site. Minimize the alteration of plant communities and fossorial species.**						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
▪ Ensure all hazardous materials are adequately stock piled in a leak proof receptacle. ▪ Ensure a spill kit is placed on site in order to contain any hydrocarbon leaks if necessary. ▪ Impose a speed limit on construction vehicles operating within the construction site. ▪ To advise construction staff of the requirements in respect of management of flora and fauna on site during the construction phase. Limit pedestrian/labour movement to within the confines of the site. ▪ Appropriate signage and environmental induction are to be carried out in order to convey this point to onsite labourers (i.e. convey acceptable areas in which to traverse within the subject site).						
OPERATIONAL PHASE						
▪ Ensure that the faunal components are retained and management of the facilities are ecologically driven. ▪ Exclusion areas should be maintained. Maintain scarp slopes and ensure that they are unimpeded by the proposed development. Avoid extensive alteration of sheet wash areas. ▪ Cordon off the sites to prevent inward migration of fauna. ▪ All vehicles that are stationary/parked for longer than 30 days within the site are to have a drip tray placed underneath the engine. ▪ A spill kit is to be placed onsite in order to limit any impact. ▪ Limit access to the riverine areas. ▪ Implementation of an invasive alien plant management programme.	To be completed post EA by relevant parties					
DECOMMISSIONING PHASE						
▪ Ensure that there is appropriate disposal of materials and waste during decommissioning activities.	To be completed post EA by relevant parties					

▪ **Impact Management Outcomes: Maintain all activities to the designated footprint and existing roadways or built structures. Avoidance of unnecessary disturbance to site and surrounds and established buffers where required. Ensure appropriate management of alien vegetation on site. Minimize the alteration of plant communities and fossorial species.**						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
▪ Manage stabilisation and reinstatement of the land. ▪ Provide adequate storm water controls to ensure attenuation of storm water runoff emanating from hard panned surfaces. ▪ Cordon off access to dendritic drainage lines. ▪ Post bi-yearly monitoring of the site to hinder proliferation of exotic species as a result of the development.						

7.5 AQUATIC ECOLOGY

Impact Management Outcomes: Reduce changes in the geomorphological state of drainage patterns in order to reduce impacts on aquatic ecology						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
PLANNING AND DESIGN PHASE						
▪ Exclusion areas should be maintained. Maintain scarp slopes are unimpeded by development. Avoid the major drainage lines, such as the Klein Droëlaagte and Droëlaagte Rivers. Avoid extensive alteration of sheet wash areas. The sensitivities are captured in the sensitivity map included in Appendix D of this EMPr. ▪ Maintenance and establishment of an ambulatory set back of more than 100 m from the identified riparian areas and points of sheet wash as per the map presented in the Aquatic Biodiversity and Species Report, and Appendix D of this EMPr. ▪ A detailed stormwater management and drainage plan should be developed that considers inter alia, surface flows arising from elevated areas above the PV facilities and its discharge from the facilities. This philosophy must include attenuation and energy dissipation mechanisms and redress of erosion and sheet flow across site.	To be completed post EA by relevant parties					

Impact Management Outcomes: Reduce changes in the geomorphological state of drainage patterns in order to reduce impacts on aquatic ecology						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
▪ Management of fauna within the site and surrounds, as well as the incorporation of wildlife porosity into fence lines and the implementation of measures on the energised fence line to avoid mortalities to wildlife. ▪ Ensure reduced security lighting, downward lighting and restriction on lumens employed. ▪ Ensure that the Department of Human Settlements, Water and Sanitation are consulted with to confirm the need and requirements of a Water Use Licence, as noted in the Aquatic Biodiversity and Species Assessment.						
CONSTRUCTION PHASE						
▪ Cordon off the sites to prevent inward migration of fauna. ▪ Provide adequate stormwater controls to ensure attenuation of stormwater runoff emanating from the hard panned surfaces.	To be completed post EA by relevant parties					
OPERATIONAL PHASE						
▪ Cordon off the sites to prevent inward migration of fauna. ▪ Provide adequate stormwater controls to ensure attenuation of storm water runoff emanating from the hard panned surfaces. ▪ Implement proper spill control and management, such as the retention of emergency spill kits on site.	To be completed post EA by relevant parties					
DECOMMISSIONING PHASE						
▪ Ensure that there is appropriate disposal of materials and waste. ▪ Manage stabilisation and reinstatement of the land. ▪ Provide adequate stormwater controls to ensure attenuation of storm water runoff emanating from hard panned surfaces. ▪ Cordon off access to dendritic drainage lines. ▪ Post bi-yearly monitoring of the site to hinder proliferation of exotic species as a result of	To be completed post EA by relevant parties					

Impact Management Outcomes: Reduce changes in the geomorphological state of drainage patterns in order to reduce impacts on aquatic ecology						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
the development.						

7.6 RIVERINE RABBIT

Impact Management Outcomes: Reduce habitat loss and disturbance as associated impact on Riverine Rabbit.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
PLANNING AND DESIGN PHASE						
▪ Adhere to the development restrictions placed on areas of High and Very High sensitivity in the Riverine Rabbit Assessment and adhere to the sensitivity maps provided within the assessment when determining the final layout. The sensitivities are captured in the sensitivity map included in Appendix D of this EMPr. No substations are to be placed in these areas and any roads through these areas should use existing footprint areas, where possible. ▪ The design should ensure that there is no electrical fencing around the substations or other infrastructure that are within 20 cm of the ground as some fauna can become stuck against such fences and are electrocuted to death.	To be completed post EA by relevant parties					
CONSTRUCTION PHASE						
▪ All vehicles should adhere to a low speed limit on site. Heavy vehicles should be restricted to 30 km/h and light vehicles to 40 km/h. ▪ As Riverine Rabbit activity is highest between dusk and dawn, traffic during these hours should be curtailed. ▪ Limiting access to the site and ensuring that construction staff and machinery remain within the demarcated construction areas during the construction phase.	To be completed post EA by relevant parties					

Impact Management Outcomes: Reduce habitat loss and disturbance as associated impact on Riverine Rabbit.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
▪ Environmental induction for all staff and contractors on-site must be undertaken.						
OPERATIONAL PHASE						
▪ Human activity and disturbance outside of the fenced areas should be kept to a minimum and restricted to required maintenance activities only. ▪ All vehicles should adhere to a low speed limit on-site. Heavy vehicles should be restricted to 30 km/h and light vehicles to 40 km/h. ▪ Ensure that all the operational phase management plans are fully implemented and that the associated monitoring and feedback mechanisms to management are in place.	To be completed post EA by relevant parties					

7.7 AVIFAUNA IMPACTS

Impact Management Outcomes: Prevent unnecessary displacement of avifauna.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
PLANNING AND DESIGN PHASE						
▪ A 300 m infrastructure-free buffer must be maintained at water reservoirs in terms of the sensitivities determined in Figure 12 of the Avifauna Assessment report and as captured in the sensitivity mapping showing in Appendix D of this EMPr.						
CONSTRUCTION PHASE						
▪ Ensure that contractors are aware of the requirements of the Construction EMPr (CEMPr. A site-specific CEMPr must be implemented, which gives appropriate and detailed description of how construction activities must be conducted. All contractors are to adhere						

Impact Management Outcomes: Prevent unnecessary displacement of avifauna.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
to the CEMPr and should apply good environmental practice during construction. The CEMPr must specifically include the following: o No off-road driving; o Maximum use should be made of existing access roads and the construction of new roads should be kept to a minimum as far as practical; o Measures to control noise and dust according to latest best practice; o Restricted access to the rest of the property; o Strict application of all recommendations in the Terrestrial Biodiversity and Species Assessment Report pertaining to the limitation of the footprint, limiting the vegetation clearance to what is absolutely necessary, and rehabilitation of transformed areas.						
DECOMMISSIONING PHASE						
▪ Prevent unnecessary displacement of avifauna by ensuring that contractors are aware of the requirements of the Decommissioning EMPr (DEMPr). A site-specific DEMPr must be implemented, which gives appropriate and detailed description of how decommissioning activities must be conducted. All contractors are to adhere to the DEMPr and should apply good environmental practice during decommissioning. The DEMPr must specifically include the following: o No off-road driving; o Maximum use of existing roads during the decommissioning phase and the construction of new roads should be kept to a minimum as far as practical; o Measures to control noise and dust according to latest best practice; o Restricted access to the rest of the property; o Strict application of all recommendations in the Terrestrial Biodiversity and Species Assessment Report pertaining to the limitation of the footprint.						

7.8 SOCIO-ECONOMIC IMPACTS

Impact Management Outcomes: Maximize potential job creation for locals. Prevent unnecessary social order disturbance, general disorientation and deterioration of social capital. Minimise increase of social ills and risky behaviours associated with workforce influx to the area.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
PLANNING AND DESIGN PHASE						
▪ It is strongly suggested that a 'locals first' policy with regard to labour needs is implemented. The developer should make every effort to ensure the majority of construction workers are de facto residents of the Tankwa Karoo, Touws River and/or Ceres region. ▪ Draft an Economic Development Plan (EDP) for the project to align local investment with local needs. A comprehensive EDP enabling maximum benefit and agency to the beneficiary communities. The EDP to be developed must be prepared by community development practitioners, to ensure that it can be effectively implemented and managed, bringing maximum benefit to the community. A third-party approach is recommended. ▪ The developer or the appointed agent must engage with local communities, religious organisations, organised agriculture, NGOs, CBOs and local government structures to identify and agree upon priorities and include them in the EDP. ▪ Where possible, the EDP should align with the Integrated Development Plans (IDPs) of the relevant Local Municipalities.						
CONSTRUCTION PHASE						
▪ The developer should make every effort to ensure the majority of construction workers are de facto residents of the Tankwa Karoo, Touws River and/or Ceres region. ▪ Where possible, subcontract to local construction companies. ▪ Develop and implement communication strategies to facilitate participation. The developer should be mindful of and regularly engage with landowners, farm residents and with Touws River and/or Ceres local communities. The former can be achieved through liaison with the Tankwa Ceres Karoo Farmers' Union. The latter can be achieved in collaboration with local community organisations.						

Impact Management Outcomes: Maximize potential job creation for locals. Prevent unnecessary social order disturbance, general disorientation and deterioration of social capital. Minimise increase of social ills and risky behaviours associated with workforce influx to the area.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
▪ The developer should develop and clearly communicate a Code of Conduct for all employees related to the project, which includes zero tolerance of activities such as violence, alcohol and drug abuse. ▪ Introduce weekly randomized alcohol and drug testing for all employees related to the project. ▪ No construction workers should be allowed to sleep at the construction site. ▪ All COVID regulations and safety precautions in force at the time of construction, operation and decommissioning must be communicated to workforce, enforced and upheld by the developer. ▪ The construction workforce should receive COVID-19 awareness training before the commencement of construction. In addition, TB testing and counselling should be made available to the construction workforce free of charge. ▪ Local HIV infection rates/ARV treatment loads must be monitored annually through close interaction with the local clinic. Should infections and treatment loads increase at a rate greater than the anticipated rate of increase; the developers (or the appointed agent) must re-evaluate its HIV awareness training, take corrective action where necessary, and repeat said training. ▪ Traffic expert should be consulted, prior to construction, and a road and traffic management plan devised and implemented to mitigate potential negative consequences of increased road use during construction. ▪ The developer must engage the local communities in the study area on the nature, duration, number and availability of employment opportunities well in advance of any construction activities taking place. It is recommended that existing social structures be utilised for such interaction, and that the process be commenced once environmental authorisations have been granted. ▪ The developer should establish employment desks in the Tankwa Karoo, Touws River and/or Ceres region to facilitate employment-related queries, and maintain a register of applicants which reflects their respective expertise, skill level and contact/residential details. Whenever planned or ad hoc employment is considered, the register should be						

Impact Management Outcomes: Maximize potential job creation for locals. Prevent unnecessary social order disturbance, general disorientation and deterioration of social capital. Minimise increase of social ills and risky behaviours associated with workforce influx to the area.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
consulted to identify appropriately qualified candidates. ▪ Employment procedures should not preclude the educationally and resource poor. ▪ The existence of the employment desks and the relevant procedures associated with the selection and appointment of workers must be communicated to the local communities. ▪ The developer should comply with the Employment Equity Act (EEA) and make every effort to ensure equal access to employment, taking the demographics of the area into account. ▪ The developer should offer debt education workshops for all project related employees. The developer is encouraged to provide on-the-job training and additional training programs to improve the chances of skills development during the construction phase. ▪ Access to the project site should be controlled with only authorised staff permitted entry. Movement to and from the project site should be controlled where construction workers are transported to and from the pick-up area and project site by the developer or the appointed agent only. ▪ The developer could consider forming or participating in a local safety forum and/or community watch to address any concerns related to possible crime escalation. ▪ The developer could consider erecting and/or contributing to the costs of erecting security cameras and/or a repeater to help improve crime prevention and management in the area. ▪ The developer should make use of local eco-tourism services and product providers where possible. The developer should provide consultants, contractors and other skilled project related staff with a list of local eco-tourism services and product providers, and local service and goods providers, with a clear request to support local eco-tourism and businesses, where possible, and where such services are required. ▪ The developer should consider appointing a community liaison person tasked with establishing and maintaining effective communication with local residents and/or their representatives.						

Impact Management Outcomes: Maximize potential job creation for locals. Prevent unnecessary social order disturbance, general disorientation and deterioration of social capital. Minimise increase of social ills and risky behaviours associated with workforce influx to the area.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
OPERATIONAL PHASE						
▪ The developer should make every effort to ensure the majority of unskilled workers employed during this phase are de facto residents of the Tankwa Karoo, Touws River and/or Ceres region. ▪ Employment opportunities and the existence of the employment desks must be communicated to the local communities in the Tankwa Karoo, Touws River and/or Ceres region. ▪ The employment desk registers compiled during construction phase should be consulted to identify appropriately qualified candidates. ▪ The developer must comply with the EEA and make every effort to ensure equal access to employment, taking the demographics of the area into account. ▪ Contracts ensuring that knowledge sharing and on-the-job training should be enforced as a condition for the development of the project. ▪ The developer should procure goods and services locally where possible. ▪ The developer should provide consultants, and other project related staff with a list of local service providers with a clear request to support local businesses where such services are required.						
DECOMMISSIONING PHASE						
▪ The developer should comply with relevant South African labour legislation when retrenching employees. ▪ The developer should implement appropriate succession training of locally employed staff earmarked for retrenchment during decommissioning.						

7.9 GEOHYDROLOGY IMPACTS

Impact Management Outcomes: To reduce the impact of the proposed project on the groundwater resources. To prevent the lowering of groundwater levels as a result of over-abstraction (should ground water be used during the project phases). To reduce the potential of groundwater pollution.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
PLANNING AND DESIGN PHASE						
▪ If groundwater will be used as a water source during the project phases, then a registration process must be followed for the use of existing boreholes; i.e. Section 39 of the National Water Act (Act 36 of 1998, as amended). Ensure that the Department of Human Settlements, Water and Sanitation (DHSWS) are consulted with to confirm the need and requirements of a General Authorisation for use of existing boreholes in the vicinity. In addition, agreements must be put in place with the current landowners for the use of groundwater. These agreements must be legally valid documents. ▪ If no such agreements can be put in place, and if ground water needs to be used, then additional boreholes may be drilled on the relevant farm portions, followed by yield and water quality testing, and then authorization from DHSWS to use the ground water will be required.						
CONSTRUCTION PHASE						
▪ The boreholes that are to be used must be correctly yield tested prior to use according to the National Standard (SANS 10299-4:2003, Part 4 – Test pumping of water boreholes) so that the correct pump sizes and installation depths can be determined. This includes a Step Test, Constant Discharge Test and recovery monitoring. ▪ The boreholes should also be sampled and chemically and microbiologically analysed by a SANAS accredited laboratory. ▪ Once the boreholes are in use they should be equipped with: o Observation pipes - so that the water levels can be measured (either manually or by data loggers); o Flow meters – to assess how much water is used and thereby all authorisations in place for use of the water are adhered to; and						

Impact Management Outcomes: To reduce the impact of the proposed project on the groundwater resources. To prevent the lowering of groundwater levels as a result of over-abstraction (should ground water be used during the project phases). To reduce the potential of groundwater pollution.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
○ Sampling tap – to enable annual sampling to ensure the groundwater is safe for continued use – especially if it is to be used as drinking water. ▪ Adhere to the borehole's safe yield and to monitor water levels and flow. ▪ Avoid using old or damaged construction equipment and vehicles and ensure that they are well maintained and regularly serviced in order to ensure no leakages. All vehicles and other equipment (generators etc.) must be regularly serviced to ensure they do not spill oil. ▪ Any engines that stand in one place for an excessive length of time (i.e. 30 days or more) must have drip trays. Diesel fuel storage tanks, if required, should be above ground on an impermeable concrete surface in a bunded area. ▪ Vehicles should be refuelled on paved (impervious) areas, optimally off-site. If off-site refuelling is not possible, a designated area and impermeable surface should be established at the construction site camp for this purpose. If liquid product is being transported it must be ensured this does not spill during transit. ▪ If spillages occur during refuelling, they should be contained and removed as rapidly as possible, with correct disposal procedures of the spilled material, and reported. Proof of disposal (waste disposal slips or waybills) should be obtained and retained on file for auditing purposes. ▪ Emergency measures and plans must be put in place and rehearsed in order to prepare for accidental spillage. ▪ Vehicle and washing areas must also be on paved surfaces and the by-products removed to an evaporative storage area or a hazardous waste disposal site (if the material is hazardous).						
OPERATIONAL PHASE						
▪ Adhere to the borehole's safe yield and to monitor water levels and flow and implement pollution prevention mechanisms as recommended for the operational phase.						

Impact Management Outcomes: To reduce the impact of the proposed project on the groundwater resources. To prevent the lowering of groundwater levels as a result of over-abstraction (should ground water be used during the project phases). To reduce the potential of groundwater pollution.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
DECOMMISSIONING PHASE						
▪ Adhere to the borehole's safe yield and to monitor water levels and flow and implement pollution prevention mechanisms as recommended for the decommissioning phase.						

7.10 TRAFFIC IMPACTS

Manage impact that additional traffic generation will have on the road network. Plan the project to spread and reduce the amount of road based traffic and avoid local congestion periods during the construction phase.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
PLANNING AND DESIGN PHASE						
▪ If abnormal loads need to be transported by road to the site, a permit will need to be applied for in terms of Section 81 of the National Road Traffic Act and authorisation needs to be obtained from the relevant road authorities to modify the road reserve to accommodate turning movements at intersections (if necessary). ▪ The route to the sites should be further investigated to ensure that abnormal loads are not obstructed at any point by geometric, height and width limitations along the route. ▪ Discussions must be held with the relevant landowners on which the internal gravel access farm road leading to the sites is located, prior to commencement to confirm requirements and details of the agreement. ▪ Ensure that the requirements for use of the gravel access farm road leading to the sites are addressed and considered in the design, as and where applicable. ▪ Provide a Transport Traffic Plan to the Provincial and Municipal Road Department (if	To be completed post EA by relevant parties					

Manage impact that additional traffic generation will have on the road network. Plan the project to spread and reduce the amount of road based traffic and avoid local congestion periods during the construction phase.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
required). ▪ A Road Maintenance Plan should be developed for the gravel external access roads and the internal gravel access farm road that will be used. The plan should address requirements such as, but not limited to, grading, dust suppressant mechanisms, drainage (where required), signage, and speed limits. The Road Maintenance Plan must ensure regular maintenance of the gravel external access roads, as well as the upgrading of and regular maintenance of the internal farm access road.						
CONSTRUCTION PHASE						
▪ Well-maintained vehicles should be used together with well-trained drivers during the construction phase. Vehicle maintenance and driver competency should be monitored. Proof of driver competency as well as the vehicle checks should be verified and undertaken to ensure that vehicles are roadworthy and hence, do not pose a safety risk. The Contractors must ensure that construction vehicles are roadworthy, properly serviced and maintained, and respect the vehicle safety standards implemented by the Project Developer. ▪ Plan and stagger delivery trips so that they occur during the day and minimize construction vehicle movement and delivery trips through the towns of Ceres and Touws River and on the regional road during peak traffic periods (06:00-9:00 and 16:00-18:00). ▪ Suitable parking areas should be designated for construction trucks and vehicles on the construction site in order to minimize random parking and to improve site operations. ▪ The use of public transport (buses and/or minibus taxis) to convey construction personnel to the site should be encouraged. ▪ To ensure reduced speeds along the roads, implement speed control mechanisms on site by means of a stop and go system, implement speed limits and placement of road signage for the speed limits. ▪ Adhere to all speed limits applicable to all roads used. ▪ Road kill monitoring programme (inclusive of wildlife collisions record keeping) should be	To be completed post EA by relevant parties					

Manage impact that additional traffic generation will have on the road network. Plan the project to spread and reduce the amount of road based traffic and avoid local congestion periods during the construction phase.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
established. ▪ Implement clear and visible signage and signals indicating movement of vehicles at intersections and in the vicinity of the nearby farm steads. The farm steads should be treated as a no-go area. ▪ Ensure that there is regular maintenance of the gravel external access roads by the contractor during the construction phase in line with the agreed and approved maintenance plan. ▪ Ensure that the upgrading of the internal farm access road is undertaken to suitable standards as specified by the civil engineer and in accordance with the approved maintenance plan. ▪ Construction activities will have a higher impact than the normal road activity and therefore the main access roads to site should be inspected on a weekly basis for structural damage. ▪ Vehicles must not be overloaded during the construction phase in order to reduce impacts on the road structures, particularly the access roads leading to the site. Random visual inspection of vehicles should be undertaken in order to monitor for overloading. The inspections should also verify if the trucks are covered with appropriate material (such as tarpaulin) if and where possible. ▪ Implement management strategies for dust generation e.g. apply dust suppressant on the gravel roads on site, exposed areas and stockpiles. ▪ Postpone or reduce dust-generating activities during periods with strong wind. Earthworks may need to be rescheduled or the frequency of application of dust control/suppressant increased. ▪ Avoid using old and unmaintained construction equipment (which generate high sound levels and greater exhaust emissions) and ensure equipment is well maintained.						
OPERATIONAL PHASE						
▪ Ensure that the relevant construction mitigation and management measures are adhered to during the operation phase.	To be completed post EA by relevant parties					

Manage impact that additional traffic generation will have on the road network. Plan the project to spread and reduce the amount of road based traffic and avoid local congestion periods during the construction phase.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
DECOMMISSIONING PHASE						
▪ Ensure that the construction mitigation and management measures are adhered to during the decommissioning phase.	To be completed post EA by relevant parties					

8 APPENDIX A – CV OF THE EAP

CV OF PAUL LOCHNER

Employer: Council for Scientific and Industrial Research (CSIR)
PO Box 320, Stellenbosch, 7600, South Africa
Phone: +27 21 888 2486 (w), +27 84 442 3646 (cell)
Email: plochner@csir.co.za
Date of Birth: 13 June 1969
Nationality: South African

BIOSKETCH

Paul Lochner is an environmental assessment practitioner at the CSIR in Stellenbosch, with 28 years of experience in a wide range of environmental assessment and management studies. His particular experience is in environmental planning and assessment for renewable energy, electricity grid infrastructure, desalination, oil & gas, wetlands & coastal zone management, and industrial & port development. He has been closely involvement in the research and application of Strategic Environmental Assessment in South Africa, and also has wide experience in Environmental & Social Impact Assessment, Environmental Management Programs and Environmental Screening Studies.

PERSONAL SKILLS AND CAPABILITIES

- Holistic understanding of environmental and social aspects at policy, program and project levels
- Ability to lead, inspire and motivate a team of environmental scientists in a consulting business
- Coordination of experts from diverse disciplines to support evidence-based decision-making
- Ability to integrate of environmental, social and economic aspects within a systems model
- Design of innovative processes to respond effectively to proposals and meet needs of clients
- Review and quality assurance for environmental assessment processes and reports
- Project management, financial management, report writing and communication skills.

EDUCATION

- BSc (Civil Engineering) awarded with Honours, *University of Cape Town*, 1990
- MPhil (Environmental Science), *University of Cape Town,* 1992

EMPLOYMENT

- Environmental scientist at CSIR (Stellenbosch) from October 1992 to present.
- Group Leader of CSIR Environmental Management Services since August 2008.

PROFESSIONAL REGISTRATION

- Environmental Assessment Practitioners Association of South Africa (EAPASA), Registration Number 2019/745

PROFESSIONAL MEMBERSHIP AND POSITIONS HELD

- Member of the International Association for Impact Assessment (IAIA)
- 1996 to present: Chairperson of Blouvlei Intaka Island Environmental Committee at Century City, Cape Town, which oversees management of the Intaka Island Nature Reserve
- 2010 to present: Chairperson of Intaka Island Environmental Trust, that oversees the operation of the Eco-centre and education program at the Intaka Island Nature Reserve
- 2017: Conference Organising Committee member and Program Director for IAIA South Africa national conference, August 2017, Goudini.

LANGUAGE CAPABILITY

	Speaking	*Reading*	*Writing*
English	Excellent	Excellent	Excellent
Afrikaans	Average	Average	Average

TRACK RECORD OF PROFESSIONAL EXPERIENCE

This is an abbreviated record of experience. A full record is available on request. Projects are located in South Africa unless otherwise stipulated.

Duration	Project description	Role	Client
2019 (in progress)	**Basic Assessments** for proposed PV and EGI Developments near Ceres	Project leader	Veroniva (PTY) Ltd
2019 (in progress)	**Environmental scoping** for a Desalination Plant and Water Carriage System for water supply to Windhoek and the central coastal area of Namibia	Project author	NamWater (Namibia) and KfW Development Bank (Germany)
2019 (in progress)	**Environmental Performance Compliance Study** for Foundries in South Africa	Project reviewer	National Foundries Technology Network
2019	**Independent Expert review** of the ecology study as part of the EIA and EMPR for diamond prospecting at Bloemhof Dam Nature Reserve, North West province	Independent reviewer	DEA Appeals Office
2018-2019	**Greater Saldanha Bay Strategic Environmental Assessment (SEA):** Phase 1 Monitoring and Decision Support System	Project leader	Western Cape provincial government
2018-2019	**Environmental Screening Study** for a proposed 100 to 150 megalitre/day desalination facility for City of Cape Town, Phase 1: Pre-feasibility study	Project co-leader	City of Cape Town and iX Engineers
2018-2019	**EIA for 150 MW wind power project in Ghana**	Proposal and EIA Quality Assurance	Volta River Authority and Seljen Consult Ltd
2019	**Environmental Assessment** for the Kenhardt solar PV facility and electrical infrastructure (100 MW x 3), Northern Cape	Project leader	Scatec Solar Africa (Pty) Ltd
2017-2019	**SEA for Wind & Solar Photovoltaic Energy** development in South Africa (Phase 2)	Project reviewer	DEA & national Dept of Energy (DOE)
2017-2019	**SEA for the Expansion of EGI Corridors** in South Africa	Project reviewer	DEA, DOE, iGas, Eskom (national electricity utility)
2017-2019	**SEA for Energy Corridors** and development of a gas pipeline network for South Africa	Project reviewer	DEA, DOE, iGas, Eskom (national electricity utility)
2017-2019	**SEA for Aquaculture** Development in South Africa (marine and freshwater)	Project leader	DEA and national Dept of Agriculture Forestry and Fisheries (DAFF)
2018	**Environmental Assessments** for the Vryburg Solar project (115 MW x 3) in the Vryburg Renewable Energy Development Zone (REDZ)	Co-project manager and co-author	Veroniva & Scatec
2018	**EIA** for West Bank Waste Water Treatment works **marine outfall pipeline,** East London	Independent reviewer	WSP and Buffalo City Municipality
2017-2018	**Site selection and environmental screening** for a proposed 120 – 150 ML/day desalination plant for the City of Cape Town	Project leader	City of Cape Town and iX Engineers
2017-2018	**EIA and EMP for Icyari Coltan Mine**, Rwanda	Project reviewer	Mawarid Mining Rwanda Ltd (MMRL), UAE

Duration	Project description	Role	Client
2016-2017	**SEA for the Square Kilometre Array** radio-telescope in the Karoo, South Africa	Project leader	DEA and DST
2016-2017	**SEA for Shale Gas Development** in the Karoo region of South Africa	Project co-leader	DEA and other government departments
2015-2016	**SEA for the development of Electrical Grid Infrastructure** for South Africa	Project leader	DEA and Eskom (national electricity utility)
2017	EIA for the 75 MW x 12 **solar photovoltaic** energy projects near Dealesville, Free State	Project leader	Mainstream Renewable Power SA
2014-2015	EIA for Ishwati Emoyeni 140 MW **wind energy project** and supporting electrical infrastructure at Murraysburg, Western Cape	Project leader	Windlab South Africa
2012-2015	**SEA for identification of renewable energy zones** for wind and solar photovoltaic projects in South Africa	Project leader	DEA and other national government departments
2012-2013	**Environmental Screening Study (ESS) for a desalination plant** for the City of Cape Town	Project leader	City of Cape Town & WorleyParsons
2012-2013	EIA for the **desalination plant** for the Saldanha area	Project leader	West Coast District Municipality & WorleyParsons
2012-2013	EIA for the **manganese export terminal** at the Port of Ngqura and Coega Industrial Development Zone (IDZ)	Project leader	Transnet
2011 - 2012	EIA (x2) for **100 MW solar photovoltaic** project at Blocuso and 100 MW solar PV project at Roode Kop in the Northern Cape	Project leader	Mainstream Renewable Power
2011 – 2012	EIA (x2) for 75 MW **solar photovoltaic project** at GlenThorne and 75 MW project at Valleydora, in the Free State	Project leader	Solaire Direct
2010-2011	More than 10 Basic Environmental Assessments (BAs) for **solar photovoltaic projects** in the Western Cape, Northern Cape, Eastern Cape and Free State	Project leader	Conducted for Dutch, German, French and South African companies
2010/2011	**EIA for a 100 MW wind project at Zuurbron and a 50 MW wind project Broadlands** in the Eastern Cape	Project leader	WindCurrent SA (German-based company)
2010-2011	**EIAs (x4) for the proposed InnoWind wind energy projects near Swellendam, Heidelberg, Albertinia and Mossel Bay (totalling approx 210 MW),** Western Cape, South Africa	Project leader	InnoWind South Africa (Pty) Ltd
2009-2010	**EIA for the proposed Electrawinds wind energy facility** of 45-75 MW capacity in the Coega IDZ, Eastern Cape	Project leader	Electrawinds N.V. (Belgium)
2009-2010	**EIA for proposed 180 MW Jeffreys Bay wind energy project,** Eastern Cape	Project Leader and co-author	Mainstream Renewable Power South Africa
2009-2010	**EIA for the proposed 70 megalitre/day desalination plant** at Mile 6 near Swakopmund, Namibia	Project leader	NamWater, Namibia
2009	**ESS for a proposed Deepwater Port,** Container Hub and Industrial Development Zone, Ghana	Project Manager	Project Management International Pty Ltd
2009	**EMP for the Operational Phase of the Berg River Dam**, Franschoek, South Africa	Project leader and report co-author	TCTA (national water supply utility), South Africa
2006	**Environmental Impact Assessment** (**EIA)** for extension of Port of Ngqura, Eastern Cape	Project Leader and co-author	Transnet National Port Authority

Duration	Project description	Role	Client
2004-2005	**Environmental and Social Impact Assessment (ESIA) report** for the proposed alumina refinery near Sosnogorsk, Komi Republic, Russia	Project manager and co-author	Komi Aluminium Russia, IFC, European Bank for Reconstruction & Development (EBRD)
2005	**Guideline for Environmental Management Plans (EMPs)** for the Western Cape province	Author	Dept of Environmental Affairs & Development Planning, Western Cape
2003	**Environmental Management Plan** for the Operational Phase of the wetlands and canals at Century City, Cape Town	Project leader and lead author	Century City Property Owners' Association
2002	**Environmental Impact Assessment** for the proposed Pechiney aluminium smelter at Coega, South Africa	Project Manager and lead author	Pechiney, France
1999-2000	**Cape Action Plan for the Environment**: a biodiversity Strategy and Action Plan for the Cape Floral Kingdom - legal, institutional, policy, financial and socio-economic component	Project manager and contributing writer	World Wide Fund for Nature (WWF): South Africa and Global Environment Facility (GEF)
1999	**Management Plan** for the coastal zone between the Eerste and Lourens River, False Bay, South Africa	Project manager and lead author	Heartland Properties and Somchem (a Division of Denel)
1998	**Environmental Assessment** of the Mozal Matola Terminal Development proposed for the Port of Matola, Maputo, Mozambique	Project manager and author	SNC-Lavalin-EMS
1996-1997	**Strategic Environmental Assessment (SEA)** for the proposed Industrial Development Zone and Harbour at Coega, Port Elizabeth, South Africa	SEA project manager and report writer	Coega IDZ Initiative Section 21 Company
1995-1996	**Environmental Impact Assessment and EMP** for Development Scenarios for Thesen Island, Knysna, South Africa	Project manager and report writer	Thesen and Co.
1996	**Environmental Impact Assessment** for the Blouvlei wetlands at Century City, Cape Town	Project manager and report writer	Ilco Homes Ltd (now Monex Ltd)
1995	**Environmental Impact Assessment** for the Saldanha Steel Project, South Africa	Report author and project manager	Saldanha Steel Project
1994	**Environmental Impact Assessment** for the upgrading of resort facilities on Frégate Island, Seychelles	Project management, co-author, process facilitator	Schneid Israelite and Partners
1994	**Environmental Impact Assessment** for exploration drilling in offshore Area 2815, Namibia	Project manager and lead author	Chevron Overseas (Namibia) Limited
1994	**Management Plan** for the Rietvlei Wetland Reserve, Cape Town	Project manager and lead author	Southern African Nature Foundation (now WWF-SA)

RECENT JOURNAL PUBLICATIONS AND PEER REVIEWED PAPERS

A comprehensive list of publications is available on request, with a summary provided below of recent journal publications, book chapters and peer reviewed conference papers:

Fischer D, Lochner P and Annergarn H, 2019. Evaluating the effectiveness of Strategic Environmental Assessment to facilitate renewable energy planning and improved decision-making: a South African case study, *Impact Assessment and Project Appraisal* - article ID: IAPA 1619389.

Cape L., Retief F., Lochner P., Fischer T., and Bond A., 2018. Exploring pluralism: Different stakeholder views of the expected and realised value of strategic environmental assessment (SEA). *Environmental Impact Assessment Review*, Volume 69, March 2018, Pages 32-41.

Cape L., Lochner P. and Fischer D., 2017. SEAs for major infrastructure programmes in SA. *IAIA17 Conference Proceedings* - 37th Annual Conference of the International Association for Impact Assessment, 4-7 April 2017 | Le Centre Sheraton Montreal | Montreal | Canada | www.iaia.org

Schreiner, G.O., Scholes, R.J., Snyman-Van der Walt, L., De Jager, M., S, Esterhuyse., Dludla, A., Lochner, P.A., Wright, J., Atkinson, D., Hardcastle, P., Kotze, H. 2017. Advancing a participatory and science-based approach to policy formulation for shale gas development in South Africa. *In:* Eds Whitton, J., Cotton, M., Brasier, K. 2017. *Citizen and other stakeholder participation in unconventional fossil fuel land use decision-making, policy formation, regulatory practice or other governance mechanisms*. London: Routledge.

Lochner P, Mabin M & Cape L, 2015, Recent Strategic Environmental Assessment experience in South Africa and national principles, in *IAIA16 (Japan) Conference Proceedings*.

9 APPENDIX B – ROLES AND RESPONSIBILITIES

Responsible Person(s)	Role and Responsibilities
Developer's Project Manager (DPM)	Role The Project Developer is accountable for ensuring compliance with the EMPr and any conditions of approval from the competent authority (CA). Where required, an environmental control officer (ECO) must be contracted by the Project Developer to objectively monitor the implementation of the EMPr according to relevant environmental legislation, and the conditions of the environmental authorisation (EA). The Project Developer is further responsible for providing and giving mandate to enable the ECO to perform responsibilities, and he must ensure that the ECO is integrated as part of the project team while remaining independent. Responsibilities - Be fully conversant with the conditions of the EA; - Ensure that all stipulations within the EMPr are communicated and adhered to by the Developer and its Contractor(s); - Issuing of site instructions to the Contractor for corrective actions required; - Monitor the implementation of the EMPr throughout the project by means of site inspections and meetings. Overall management of the project and EMPr implementation; and - Ensure that periodic environmental performance audits are undertaken on the project implementation.
Developer Site Supervisor (DSS)	Role The DSS reports directly to the DPM, oversees site works, liaises with the contractor(s) and the ECO. The DSS is responsible for the day to day implementation of the EMPr and for ensuring the compliance of all contractors with the conditions and requirements stipulated in the EMPr. Responsibilities - Ensure that all contractors identify a contractor's Environmental Officer (cEO); - Must be fully conversant with the conditions of the EA. Oversees site works, liaison with Contractor, DPM and ECO; - Must ensure that all landowners have the relevant contact details of the site staff, ECO and cEO; - Issuing of site instructions to the Contractor for corrective actions required; - Will issue all non-compliances to contractors; and - Ratify the Monthly Environmental Report.
Environmental Control Officer (ECO)	Role The ECO should have appropriate training and experience in the implementation of environmental management specifications. The primary role of the ECO is to act as an independent quality controller and monitoring agent regarding all environmental concerns and associated environmental impacts. In this respect, the ECO is to conduct periodic site inspections, attend regular site meetings, pre-empt problems and suggest mitigation and be available to advise on incidental issues that arise. The ECO is also required to conduct compliance audits, verifying the monitoring reports submitted by the cEO. The ECO provides feedback to the DSS and Project Manager regarding all environmental matters. The Contractor, cEO and dEO are answerable to the Environmental Control Officer for non-compliance with the Performance Specifications as set out in the EA and EMPr.

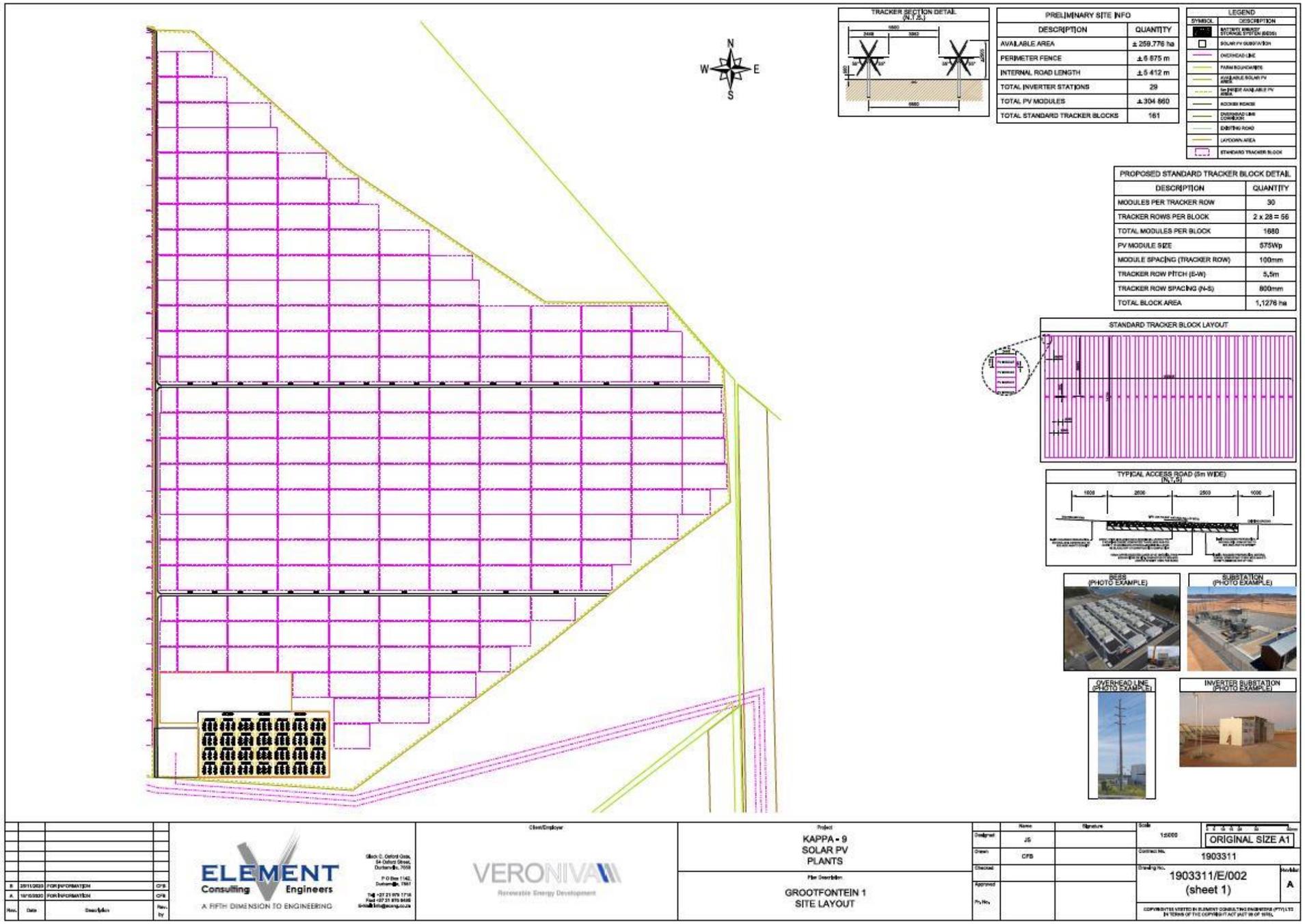
Responsible Person(s)	Role and Responsibilities
	The ECO provides feedback to the DSS and Project Manager, who in turn reports back to the Contractor and potential and Registered Interested &Affected Parties' (RI&AP's), as required. Issues of non-compliance raised by the ECO must be taken up by the Project Manager, and resolved with the Contractor as per the conditions of his contract. Decisions regarding environmental procedures, specifications and requirements which have a cost implication (i.e. those that are deemed to be a variation, not allowed for in the Performance Specification) must be endorsed by the Project Manager. The ECO must also, as specified by the EA, report to the relevant CA as and when required. <u>Responsibilities</u> The responsibilities of the ECO will include the following: - Be aware of the findings and conclusions of all EA related to the development; - Be familiar with the recommendations and mitigation measures of this EMPr; - Be conversant with relevant environmental legislation, policies and procedures, and ensure compliance with them; - Undertake regular and comprehensive site inspections / audits of the construction site according to the generic EMPr and applicable licenses in order to monitor compliance as required; - Educate the construction team about the management measures contained in the EMPr and environmental licenses; - Compilation and administration of an environmental monitoring plan to ensure that the environmental management measures are implemented and are effective; - Monitoring the performance of the Contractors and ensuring compliance with the EMPr and associated Method Statements; - In consultation with the Developer Site Supervisor order the removal of person(s) and/or equipment which are in contravention of the specifications of the EMPr and/or environmental licenses; - Liaison between the DPM, Contractors, authorities and other lead stakeholders on all environmental concerns; - Compile a regular environmental audit report highlighting any non-compliance issues as well as satisfactory or exceptional compliance with the EMPr; - Validating the regular site inspection reports, which are to be prepared by the contractor Environmental Officer (cEO); - Checking the cEO's record of environmental incidents (spills, impacts, legal transgressions etc.) as well as corrective and preventive actions taken; - Checking the cEO's public complaints register in which all complaints are recorded, as well as action taken; - Assisting in the resolution of conflicts; - Facilitate training for all personnel on the site – this may range from carrying out the training, to reviewing the training programmes of the Contractor; - In case of non-compliances, the ECO must first communicate this to the Senior Site Supervisor, who has the power to ensure this matter is addressed. Should no action or insufficient action be taken, the ECO may report this matter to the authorities as non-compliance; - Maintenance, update and review of the EMPr; - Communication of all modifications to the EMPr to the relevant stakeholders.
developer Environmental Officer (dEO)	<u>Role</u> The dEOs will report to the Project Manager and are responsible for implementation of the EMPr, environmental monitoring and reporting, providing environmental input to the Project Manager and Contractor's Manager, liaising with contractors and the landowners as well as a range of environmental coordination responsibilities.

Responsible Person(s)	Role and Responsibilities
	Responsibilities - Be fully conversant with the EMPr; - Be familiar with the recommendations and mitigation measures of this EMPr, and implement these measures; - Ensure that all stipulations within the EMPr are communicated and adhered to by the Employees, Contractor(s) ; - Confine the development site to the demarcated area; - Conduct environmental internal audits with regards to EMPr and authorisation compliance (on cEO); - Assist the contractors in addressing environmental challenges on site; - Assist in incident management: - Reporting environmental incidents to developer and ensuring that corrective action is taken, and lessons learnt shared; - Assist the contractor in investigating environmental incidents and compile investigation reports; - Follow-up on pre-warnings, defects, non-conformance reports; - Measure and communicate environmental performance to the Contractor; - Conduct environmental awareness training on site together with ECO and cEO; - Ensure that the necessary legal permits and / or licenses are in place and up to date; - Acting as Developer's Environmental Representative on site and work together with the ECO and contractor;
Contractor	Role The Contractor appoints the cEO and has overall responsibility for ensuring that all work, activities, and actions linked to the delivery of the contract are in line with the EMPr and that Method Statements are implemented as described. External contractors must ensure compliance with this EMPr while performing the onsite activities as per their contract with the Project Developer. The contractors are required, where specified, to provide Method Statements setting out in detail how the impact management actions contained in the EMPr will be implemented during the development or expansion of substation infrastructure for the transmission and distribution of electricity activities. Responsibilities - project delivery and quality control for the development services as per appointment; - employ a suitably qualified person to monitor and report to the Project Developer's appointed person on the daily activities on-site during the construction period; - ensure that safe, environmentally acceptable working methods and practices are implemented and that equipment is properly operated and maintained, to facilitate proper access and enable any operation to be carried out safely; - attend on site meeting(s) prior to the commencement of activities to confirm the procedure and designated activity zones; - ensure that contractors' staff repair, at their own cost, any environmental damage as a result of a contravention of the specifications contained in EMPr, to the satisfaction of the ECO.
contractor Environmental Officer (cEO)	Role Each Contractor affected by the EMPr should appoint a cEO, who is responsible for the on-site implementation of the EMPr (or relevant sections of the EMPr). The Contractor's representative can be the site agent; site engineer; a dedicated environmental officer; or an independent consultant. The Contractor must ensure that the Contractor's Representative is suitably qualified to perform the necessary tasks and is appointed at a level such that she/he can interact effectively with other site Contractors, labourers, the Environmental Control Officer and the public. As a minimum the cEO shall meet the following criteria: Responsibilities

Responsible Person(s)	Role and Responsibilities
	- Be on site throughout the duration of the project and be dedicated to the project; - Ensure all their staff are aware of the environmental requirements, conditions and constraints with respect to all of their activities on site; - Implementing the environmental conditions, guidelines and requirements as stipulated within the EA, EMPr and Method Statements; - Attend the Environmental Site Meeting; - Undertaking corrective actions where non-compliances are registered within the stipulated timeframes; - Report back formally on the completion of corrective actions; - Assist the ECO in maintaining all the site documentation; - Prepare the site inspection reports and corrective action reports for submission to the ECO; - Assist the ECO with the preparing of the monthly report; and - Where more than one Contractor is undertaking work on site, each company appointed as a Contractor will appoint a cEO representing that company.

10 APPENDIX C – SITE LAYOUT

GROOTFONTEIN PV 1

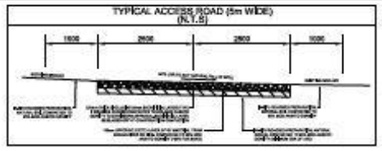


GROOTFONTEIN PV 2

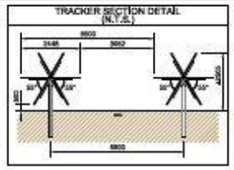
BESS (PHOTO EXAMPLE)

SUBSTATION (PHOTO EXAMPLE)

TYPICAL ACCESS ROAD (6m WIDE) (N.T.S)

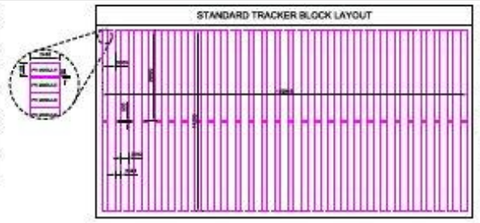


TRACKER SECTION DETAIL (N.T.S.)



PRELIMINARY SITE INFO	
DESCRIPTION	QUANTITY
AVAILABLE AREA	± 253,6656 ha
PERIMETER FENCE	± 7 684 m
INTERNAL ROAD LENGTH	± 4 131 m
TOTAL INVERTER STATIONS	29
TOTAL PV MODULES	± 304 380
TOTAL STANDARD TRACKER BLOCKS	179

STANDARD TRACKER BLOCK LAYOUT



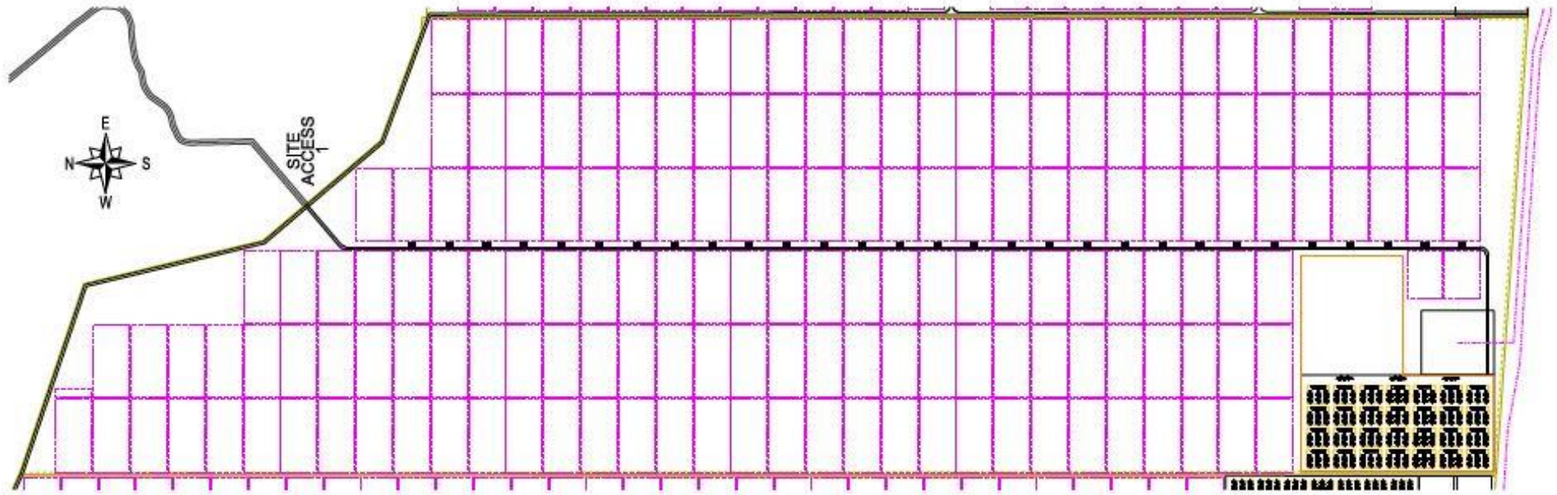
LEGEND

SYMBOL	DESCRIPTION
	BATTERY ENERGY STORAGE SYSTEM (BESS)
	SOLAR PV SUBSTATION
	OVERHEAD LINE
	FARM BOUNDARIES
	AVAILABLE SOLAR PV AREA
	5m BUFFER AVAILABLE PV AREA
	ACCESS ROADS
	OVERHEAD LINE CONNECTION
	EXISTING ROAD
	LAYDOWN AREA
	STANDARD TRACKER BLOCK

INVERTER SUBSTATION (PHOTO EXAMPLE)

OVERHEAD LINE (PHOTO EXAMPLE)

PROPOSED STANDARD TRACKER BLOCK DETAIL	
DESCRIPTION	QUANTITY
MODULES PER TRACKER ROW	30
TRACKER ROWS PER BLOCK	2 x 28 = 56
TOTAL MODULES PER BLOCK	1680
PV MODULE SIZE	575Wp
MODULE SPACING (TRACKER ROW)	100mm
TRACKER ROW PITCH (E-W)	5,5m
TRACKER ROW SPACING (N-S)	800mm
TOTAL BLOCK AREA	1,1276 ha



Rev.	Date	Description	Rev. by
B	25/11/2020	FOR INFORMATION	CFS
A	19/10/2020	FOR INFORMATION	CFS

ELEMENT Consulting Engineers
A FIFTH DIMENSION TO ENGINEERING

Block C, Oxford Gate, 64 Oxford Street, Durbanville, 7550
P O Box 1142, Durbanville, 7551
Tel: +27 21 975 1715
Fax: +27 21 975 9456
e-mail: info@ecoeng.co.za

Client/Employer: VERONIVA Renewable Energy Development

Project: KAPPA - 9 SOLAR PV PLANTS

File Description: GROOTFONTEIN 2 SITE LAYOUT

	Name	Signature
Designed	JS	
Drawn	CFS	
Checked		
Approved		
Pr.Nr.		

Scale: 1:2000 — ORIGINAL SIZE A1

Contract No.: 1903311

Drawing No.: 1903311/E/003 (sheet 1)

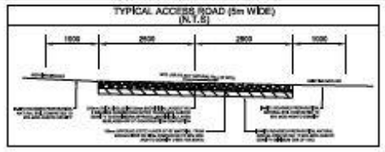
Revision: A

GROOTFONTEIN PV 3

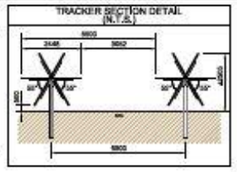
BESS (PHOTO EXAMPLE)

SUBSTATION (PHOTO EXAMPLE)

TYPICAL ACCESS ROAD (5m WIDE) (N.T.S.)

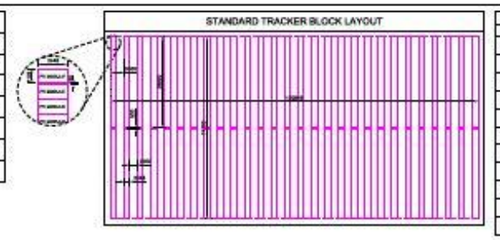


TRACKER SECTION DETAIL (N.T.S.)



PRELIMINARY SITE INFO	
DESCRIPTION	QUANTITY
AVAILABLE AREA	± 255.976 ha
PERIMETER FENCE	± 7 469 m
INTERNAL ROAD LENGTH	± 3 636 m
TOTAL INVERTER STATIONS	29
TOTAL PV MODULES	± 304 560
TOTAL STANDARD TRACKER BLOCKS	167

STANDARD TRACKER BLOCK LAYOUT



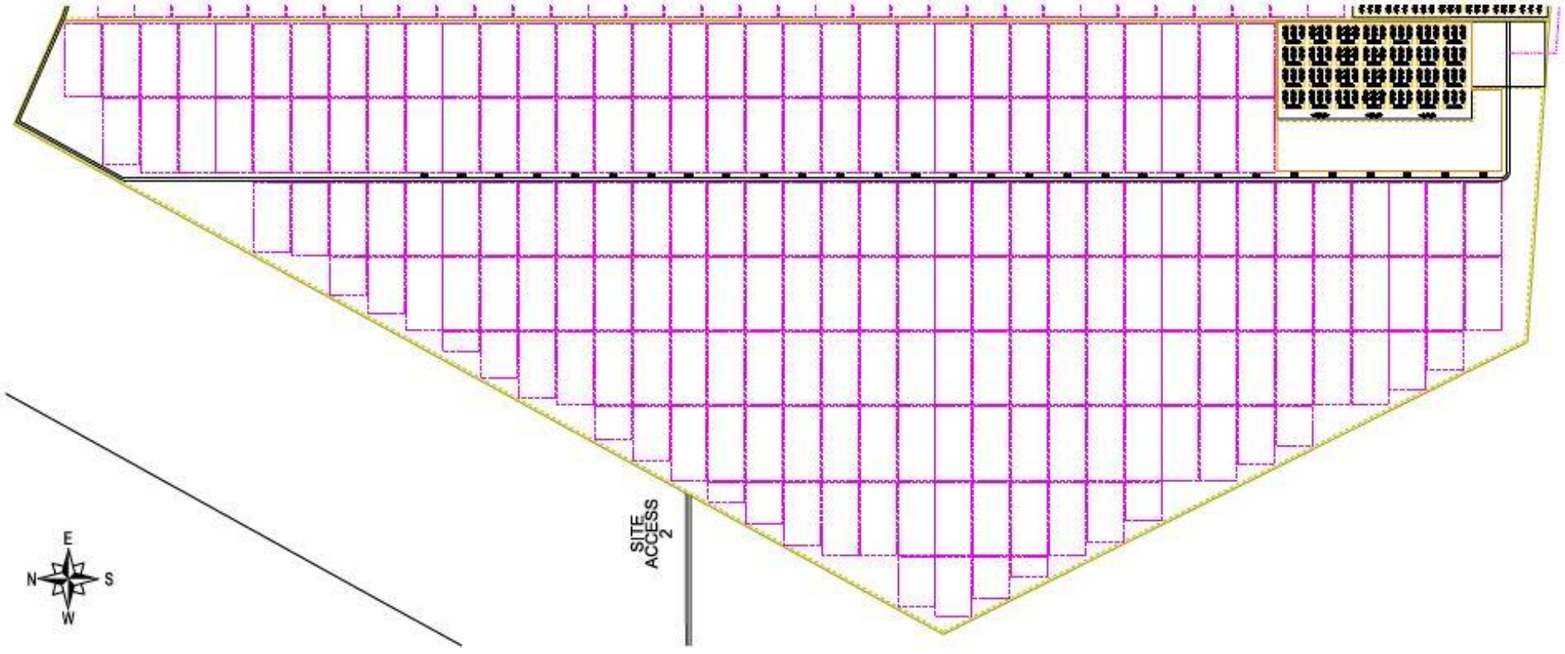
LEGEND

SYMBOL	DESCRIPTION
	BATTERY ENERGY STORAGE SYSTEM (BESS)
	SOLAR PV OVERVIEW
	OVERHEAD LINE
	FARM BOUNDARIES
	AVAILABLE SOLAR PV AREA
	5m [INSIDE AVAILABLE PV AREA]
	ROCKIES RIDGE
	ENDANGERED LINE CORRIDOR
	EXISTING ROAD
	LAYDOWN AREA
	STANDARD TRACKER BLOCK

INVERTER SUBSTATION (PHOTO EXAMPLE)

OVERHEAD LINE (PHOTO EXAMPLE)

PROPOSED STANDARD TRACKER BLOCK DETAIL	
DESCRIPTION	QUANTITY
MODULES PER TRACKER ROW	30
TRACKER ROWS PER BLOCK	2 x 28 = 56
TOTAL MODULES PER BLOCK	1680
PV MODULE SIZE	575Wp
MODULE SPACING (TRACKER ROW)	100mm
TRACKER ROW PITCH (E-W)	5,5m
TRACKER ROW SPACING (N-S)	800mm
TOTAL BLOCK AREA	1,1276 ha



ELEMENT Consulting Engineers
A FIFTH DIMENSION TO ENGINEERING

Client/Employer: VERONIVA Renewable Energy Development

Project: KAPPA - 9 SOLAR PV PLANTS

Plan Description: GROOTFONTEIN 3 SITE LAYOUT

	Name	Signature
Designed	JS	
Drawn	CFB	
Checked		
Approved		
Pr.Nat.		

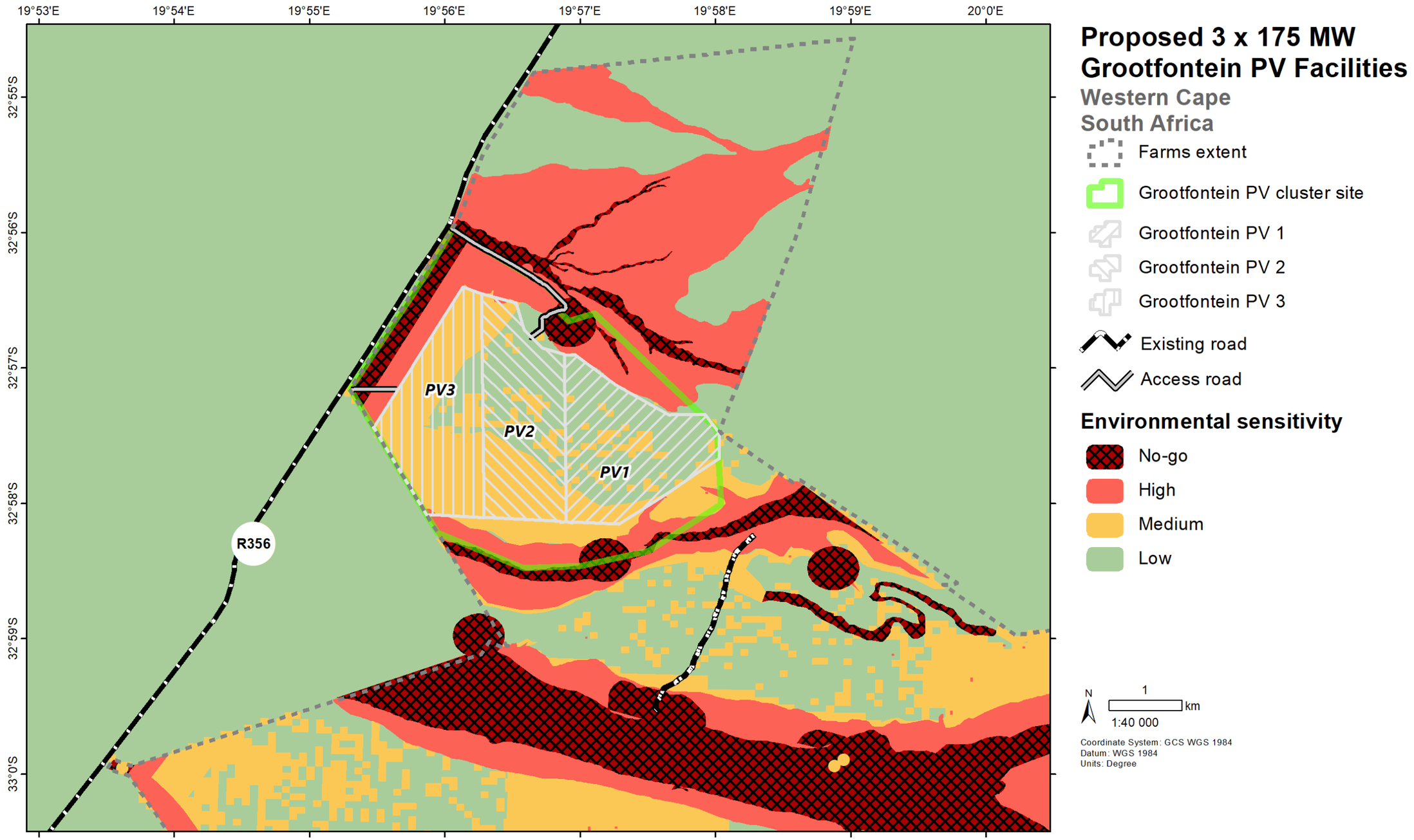
Scale: 1:5000 — ORIGINAL SIZE A1

Contract No.: 1903311

Drawing No.: 1903311/E/004 (sheet 1) — Revision: A

Rev.	Date	Description	Rev. by
B	20/11/2020	FOR INFORMATION	CFB
A	19/10/2020	FOR INFORMATION	CFB

11 APPENDIX D – COMBINED LAYOUT AND SENSITIVITY MAP


19°53'E
19°54'E
19°55'E
19°56'E
19°57'E
19°58'E
19°59'E
20°0'E
32°55'S
32°56'S
32°57'S
32°58'S
32°59'S
33°0'S
PV3
PV2
PV1
R356
Proposed 3 x 175 MW Grootfontein PV Facilities
Western Cape
South Africa
Farms extent
Grootfontein PV cluster site
Grootfontein PV 1
Grootfontein PV 2
Grootfontein PV 3
Existing road
Access road
Environmental sensitivity
No-go
High
Medium
Low
N
1
km
1:40 000
Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree

12 APPENDIX E – PRE-APPROVED GAZETTED EMPR FOR SUBSTATION DEVELOPMENT (GN 435)

PRE-APPROVED GENERIC EMPR TEMPLATE FOR SUBSTATION INFRASTRUCTURE FOR THE TRANSMISSION AND DISTRIBUTION OF ELECTRICITY GOVERNMENT GAZETTE 42323, GOVERNMENT NOTICE 435

SECTION 5: IMPACT MANAGEMENT OUTCOMES AND IMPACT MANAGEMENT ACTIONS

This section provides a pre-approved generic EMPr template with aspects that are common to the development of substation infrastructure for the transmission and distribution of electricity. There is a list of aspects identified for the development or expansion of substation infrastructure for the transmission and distribution of electricity, and for each aspect a set of prescribed impact management outcomes and associated impact management actions have been identified. Holders of EAs are responsible to ensure the implementation of these outcomes and actions for all projects as a minimum requirement, in order to mitigate the impact of such aspects identified for the development or expansion of substation infrastructure for the transmission and distribution of electricity.

The template provided below is to be completed by providing the information under each heading for each environmental impact management action.

The completed template must be signed and dated on each page by both the contractor and the holder of the EA prior to commencement of the activity. The method statements prepared and agreed to by the holder of the EA must be appended to the template as Appendix 1. Each method statement must also be duly signed and dated on each page by the contactor and the holder of the EA. This template, once signed and dated, is legally binding. The holder of the EA will remain responsible for its implementation.

5.1. Environmental awareness training

Impact management outcome: All onsite staff are aware and understands the individual responsibilities in terms of this EMPr.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All staff must receive environmental awareness training prior to commencement of the activities; – The Contractor must allow for sufficient sessions to train all personnel with no more than 20 personnel attending each course; – Refresher environmental awareness training is available as and when required; – All staff are aware of the conditions and controls linked to the EA and within the EMPr and made aware of their individual roles and responsibilities in achieving compliance with the EA and EMPr; – The Contractor must erect and maintain information posters at key locations on site, and the posters must include the following information as a minimum:						

Impact management outcome: All onsite staff are aware and understands the individual responsibilities in terms of this EMPr.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
a) Safety notifications; and b) No littering. – Environmental awareness training must include as a minimum the following: a) Description of significant environmental impacts, actual or potential, related to their work activities; b) Mitigation measures to be implemented when carrying out specific activities; c) Emergency preparedness and response procedures; d) Emergency procedures; e) Procedures to be followed when working near or within sensitive areas; f) Wastewater management procedures; g) Water usage and conservation; h) Solid waste management procedures; i) Sanitation procedures; j) Fire prevention; and k) Disease prevention. – A record of all environmental awareness training courses undertaken as part of the EMPr must be available; – Educate workers on the dangers of open and/or unattended fires; – A staff attendance register of all staff to have received environmental awareness training must be available. – Course material must be available and presented in appropriate languages that all staff can understand.						

5.2. *Site Establishment development*

Impact management outcome: Impacts on the environment are minimised during site establishment and the development footprint are kept to demarcated development area.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– A method statement must be provided by the contractor prior to any onsite activity that includes the layout of the construction camp in the form of a plan showing the location of key infrastructure and services (where applicable), including but not limited to offices, overnight vehicle parking areas, stores, the workshop, stockpile and lay down areas, hazardous materials storage areas (including fuels), the batching plant (if one is located at the construction camp), designated access routes,						

Impact management outcome: Impacts on the environment are minimised during site establishment and the development footprint are kept to demarcated development area.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
equipment cleaning areas and the placement of staff accommodation, cooking and ablution facilities, waste and wastewater management; – Location of camps must be within approved area to ensure that the site does not impact on sensitive areas identified in the environmental assessment or site walk through; – Sites must be located where possible on previously disturbed areas; – The camp must be fenced in accordance with ***Section 5.5: Fencing and gate installation***; and – The use of existing accommodation for contractor staff, where possible, is encouraged.						

5.3. Access restricted areas

Impact management outcome: Access to restricted areas prevented.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Identification of access restricted areas is to be informed by the environmental assessment, site walk through and any additional areas identified during development; – Erect, demarcate and maintain a temporary barrier with clear signage around the perimeter of any access restricted area, colour coding could be used if appropriate; and – Unauthorised access and development related activity inside access restricted areas is prohibited.						

5.4. Access roads

Impact management outcome: Minimise impact to the environment through the planned and restricted movement of vehicles on site.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– An access agreement must be formalised and signed by the DPM, Contractor and landowner before commencing with the activities;						

Impact management outcome: Minimise impact to the environment through the planned and restricted movement of vehicles on site.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All private roads used for access to the servitude must be maintained and upon completion of the works, be left in at least the original condition – All contractors must be made aware of all these access routes. – Any access route deviation from that in the written agreement must be closed and re-vegetated immediately, at the contractor's expense; – Maximum use of both existing servitudes and existing roads must be made to minimize further disturbance through the development of new roads; – In circumstances where private roads must be used, the condition of the said roads must be recorded in accordance with ***section 4.9: photographic record***; prior to use and the condition thereof agreed by the landowner, the DPM, and the contractor; – Access roads in flattish areas must follow fence lines and tree belts to avoid fragmentation of vegetated areas or croplands – Access roads must only be developed on a pre-planned and approved roads.						

5.5. Fencing and Gate installation

Impact management outcome: Minimise impact to the environment and ensure safe and controlled access to the site through the erection of fencing and gates where required.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Use existing gates provided to gain access to all parts of the area authorised for development, where possible; – Existing and new gates to be recorded and documented in accordance with **section *4.9: photographic record***; – All gates must be fitted with locks and be kept locked at all times during the development phase, unless otherwise agreed with the landowner; – At points where the line crosses a fence in which there is no suitable gate within the extent of the line servitude, on the instruction of the DPM, a gate must be installed at the approval of the landowner; – Care must be taken that the gates must be so erected that there is a gap of no more than 100 mm between the bottom of the gate and the ground; – Where gates are installed in jackal proof fencing, a suitable reinforced concrete sill must be provided beneath the gate; – Original tension must be maintained in the fence wires; – All gates installed in electrified fencing must be re-electrified; – All demarcation fencing and barriers must be maintained in good working order for the duration of the development activities;						

Impact management outcome: Minimise impact to the environment and ensure safe and controlled access to the site through the erection of fencing and gates where required.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Fencing must be erected around the camp, batching plants, hazardous storage areas, and all designated access restricted areas, where applicable; – Any temporary fencing to restrict the movement of life-stock must only be erected with the permission of the landowner. – All fencing must be developed of high quality material bearing the SABS mark; – The use of razor wire as fencing must be avoided; – Fenced areas with gate access must remain locked after hours, during weekends and on holidays if staff is away from site. Site security will be required at all times; – On completion of the development phase all temporary fences are to be removed; – The contractor must ensure that all fence uprights are appropriately removed, ensuring that no uprights are cut at ground level but rather removed completely.						

5.6. Water Supply Management

Impact management outcome: Undertake responsible water usage**.**						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All abstraction points or bore holes must be registered with the DHSWS and suitable water meters installed to ensure that the abstracted volumes are measured on a daily basis; – The Contractor must ensure the following: a. The vehicle abstracting water from a river does not enter or cross it and does not operate from within the river; b. No damage occurs to the river bed or banks and that the abstraction of water does not entail stream diversion activities; and c. All reasonable measures to limit pollution or sedimentation of the downstream watercourse are implemented. – Ensure water conservation is being practiced by: a. Minimising water use during cleaning of equipment; b. Undertaking regular audits of water systems; and c. Including a discussion on water usage and conservation during environmental awareness training. d. The use of grey water is encouraged.						

5.7. Storm- and wastewater management

Impact management outcome: Impacts to the environment caused by storm water and wastewater discharges during construction are avoided.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Runoff from the cement / concrete batching areas must be strictly controlled, and contaminated water must be collected, stored and either treated or disposed of off-site, at a location approved by the project manager; – All spillage of oil onto concrete surfaces must be controlled by the use of an approved absorbent material and the used absorbent material disposed of at an appropriate waste disposal facility; – Natural storm water runoff not contaminated during the development and clean water can be discharged directly to watercourses and water bodies, subject to the Project Manager's approval and support by the ECO; – Water that has been contaminated with suspended solids, such as soils and silt, may be released into watercourses or water bodies only once all suspended solids have been removed from the water by settling out these solids in settlement ponds. The release of settled water back into the environment must be subject to the Project Manager's approval and support by the ECO.						

5.8. Solid and hazardous waste management

Impact management outcome: Wastes are appropriately stored, handled and safely disposed of at a recognised waste facility**.**						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All measures regarding waste management must be undertaken using an integrated waste management approach; – Sufficient, covered waste collection bins (scavenger and weatherproof) must be provided; – A suitably positioned and clearly demarcated waste collection site must be identified and provided; – The waste collection site must be maintained in a clean and orderly manner; – Waste must be segregated into separate bins and clearly marked for each waste type for recycling and safe disposal; – Staff must be trained in waste segregation; – Bins must be emptied regularly; – General waste produced onsite must be disposed of at registered waste disposal sites/ recycling company; – Hazardous waste must be disposed of at a registered waste disposal site;						

Impact management outcome: Wastes are appropriately stored, handled and safely disposed of at a recognised waste facility**.**						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Certificates of safe disposal for general, hazardous and recycled waste must be maintained.						

5.9. Protection of watercourses and estuaries

Impact management outcome: Pollution and contamination of the watercourse environment and or estuary erosion are prevented.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All watercourses must be protected from direct or indirect spills of pollutants such as solid waste, sewage, cement, oils, fuels, chemicals, aggregate tailings, wash and contaminated water or organic material resulting from the Contractor's activities; – In the event of a spill, prompt action must be taken to clear the polluted or affected areas; – Where possible, no development equipment must traverse any seasonal or permanent wetland – No return flow into the estuaries must be allowed and no disturbance of the Estuarine functional Zone should occur; – Development of permanent watercourse or estuary crossing must only be undertaken where no alternative access to tower position is available; – There must not be any impact on the long term morphological dynamics of watercourses or estuaries; – Existing crossing points must be favored over the creation of new crossings (including temporary access) – When working in or near any watercourse or estuary, the following environmental controls and consideration must be taken: a) Water levels during the period of construction; b) No altering of the bed, banks, course or characteristics of a watercourse c) During the execution of the works, appropriate measures to prevent pollution and contamination of the riparian environment must be implemented e.g. including ensuring that construction equipment is well maintained; d) Where earthwork is being undertaken in close proximity to any watercourse, slopes must be stabilised using suitable materials, i.e. sandbags or geotextile fabric, to prevent sand and rock from entering the channel; and						

Impact management outcome: Pollution and contamination of the watercourse environment and or estuary erosion are prevented.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
e) Appropriate rehabilitation and re-vegetation measures for the watercourse banks must be implemented timeously. In this regard, the banks should be appropriately and incrementally stabilised as soon as development allows.						

5.10. Vegetation clearing

Impact management outcome: Vegetation clearing is restricted to the authorised development footprint of the proposed infrastructure.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
General: – Indigenous vegetation which does not interfere with the development must be left undisturbed; – Protected or endangered species may occur on or near the development site. Special care should be taken not to damage such species; – Search, rescue and replanting of all protected and endangered species likely to be damaged during project development must be identified by the relevant specialist and completed prior to any development or clearing; – Permits for removal must be obtained from the relevant CA prior to the cutting or clearing of the affected species, and they must be filed; – The Environmental Audit Report must confirm that all identified species have been rescued and replanted and that the location of replanting is compliant with conditions of approvals; – Trees felled due to construction must be documented and form part of the Environmental Audit Report; – Rivers and watercourses must be kept clear of felled trees, vegetation cuttings and debris; – Only a registered pest control operator may apply herbicides on a commercial basis and commercial application must be carried out under the supervision of a registered pest control operator, supervision of a registered pest control operator or is appropriately trained; – A daily register must be kept of all relevant details of herbicide usage; – No herbicides must be used in estuaries; – All protected species and sensitive vegetation not removed must be clearly marked and such areas fenced off in accordance to ***Section 5.3: Access restricted areas***.						

Impact management outcome: Vegetation clearing is restricted to the authorised development footprint of the proposed infrastructure.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
Alien invasive vegetation must be removed and disposed of at a licensed waste management facility.						

5.11. Protection of fauna

Impact management outcome: Disturbance to fauna is minimised.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– No interference with livestock must occur without the landowner's written consent and with the landowner or a person representing the landowner being present; – The breeding sites of raptors and other wild birds species must be taken into consideration during the planning of the development programme; – Breeding sites must be kept intact and disturbance to breeding birds must be avoided. Special care must be taken where nestlings or fledglings are present; – Special recommendations of the avian specialist must be adhered to at all times to prevent unnecessary disturbance of birds; – No poaching must be tolerated under any circumstances. All animal dens in close proximity to the works areas must be marked as Access restricted areas; – No deliberate or intentional killing of fauna is allowed; – In areas where snakes are abundant, snake deterrents to be deployed on the pylons to prevent snakes climbing up, being electrocuted and causing power outages; and – No Threatened or Protected species (ToPs) and/or protected fauna as listed according NEMBA (Act No. 10 of 2004) and relevant provincial ordinances may be removed and/or relocated without appropriate authorisations/permits.						

5.12. Protection of heritage resources

Impact management outcome: Impact to heritage resources is minimised.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Identify, demarcate and prevent impact to all known sensitive heritage features on site in accordance with the No-Go procedure in ***Section 5.3: Access restricted areas***; – Carry out general monitoring of excavations for potential fossils, artefacts and material of heritage importance; – All work must cease immediately, if any human remains and/or other archaeological, palaeontological and historical material are uncovered. Such material, if exposed, must be reported to the nearest museum, archaeologist/ palaeontologist (or the South African Police Services), so that a systematic and professional investigation can be undertaken. Sufficient time must be allowed to remove/collect such material before development recommences.						

5.13. Safety of the public

Impact management outcome: All precautions are taken to minimise the risk of injury, harm or complaints.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Identify fire hazards, demarcate and restrict public access to these areas as well as notify the local authority of any potential threats e.g. large brush stockpiles, fuels etc.; – All unattended open excavations must be adequately fenced or demarcated; – Adequate protective measures must be implemented to prevent unauthorised access to and climbing of partly constructed towers and protective scaffolding; – Ensure structures vulnerable to high winds are secured; – Maintain an incidents and complaints register in which all incidents or complaints involving the public are logged.						

5.14. Sanitation

Impact management outcome: Clean and well maintained toilet facilities are available to all staff in an effort to minimise the risk of disease and impact to the environment.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Mobile chemical toilets are installed onsite if no other ablution facilities are available; – The use of ablution facilities and or mobile toilets must be used at all times and no indiscriminate use of the veld for the purposes of ablutions must be permitted under any circumstances; – Where mobile chemical toilets are required, the following must be ensured: a) Toilets are located no closer than 100 m to any watercourse or water body; b) Toilets are secured to the ground to prevent them from toppling due to wind or any other cause; c) No spillage occurs when the toilets are cleaned or emptied and the contents are managed in accordance with the EMPr; d) Toilets have an external closing mechanism and are closed and secured from the outside when not in use to prevent toilet paper from being blown out; e) Toilets are emptied before long weekends and workers holidays, and must be locked after working hours; f) Toilets are serviced regularly and the ECO must inspect toilets to ensure compliance to health standards; – A copy of the waste disposal certificates must be maintained.						

5.15. Prevention of disease

Impact Management outcome: All necessary precautions linked to the spread of disease are taken.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Undertake environmentally-friendly pest control in the camp area; – Ensure that the workforce is sensitised to the effects of sexually transmitted diseases, especially HIV AIDS; – The Contractor must ensure that information posters on AIDS are displayed in the Contractor Camp area; – Information and education relating to sexually transmitted diseases to be made available to both construction workers and local community, where applicable; – Free condoms must be made available to all staff on site at central points; – Medical support must be made available; – Provide access to Voluntary HIV Testing and Counselling Services.						

5.16. Emergency procedures

Impact management outcome: Emergency procedures are in place to enable a rapid and effective response to all types of environmental emergencies.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Compile an Emergency Response Action Plan (ERAP) prior to the commencement of the proposed project; – The Emergency Plan must deal with accidents, potential spillages and fires in line with relevant legislation; – All staff must be made aware of emergency procedures as part of environmental awareness training; – The relevant local authority must be made aware of a fire as soon as it starts; – In the event of emergency necessary mitigation measures to contain the spill or leak must be implemented (see ***Hazardous Substances section 5.17***).						

5.17. Hazardous substances

Impact management outcome: Safe storage, handling, use and disposal of hazardous substances.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– The use and storage of hazardous substances to be minimised and non-hazardous and non-toxic alternatives substituted where possible; – All hazardous substances must be stored in suitable containers as defined in the Method Statement; – Containers must be clearly marked to indicate contents, quantities and safety requirements; – All storage areas must be bunded. The bunded area must be of sufficient capacity to contain a spill / leak from the stored containers; – Bunded areas to be suitably lined with a SABS approved liner; – An Alphabetical Hazardous Chemical Substance (HCS) control sheet must be drawn up and kept up to date on a continuous basis; – All hazardous chemicals that will be used on site must have Material Safety Data Sheets (MSDS); – All employees working with HCS must be trained in the safe use of the substance and according to the safety data sheet; – Employees handling hazardous substances / materials must be aware of the potential impacts and follow appropriate safety measures. Appropriate personal protective equipment must be made available; – The Contractor must ensure that diesel and other liquid fuel, oil and hydraulic fluid is						

Impact management outcome: Safe storage, handling, use and disposal of hazardous substances.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
stored in appropriate storage tanks or in bowsers; – The tanks/ bowsers must be situated on a smooth impermeable surface (concrete) with a permanent bund. The impermeable lining must extend to the crest of the bund and the volume inside the bund must be 130% of the total capacity of all the storage tanks/ bowsers (110% statutory requirement plus an allowance for rainfall); – The floor of the bund must be sloped, draining to an oil separator; – Provision must be made for refueling at the storage area by protecting the soil with an impermeable groundcover. Where dispensing equipment is used, a drip tray must be used to ensure small spills are contained; – All empty externally dirty drums must be stored on a drip tray or within a bunded area; – No unauthorised access into the hazardous substances storage areas must be permitted; – No smoking must be allowed within the vicinity of the hazardous storage areas; – Adequate fire-fighting equipment must be made available at all hazardous storage areas; – Where refueling away from the dedicated refueling station is required, a mobile refueling unit must be used. Appropriate ground protection such as drip trays must be used; – An appropriately sized spill kit kept onsite relevant to the scale of the activity/s involving the use of hazardous substance must be available at all times; – The responsible operator must have the required training to make use of the spill kit in emergency situations; – An appropriate number of spill kits must be available and must be located in all areas where activities are being undertaken; – In the event of a spill, contaminated soil must be collected in containers and stored in a central location and disposed of according to the National Environmental Management: Waste Act 59 of 2008. Refer to ***Section 5.7*** for procedures concerning ***storm- and wastewater management*** and **5*.8*** for ***solid and hazardous waste management.***						

5.18. Workshop, equipment maintenance and storage

Impact management outcome: Soil, surface water and groundwater contamination is minimised.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Where possible and practical all maintenance of vehicles and equipment must take place in the workshop area; – During servicing of vehicles or equipment, especially where emergency repairs are effected outside the workshop area, a suitable drip tray must be used to prevent spills onto the soil. The relevant local authority must be made aware of a fire as soon as it starts; – Leaking equipment must be repaired immediately or be removed from site to facilitate repair; – Workshop areas must be monitored for oil and fuel spills; – Appropriately sized spill kit kept onsite relevant to the scale of the activity taking place must be available; – The workshop area must have a bunded concrete slab that is sloped to facilitate runoff into a collection sump or suitable oil / water separator where maintenance work on vehicles and equipment can be performed; – Water drainage from the workshop must be contained and managed in accordance Section ***5.7: Storm- and wastewater management***.						

5.19. Batching plants

Impact management outcome: Minimise spillages and contamination of soil, surface water and groundwater**.**						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Concrete mixing must be carried out on an impermeable surface; – Batching plants areas must be fitted with a containment facility for the collection of cement laden water. – Dirty water from the batching plant must be contained to prevent soil and groundwater contamination – Bagged cement must be stored in an appropriate facility and at least 10 m away from any water courses, gullies and drains; – A washout facility must be provided for washing of concrete associated equipment. Water used for washing must be restricted; – Hardened concrete from the washout facility or concrete mixer can either be reused or disposed of at an appropriate licenced disposal facility; – Empty cement bags must be secured with adequate binding material if these will be temporarily stored on site; – Sand and aggregates containing cement must be kept damp to prevent the						

Impact management outcome: Minimise spillages and contamination of soil, surface water and groundwater**.**						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
generation of dust (Refer to ***Section 5.20: Dust emissions***) – Any excess sand, stone and cement must be removed or reused from site on completion of construction period and disposed at a registered disposal facility; – Temporary fencing must be erected around batching plants in accordance with Section ***5.5: Fencing and gate installation***.						

5.20. Dust emissions

Impact management outcome: Dust prevention measures are applied to minimise the generation of dust.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Take all reasonable measures to minimise the generation of dust as a result of project development activities to the satisfaction of the ECO; – Removal of vegetation must be avoided until such time as soil stripping is required and similarly exposed surfaces must be re- vegetated or stabilised as soon as is practically possible; – Excavation, handling and transport of erodible materials must be avoided under high wind conditions or when a visible dust plume is present; – During high wind conditions, the ECO must evaluate the situation and make recommendations as to whether dust-damping measures are adequate, or whether working will cease altogether until the wind speed drops to an acceptable level; – Where possible, soil stockpiles must be located in sheltered areas where they are not exposed to the erosive effects of the wind; – Where erosion of stockpiles becomes a problem, erosion control measures must be implemented at the discretion of the ECO; – Vehicle speeds must not exceed 40 km/h along dust roads or 20 km/h when traversing unconsolidated and non-vegetated areas; – Straw stabilisation must be applied at a rate of one bale/10 m² and harrowed into the top 100 mm of top material, for all completed earthworks; – For significant areas of excavation or exposed ground, dust suppression measures must be used to minimise the spread of dust.						

5.21. Blasting

Impact management outcome: Impact to the environment is minimised through a safe blasting practice.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Any blasting activity must be conducted by a suitably licensed blasting contractor; and – Notification of surrounding landowners, emergency services site personnel of blasting activity 24 hours prior to such activity taking place on Site.						

5.22. Noise

Impact Management outcome: Prevent unnecessary noise to the environment by ensuring that noise from development activity is mitigated.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– The Contractor must keep noise level within acceptable limits, Restrict the use of sound amplification equipment for communication and emergency only; – All vehicles and machinery must be fitted with appropriate silencing technology and must be properly maintained; – Any complaints received by the Contractor regarding noise must be recorded and communicated. Where possible or applicable, provide transport to and from the site on a daily basis for construction workers; – Develop a Code of Conduct for the construction phase in terms of behaviour of construction staff. Operating hours as determined by the environmental authorisation are adhered to during the development phase. Where not defined, it must be ensured that development activities must still meet the impact management outcome related to noise management.						

5.23. Fire prevention

Impact management outcome: Prevention of uncontrollable fires.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Designate smoking areas where the fire hazard could be regarded as insignificant; – Firefighting equipment must be available on all vehicles located on site;						

Impact management outcome: Prevention of uncontrollable fires.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– The local Fire Protection Agency (FPA) must be informed of construction activities; – Contact numbers for the FPA and emergency services must be communicated in environmental awareness training and displayed at a central location on site; – Two way swop of contact details between ECO and FPA.						

5.24. Stockpiling and stockpile areas

Impact management outcome: Reduce erosion and sedimentation as a result of stockpiling.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All material that is excavated during the project development phase (either during piling (if required) or earthworks) must be stored appropriately on site in order to minimise impacts to watercourses, watercourses and water bodies; – All stockpiled material must be maintained and kept clear of weeds and alien vegetation growth by undertaking regular weeding and control methods; – Topsoil stockpiles must not exceed 2 m in height; – During periods of strong winds and heavy rain, the stockpiles must be covered with appropriate material (e.g. cloth, tarpaulin etc.); – Where possible, sandbags (or similar) must be placed at the bases of the stockpiled material in order to prevent erosion of the material.						

5.25. Civil works

Impact management outcome: Impact to the environment minimised during civil works to create the substation terrace.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Where terracing is required, topsoil must be collected and retained for the purpose of re-use later to rehabilitate disturbed areas not covered by yard stone; – Areas to be rehabilitated include terrace embankments and areas outside the high voltage yards;						

Impact management outcome: Impact to the environment minimised during civil works to create the substation terrace.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Where required, all sloped areas must be stabilised to ensure proper rehabilitation is effected and erosion is controlled; – These areas can be stabilised using design structures or vegetation as specified in the design to prevent erosion of embankments. The contract design specifications must be adhered to and implemented strictly; – Rehabilitation of the disturbed areas must be managed in accordance with ***Section 5.35: Landscaping and rehabilitation***; – All excess spoil generated during terracing activities must be disposed of in an appropriate manner and at a recognised landfill site; and – Spoil can however be used for landscaping purposes and must be covered with a layer of 150 mm topsoil for rehabilitation purposes.						

5.26. Excavation of foundation, cable trenching and drainage systems

Impact management outcome: No environmental degradation occurs as a result of excavation of foundation, cable trenching and drainage systems.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All excess spoil generated during foundation excavation must be disposed of in an appropriate manner and at a licensed landfill site, if not used for backfilling purposes; – Spoil can however be used for landscaping purposes and must be covered with a layer of 150 mm topsoil for rehabilitation purposes; – Management of equipment for excavation purposes must be undertaken in accordance with ***Section 5.18: Workshop, equipment maintenance and storage***; and – Hazardous substances spills from equipment must be managed in accordance with ***Section 5.17: Hazardous substances***.						

5.27. Installation of foundations, cable trenching and drainage systems

Impact management outcome: No environmental degradation occurs during the installation of foundation, cable trenching and drainage system.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance

Impact management outcome: No environmental degradation occurs during the installation of foundation, cable trenching and drainage system.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Batching of cement to be undertaken in accordance with **Section *5.19: Batching plants***; and – Residual solid waste must be disposed of in accordance with **Section *5.8: Solid waste and hazardous management***.						

5.28. Installation of equipment (circuit breakers, current Transformers, Isolators, Insulators, surge arresters, voltage transformers, earth switches)

Impact management outcome: No environmental degradation occurs as a result of installation of equipment.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Management of dust must be conducted in accordance with Section ***5. 20: Dust emissions***; – Management of equipment used for installation must be conducted in accordance with Section **5*.18: Workshop, equipment maintenance and storage***; – Management hazardous substances and any associated spills must be conducted in accordance with Section ***5.17: Hazardous substances***; and – Residual solid waste must be recycled or disposed of in accordance with ***Section 5.8: Solid waste and hazardous management***.						

5.29. Steelwork Assembly and Erection

Impact management outcome: No environmental degradation occurs as a result of steelwork assembly and erection.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– During assembly, care must be taken to ensure that no wasted/unused materials are left on site e.g. bolts and nuts – Emergency repairs due to breakages of equipment must be managed in accordance with ***Section 5. 18: Workshop, equipment maintenance and storage*** and ***Section 5.16: Emergency procedures***.						

5.30. Cabling and Stringing

Impact management outcome: No environmental degradation occurs as a result of stringing.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Residual solid waste (off cuts etc.) shall be recycled or disposed of in accordance with **Section *6.8: Solid waste and hazardous Management***; – Management of equipment used for installation shall be conducted in accordance with **Section 5*.18: Workshop, equipment maintenance and storage***; – Management hazardous substances and any associated spills shall be conducted in accordance with ***Section 5.17: Hazardous substances***.						

5.31. Testing and Commissioning (all equipment testing, earthing system, system integration)

Impact management outcome: No environmental degradation occurs as a result of Testing and Commissioning.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Residual solid waste must be recycled or disposed of in accordance with ***Section 5.8: Solid waste and hazardous management***.						

5.32. Socio-economic

Impact management outcome: enhanced socio-economic development.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Develop and implement communication strategies to facilitate public participation; – Develop and implement a collaborative and constructive approach to conflict resolution as part of the external stakeholder engagement process; – Sustain continuous communication and liaison with neighboring owners and residents – Create work and training opportunities for local stakeholders; and – Where feasible, no workers, with the exception of security personnel, must be permitted to stay over-night on the site. This would reduce the risk to local farmers.						

5.33. Temporary closure of site

Impact management outcome: Minimise the risk of environmental impact during periods of site closure greater than five days.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Bunds must be emptied (where applicable) and need to be undertaken in accordance with the impact management actions included in ***sections 5.17: Hazardous substances and 5.18: Workshop, equipment maintenance and storage***; – Hazardous storage areas must be well ventilated; – Fire extinguishers must be serviced and accessible. Service records to be filed and audited at last service; – Emergency and contact details displayed must be displayed; – Security personnel must be briefed and have the facilities to contact or be contacted by relevant management and emergency personnel; – Night hazards such as reflectors, lighting, traffic signage etc. must have been checked; – Fire hazards identified and the local authority must have been notified of any potential threats e.g. large brush stockpiles, fuels etc.; – Structures vulnerable to high winds must be secured; – Wind and dust mitigation must be implemented; – Cement and materials stores must have been secured; – Toilets must have been emptied and secured; – Refuse bins must have been emptied and secured; – Drip trays must have been emptied and secured.						

5.34. Dismantling of old equipment

Impact management outcome: Impact to the environment to be minimised during the dismantling, storage and disposal of old equipment commissioning.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All old equipment removed during the project must be stored in such a way as to prevent pollution of the environment; – Oil containing equipment must be stored to prevent leaking or be stored on drip trays; – All scrap steel must be stacked neatly and any disused and broken insulators must be stored in containers; – Once material has been scrapped and the contract has been placed for removal, the disposal Contractor must ensure that any equipment containing pollution						

Impact management outcome: Impact to the environment to be minimised during the dismantling, storage and disposal of old equipment commissioning.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
causing substances is dismantled and transported in such a way as to prevent spillage and pollution of the environment; – The Contractor must also be equipped to contain and clean up any pollution causing spills; and – Disposal of unusable material must be at a licensed waste disposal site.						

5.35. Landscaping and rehabilitation

Impact management outcome: Areas disturbed during the development phase are returned to a state that approximates the original condition.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All areas disturbed by construction activities must be subject to landscaping and rehabilitation; All spoil and waste must be disposed of to a registered waste site; – All slopes must be assessed for contouring, and to contour only when the need is identified in accordance with the Conservation of Agricultural Resources Act, No 43 of 1983 – All slopes must be assessed for terracing, and to terrace only when the need is identified in accordance with the Conservation of Agricultural Resources Act, No 43 of 1983; – Berms that have been created must have a slope of 1:4 and be replanted with indigenous species and grasses that approximates the original condition; – Where new access roads have crossed cultivated farmlands, that lands must be rehabilitated by ripping which must be agreed to by the holder of the EA and the landowners; – Rehabilitation of access roads outside of farmland; – Indigenous species must be used for with species and/grasses to where it compliments or approximates the original condition; – Stockpiled topsoil must be used for rehabilitation (refer to ***Section 5.24: Stockpiling and stockpiled areas***); – Stockpiled topsoil must be evenly spread so as to facilitate seeding and minimise loss of soil due to erosion; – Before placing topsoil, all visible weeds from the placement area and from the topsoil must be removed; – Subsoil must be ripped before topsoil is placed; – The rehabilitation must be timed so that rehabilitation can take place at the optimal						

Impact management outcome: Areas disturbed during the development phase are returned to a state that approximates the original condition.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
time for vegetation establishment; – Where impacted through construction related activity, all sloped areas must be stabilised to ensure proper rehabilitation is effected and erosion is controlled; – Sloped areas stabilised using design structures or vegetation as specified in the design to prevent erosion of embankments. The contract design specifications must be adhered to and implemented strictly; – Spoil can be used for backfilling or landscaping as long as it is covered by a minimum of 150 mm of topsoil. – Where required, re-vegetation including hydro-seeding can be enhanced using a vegetation seed mixture as described below. A mixture of seed can be used provided the mixture is carefully selected to ensure the following: a) Annual and perennial plants are chosen; b) Pioneer species are included; c) Species chosen must be indigenous to the area with the seeds used coming from the area; d) Root systems must have a binding effect on the soil; e) The final product must not cause an ecological imbalance in the area						

6. ACCESS TO THE GENERIC EMPr

Once completed and signed, to allow the public access to the generic EMPr, the holder of the EA must make the EMPr available to the public in accordance with the requirements of Regulation 26(h) of the EIA Regulations.